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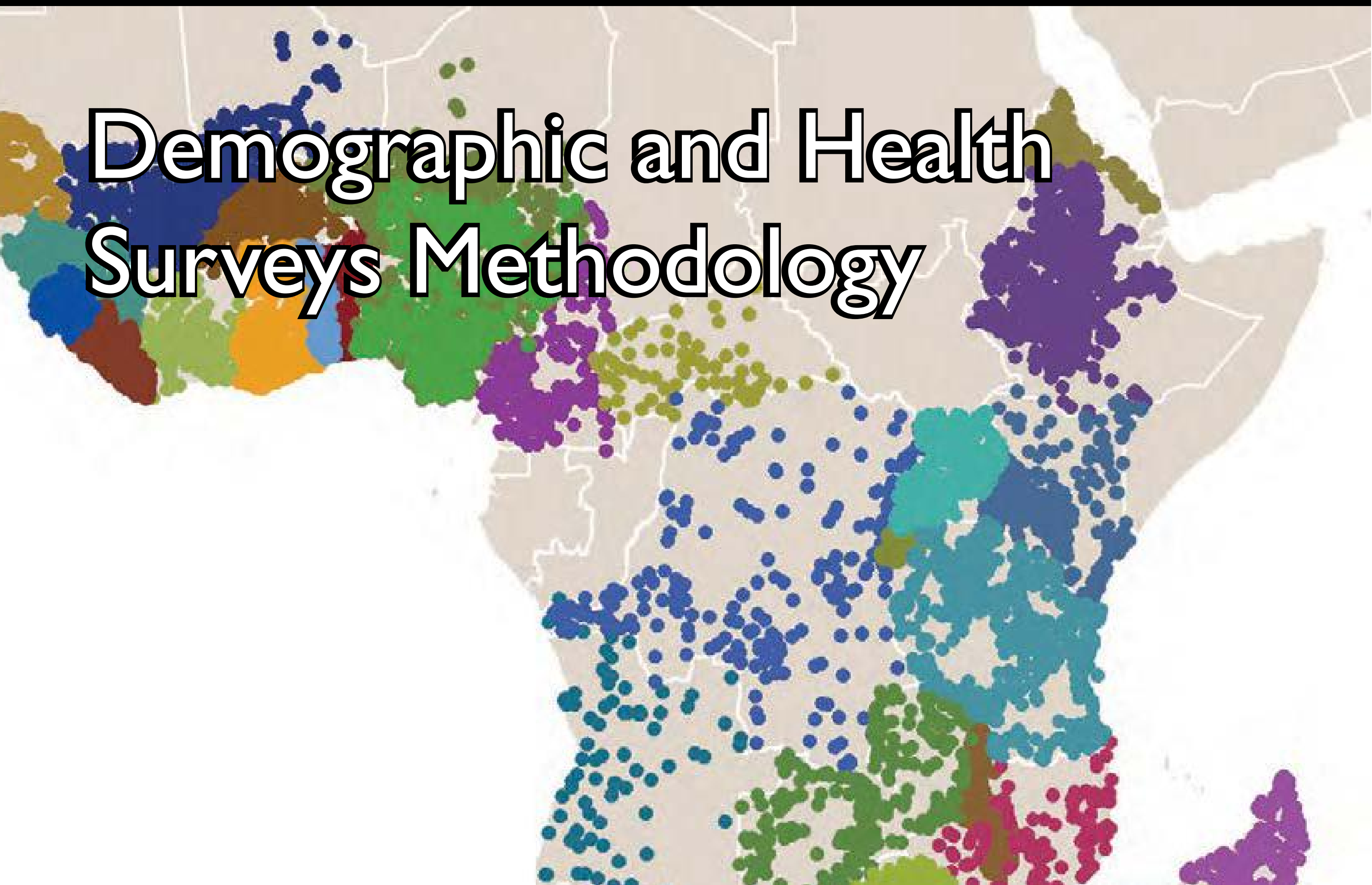

This document is part of the Demographic and Health Survey's *DHS Toolkit* of methodology for the MEASURE DHS Phase III project, implemented from 2008-2013.

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DHS TOOLKIT

Demographic and Health Survey

Sampling and Household Listing Manual

ICF International
Calverton, Maryland USA

September 2012

MEASURE DHS is a five-year project to assist institutions in collecting and analyzing data needed to plan, monitor, and evaluate population, health, and nutrition programs. MEASURE DHS is funded by the U.S. Agency for International Development (USAID). The project is implemented by ICF International in Calverton, Maryland, in partnership with the Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs, the Program for Appropriate Technology in Health (PATH), Futures Institute, Camris International, and Blue Raster.

The main objectives of the MEASURE DHS program are to: 1) provide improved information through appropriate data collection, analysis, and evaluation; 2) improve coordination and partnerships in data collection at the international and country levels; 3) increase host-country institutionalization of data collection capacity; 4) improve data collection and analysis tools and methodologies; and 5) improve the dissemination and utilization of data.

For information about the Demographic and Health Surveys (DHS) program, write to DHS, ICF International, 11785 Beltsville Drive, Suite 300, Calverton, MD 20705, U.S.A. (Telephone: 301-572-0200; fax: 301-572-0999; e-mail: info@measuredhs.com; Internet: http://www.measuredhs.com).

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1 DEMOGRAPHIC AND HEALTH SURVEYS SAMPLING POLICY

1.1 General principles

Scientific sample surveys are cost-efficient and reliable ways to collect population-level information such as social, demographic and health data. The MEASURE DHS project is a worldwide project implemented across various countries and at multiple points in time within a country. In order to achieve **comparability, consistency** and the **best quality** in survey results, sampling activities in the Demographic and Health Surveys (DHS) should be guided by a number of general principles. This manual presents general guidelines on sampling for DHS surveys, although modifications may be required for country-specific situations. The key principles of DHS sampling include:

- Use of an existing sampling frame
- Full coverage of the target population
- Probability sampling
- Using a suitable sample size
- Using the most simple design possible
- Conducting a household listing and pre-selection of households
- Providing good sample documentation
- Maintaining confidentiality of individual's information
- Implementing the sample exactly as designed

1.1.1 Existing sampling frame

A probability sample can only be drawn from an existing sampling frame which is a complete list of statistical units covering the target population. Since the construction of a new sampling frame is likely to be too expensive, DHS surveys should use an adequate pre-existing sampling frame which is officially recognized. This is possible for most of the countries where there has been a population census in recent years. Census frames are generally the best available sampling frame in terms of coverage, cartographic materials and organization. However, an evaluation of the quality and the accessibility of the frame should be considered during the development of the survey design, and a detailed study of the sampling frame is necessary before drawing the sample. In the absence of a census frame, a DHS survey can use an alternative sampling frame, such as a complete list of villages or communities in the country with all necessary identification information including a measure of population size (e.g. number of households), or a master sample which is large enough to support the DHS design.

1.1.2 Full coverage

A DHS survey should cover 100 percent of the target population in the country. The target population for the DHS survey is all women age 15-49 and children under five years of age living in residential households. Most surveys also include all men age 15-59[1]. The target population may vary from country to country or from survey to survey, but the general sampling principles are the same. In some cases, exclusion of some areas may be necessary because of extreme inaccessibility, violence or instability, but these issues need to be considered at the very beginning of the survey, before the sample is drawn.

[1] The age range varies from survey to survey and may be 15-49, 15-54, 15-59 or 15-64.

1.1.3 Probability sampling

A scientific probability sampling methodology must be used in DHS surveys. A probability sample is defined as one in which the units are selected randomly with known and nonzero probabilities. This is the only way to obtain unbiased estimation and to be able to evaluate the sampling errors. The term probability sampling excludes purposive sampling, quota sampling, and other uncontrolled non-probability methods because they cannot provide evaluation of precision and/or confidence of survey findings.

1.1.4 Suitable sample size

Sample size is a key parameter for DHS surveys because it is directly related to survey budget, data quality and survey precision. Theoretically, the larger the sample size, the better the survey precision, but this is not always true in practice. Survey budget is not the only important factor in determining the sample size. Desired precision, the number of domains, capability of the implementing organization, data quality concerns and cost effectiveness are essential constraints in determining the total sample size. Thus a suitable sample size is also a key parameter to guarantee data quality.

1.1.5 Simple design

In large-scale surveys, non-sampling errors (coverage errors, errors committed in survey implementation and data processing, etc.) are usually the most important sources of error and are expensive to control and difficult to evaluate quantitatively. It is therefore important to minimize them in survey implementation. In order to facilitate accurate implementation of the survey, the sampling design for DHS should be as simple and straightforward as possible. Macro's experience from 25 years of DHS surveys shows that a two-stage household-based sample design is relatively easy to implement and that quality can be maintained.

1.1.6 Household listing and pre-selection of households

The DHS standard procedure recommends that households be pre-selected in the central office prior to the start of fieldwork rather than by teams in the field who may have pressures to bias the selection. The interviewers are asked to interview only the pre-selected households. In order to prevent bias, no changes or replacements are allowed in the field. To perform pre-selection of households, a complete list of all residential households in each of the selected sample clusters is necessary. This list is usually obtained from a household listing operation conducted before the main survey.

In some surveys, the household listing operation may be combined with the main survey to form a single field operation, and households can be selected in the field from a complete listing. Combining the household listing and survey data collection in one field operation is less expensive; however, it provides incentive to leave households off the household list to reduce workload, thus reducing the representativeness of the survey results. Close supervision is needed during the field work to prevent this problem. Separate listing and data collection operations are thus required for this reason. Interviewers selecting households in the field without a complete listing is not acceptable for DHS surveys.

1.1.7 Good sample documentation

DHS surveys are usually year-long projects conducted by different people specialized in different aspects of survey implementation, so good sample documentation is necessary to guarantee the exact implementation of the project. The sample documentation should include a sample design document and the list of primary sampling units. The sample design document should explain in detail the methodology, the sampling procedure, the sample size, the sample allocation, the survey domains and the stratification. This should also form the basis for an appendix to the DHS final report describing the sample design. The sample list should include all identification information for all of the selected sample points, along with their probability of selection.

1.1.8 Confidentiality

Confidentiality is a major concern in DHS, especially when human bio-markers are collected such as blood samples for HIV testing. The DHS surveys are anonymous surveys which do not allow any potential identification of any single household or individual in the data file. Confidentiality is also a key factor affecting the response rate to sensitive questions regarding sexual activity and partners.

In particular, in surveys that include HIV testing DHS policy requires that PSU and household codes are scrambled in the final data to further anonymize the data and the original sample list is destroyed.

1.1.9 Exactness of survey implementation

Exactness of sample implementation is the last element in achieving good sampling precision. No matter how carefully a survey is designed and how complete the materials for conducting sampling activities are, if the implementation of the sampling activities by sampling staff (office staff responsible for selecting sample units, field workers responsible for the mapping and household listing and interviewers responsible for data collection) is not preformed exactly as designed, serious bias and misleading results may occur.

In the sections that follow, DHS policies related to sample design and implementation are described.

1.2 Survey objectives and target population

The main objective of DHS surveys is to collect up-to-date information on basic demographic and health indicators, including housing characteristics, fertility, childhood mortality, contraceptive knowledge and use, maternal and child health, nutritional status of mothers and children, knowledge, attitudes and behavior toward HIV/AIDS and other sexually transmitted infections (STI), women's status. The target population for DHS is defined as all women of reproductive age (15-49 years old) and their young children under five years of age living in ordinary residential households. However, in some countries, the coverage may be restricted to ever-married women.

The main indicator topics include:

- Total fertility and age specific fertility rates
- Age at first sex, first birth, and first marriage
- Knowledge and use of contraception
- Unmet need for family planning
- Birth spacing
- Antenatal care
- Place of delivery
- Assistance from skilled personnel during delivery
- Knowledge of HIV/AIDS and other STIs
- Higher-risk sexual behavior
- Condom use
- Childhood vaccination coverage

- Treatment of diarrhea, fever, and cough
- Infant and under-five mortality rates
- Nutritional status

Since the target population can be easily found in residential households, DHS is a household-based survey.

1.3 Survey domain

In DHS surveys, an important objective is to compare the survey results for different characteristics such as urban and rural residence, different administrative or geographic regions, or different educational levels of respondents. A *survey domain* or *study domain* is a sub-population for which separate estimation of the main indicators is required. There are two kinds of survey domains: *design domains* and *analysis domains*. A design domain consists of a sub-population which can be identified in the sampling frame and therefore can be handled independently in the sample size and sampling procedures, usually consisting of geographic areas or administrative units. For example, urban and rural differences are very frequently requested; therefore, urban and rural areas are usually separate design domains for Demographic and Health Surveys. An analysis domain is a sub-population which cannot be identified in the sampling frame, such as domains specified by individual characteristics. These may include women with secondary or higher education, pregnant women, children 12-23 months, and children having diarrhea in the two weeks preceding the survey.

In order for survey estimates to be reliable at the domain level, it is necessary to ensure that the number of cases in each survey domain is sufficient, especially when desired levels of precision are required for particular domains. For a design domain, adequate sample size is achieved by allocating the target population at the survey design stage into the requested design domains, and then calculating the sample size for the specific design domains by taking the precision required into account. On the other hand, for an analysis domain, it is difficult to guarantee a specified precision because it is difficult to control the sample size at the design stage. However, if prior estimates of the average number of target individuals per household are available, then it is possible to control the precision for an analysis domain. For example, if survey estimates are required for the nutritional status of children under age 5 is required and estimates of the number of children under age 5 per household are available, it is then possible to calculate a sample size to give a certain level of precision.

DHS reports also produce some indicators for *second level domains* such as vaccination coverage of children age 12-23 months within a region, where region is the first level domain, and children 12-23 months is the second level domain. Caution must be paid to the precision required for a second level domain because the second level domain usually includes a very small sub-population.

If domain-level estimates are required, it is better to avoid a large number of domains because otherwise a very large sample size will be needed. The number of domains and the desired level of precision for each must be taken into account in the budget calculation and assessment of the implementation capabilities of the implementing organization. The total sample size needed is the sum of sample sizes needed in all exclusive (first level) domains.

1.4 Sampling frame

A *sampling frame* is a complete list of all *sampling units* that entirely covers the target population. The existence of a sampling frame allows a probability selection of sampling units. For a multi-stage survey, a sampling frame should exist for each stage of selection. The sampling unit for the first stage of selection is called the *Primary Sampling Unit* (PSU); the sampling unit for the second stage of selection is called the *Secondary Sampling Unit* (SSU), and so on. In most cases, DHS surveys are two-stage surveys. Note that each stage of sample selection will involve sampling errors, so it is better to avoid more than two stages if additional stages of selection are not necessary.

The availability of a suitable sampling frame is a major determinant of the feasibility of conducting a DHS survey. This issue should be addressed in the earliest stages of planning for a survey. A sampling frame for a DHS survey could be an existing sampling frame, an existing master sample, or a sample of a previously executed survey of sufficiently large sample size, which allows for the selection of subsamples of desired size for the DHS survey.

1.4.1 Conventional sampling frame

The best frame is the list of *Enumeration Areas* (EAs) from a recently completed population census. An EA is usually a geographic area which groups a number of households together for convenient counting purposes for the census. A complete list of EAs which covers the survey area entirely is the most ideal frame for DHS surveys.

In most cases, a list of EAs from a recent census is available. This list should be thoroughly evaluated before it is used. The sampling frame used for DHS should be as up-to-date as possible. It should cover the whole survey area, without omission or overlap. Basic cartographic materials should exist for each area unit or at least for groups of units with clearly defined boundaries. Each area unit should have a unique identification code or a series of codes that, when combined, can serve as a unique identification code. Each unit should have at least one measure of size estimate (population and/or number of households). If other characteristics of the area units (e.g., socioeconomic level) exist, they should be evaluated and retained as they may be used for stratification.

A pre-existing master sample (which is a random sample from the census frame) can be accepted only where there is confidence in the master sample design, including detailed sampling design parameters such as sampling method, stratification, and inclusion probability for the selected primary sampling units. The task for the DHS survey is then to design a sub-sampling procedure, which produces a sample in line with DHS requirements. This will not always be possible. However, the larger the master sample is in relation to the desired DHS sub-sample, the more flexibility there will be for developing a sub-sampling design. A key question with a pre-existing sample is whether the listing of dwellings/households is still current or whether it needs to be updated. If updating is required, use of a pre-existing sample may not be economical. The potential advantages of using a pre-existing sample are: 1) economy, and 2) increased analytic power through comparative analysis of two or more surveys. The disadvantages are: 1) the problem of adapting the sample to DHS requirements, and 2) the problem of repeated interviews with the same household or person in different surveys, resulting in respondent fatigue or contamination. One way to avoid this last problem is to keep just the primary sampling units from the pre-existing sample and reselect the households for the DHS survey.

1.4.2 Alternative sampling frames

When neither a census frame nor a master sample is available then alternative frames should be considered. Examples of such frames are:

- A list of electoral zones with estimated number of qualified voters for each zone
- A gridded high resolution satellite map with estimated number of structures for each grid
- A list of administrative units such as villages with estimated population for each unit

A main concern when using alternative frames are coverage problems, that is, does the frame completely cover the target population? Usually checking the quality of an alternative frame is more difficult because of a lack of information either from the frame itself or from administrative sources.

Another problem is the size of the primary sampling unit. Since the alternative frame is not specifically created for a population census or household based survey, the size of the PSUs of such frames may be too large or too small for a DHS survey. A third problem is identifying the boundaries of the sampling units due to the lack of cartographic materials.

In the first two examples of alternative sampling frames, the standard DHS two-stage sampling procedure can be applied by treating the electoral zones or the grids of satellite map as the PSUs. In the third case, when a list of administrative units larger than villages (e.g. sub-districts, wards or communes) is available, for example, a complete list of all communes in a country may be easier to get than a complete list of villages, then it is necessary to use a selection procedure that includes more than two stages. In the first stage, select a number of communes; in each of the selected communes, construct a complete list of all villages residing in the commune; select one village per commune as a DHS cluster, then proceed with the subsequent household listing and selection as in a standard DHS. This procedure works best when the number of communes is large and the commune size is small. A list of administrative units that are small in number but large in size is not suitable for a DHS sampling frame because this situation will result in large sampling errors, as explained later in Section 1.9.

1.4.3 Evaluation of the sampling frame

No matter what kind of sampling frame will be used, it is always necessary to check the quality of the frame before selecting the sample. Following are several things that need to be checked when using a conventional sampling frame:

- Coverage
- Distribution
- Identification and coding
- Measure of size
- Consistency

There are several easy but useful ways to check the quality of a sampling frame. For example, for a census frame, check the total population of the sampling frame and the population distribution among urban and rural areas and among different regions/administrative units obtained from the frame with that from the census report. Any important differences may indicate that there may be coverage problems. If the frame provides information on population and households for each EA, then the average number of household members can be calculated, and a check for extreme values can help to find incorrect measures of size of the PSUs. If information on population by sex is available for each EA, then a sex ratio can be calculated for each EA, and a check for extreme values can help to identify non-residential EAs. If the EAs are associated with an identification (ID) code, then check the ID codes to identify miscoded or misplaced EAs. A sampling frame with full coverage and of good quality is the first element for a DHS survey; therefore, efforts should be made to guarantee a good start for the project.

For a nationally representative survey, geographic coverage of the survey should include the entire national territory unless there are strong reasons for excluding certain areas. If areas must be excluded, they should constitute a coherent domain. A survey from which a number of scattered zones have been excluded is difficult to interpret and to use.

1.5 Stratification

Stratification is the process by which the survey population is divided into subgroups or strata that are as homogeneous as possible using certain criteria. *Explicit stratification* is the actual sorting and separating of the units into specified strata. Within each stratum, the sample is designed and selected independently. It is also possible to systematically sample units from an ordered list (with a fixed sampling interval between selected units) to achieve the effect of stratification. For example, in DHS survey, it is not unusual for the PSUs within the explicit strata to be sorted geographically. This is called *implicit stratification*.

The principal objective of stratification is to reduce sampling errors. In a stratified sample, the sampling errors depend on the population variance existing within the strata but not between the strata. For this reason, it pays to create strata with low internal variability (or high homogeneity). Another major reason for stratification is that, where marked differences exist between subgroups of the population (e.g., urban vs. rural areas), stratification allows for a flexible sample design that can be different for each subgroup.

Stratification should be introduced only at the first stage of sampling. At the dwelling/household selection stage, systematic sampling is used for convenience; however, no attempt should be made to reorder the dwelling/household list before selection in the hope of increasing the implicit stratification effect. Such efforts generally have a negligible effect.

Stratification can be single-level or multi-level. In single-level stratification, the population is divided into strata according to certain criteria. In multi-level stratification, the population is divided into first-level strata according to certain criteria, and then the first-level strata are subdivided into second-level strata, and so on. A typical two-level stratification involves first stratifying the population by region at the first level and then by urban-rural within each region. A DHS survey usually employs multi-level stratification.

Strata should not be confused with survey domains. A survey domain is a population subgroup for which separate survey estimates are desired (e.g., urban areas/rural areas). A stratum is a subgroup of homogeneous units (e.g., subdivisions of an administrative region) in which the sample may be designed differently and is selected separately. Survey domains and strata can be the same but they need not be. For example, survey domains could be the first-level stratum in a multi-level stratification. On the other hand, a survey domain could consist of one or several lower-level strata.

DHS surveys typically use explicit stratification by separating urban and rural residence within each region. Where data are available, explicit stratification could also be done on the basis of socio-economic zones or more directly relevant characteristics such as the level of female literacy or the presence of health facilities in the areas. These kinds of information could be obtained from administrative sources. Within each explicit stratum, the units can then be ordered according to location, thus providing further implicit geographic stratification.

1.6 Sample size

1.6.1 Sample size and sampling errors

The estimates from a sample survey are affected by two types of errors: *sampling errors* and *non-sampling errors*. Sampling errors are the representative errors due to sampling of a small number of eligible units from the target population instead of including every eligible unit in the survey. Sampling errors are related to the sample size and the variability among the sampling units. Sampling errors can be statistically evaluated after the survey. Non-sampling errors result from problems during data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Non-sampling errors are related to the capacity of the implementing organization, and experience shows that (1) non-sampling errors are always the **most important source of error** in a survey, and (2) it is difficult to evaluate the magnitude of non-sampling errors once a survey is complete. Theoretically, with the same survey methodology and under the same survey conditions, the larger the sample size, the better the survey precision. However, this relationship does not always hold true in practice, because non-sampling errors tend to increase with survey scale and sample size. The challenge in deciding on the sample size for a survey is to balance the demands of analysis and precision with the capacity of the implementing organization and the constraints of funding.

A common measure of precision for estimating an indicator is its *relative standard error* (RSE) which is defined as its *standard error* (SE) divided by the estimated value of the indicator. The standard error of an estimator is the representative error due to sampling. The relative standard error describes the amount of sampling error relative to the indicator level and is independent of the scale of the indicator to be estimated; therefore, a unique RSE can be applied to a reference indicator for all domains. If a unique RSE is desired for all domains, the domain sample size depends on the variability and the size of the domain. The total sample size is the sum of the sample sizes over all domains for which desired precision are required. The following are some concepts related to sample size calculation.

1. The standard error of an estimator when estimating a proportion with a *simple random sampling without replacement*[2] is given by:

$$SE = SQRT\left(\frac{1\text{ - f}}{n} \times \frac{N}{N-1} \times P(1-P)\right)$$

where n is the sample size (number of completed interviews),
P is the proportion,
N is the target population size, and
f=n/N is the sampling fraction.

When N is large and n is relatively small, the above quantity can be approximated by:

$$SE \cong SQRT\left(\frac{P(1-P)}{n}\right)$$

Therefore the RSE of the estimator is given by:

$$RSE(P) \cong SQRT\left(\frac{P(1-P)}{n}\right) / P = SQRT\left(\frac{1/P-1}{n}\right)$$

2. For a required precision with a relative standard error α, the net sample size (number of completed interviews) needed for a simple random sampling is given by:

$$n = \frac{(1/P-1)}{\alpha^2}$$

3. Since a simple random sampling is not feasible for a DHS, the sample size for a complex survey with clustering such as the DHS can be calculated by inflating the above calculated sample size by using a design effect (*Deft)*. *Deft* is a measure of efficiency of cluster sampling compared to a direct simple random sampling of individuals, defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used. A *Deft* value of 1.0 indicates that the sample design is

[2] A simple random sample would be a random selection of individuals or households directly from the target population. This is not feasible for DHS surveys because a list of all eligible individuals or households is not available.

as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design. The net sample size needed for a cluster sampling with same relative standard error is given by:

$$n = \text{Deft}^2 \times \frac{(1/P - 1)}{\alpha^2}$$

4. The formula for calculating the final sample size in terms of the number of households while taking non-response into account (the formula used in the templates for sample size calculation as shown in Table 1.1) is given by:

$$n = \text{Deft}^2 \times \frac{(1/P - 1)}{\alpha^2} \bigg/ (R_i \times R_h \times d)$$

where	n	is the sample size in households;
	Deft	is the design effect (a default value of 1.5 is used for Deft if not specified);
	P	is the estimated proportion;
	α	is the desired relative standard error;
	R_i	is the individual response rate;
	R_h	is the *household gross response rate*; and
	d	is the number of eligible individuals per household.

The *household gross response rate* is the number of households interviewed over the number selected. DHS reports typically report the net household response rate which is the number of households interviewed over the number valid households found in the field (i.e. excluding vacant and destroyed dwellings.)

5. If the target population is small (such as in a sub-national survey), a finite population correction of the above calculated sample size should be applied. The final sample size *n* is calculated by

$$n = \frac{n_0}{1 + n_0 / N}$$

where n_0 is the initial sample size calculated in point number 4, and *N* is the target population size.

6. The relationship between the RSE and the sample size shows that, if one reduces a desired RSE to half, then the sample size needed will increase 4 times. For example, the sample size for a RSE of 5% is 4 times larger than the sample size for a RSE of 10% (see Tables 1.1 and 1.2 in the next section). This means that it is very expensive to reduce the RSE by increasing the sample size. Therefore, when designing the sample size, the efficiency of the design must be considered, that is, the balance between the gain in precision and the increase in sample size (or survey cost).

7. The width of the confidence interval is determined by the RSE. With a confidence level of 95%, 2*P*RSE is the half-length of the confidence interval for P. For example, for RSE=0.10 and P=0.20, the half-length of the confidence interval is 0.04, which means the confidence interval for P is (0.16, 0.24). (DHS reports +/-2*SE instead of +/-1.96*SE as 95% confidence interval for conservative purposes).

1.6.2 Sample size determination

The total sample size for a DHS survey with a number of survey domains (design domain) is the sum of the sample sizes over all domains. An appropriate sample size for a survey domain is the minimum number of persons (e.g., women age 15-49, currently married women 15-49, children under age five) that achieves the desired survey precision for core indicators at the domain level. If funding is tight and fixed, the sample size is the maximum number of persons that the funding can cover. Precision at the national level is usually not a problem. In almost all cases, sample size is decided to guarantee precision at domain level with appropriate allocation of the sample. So apart from survey costs, the total sample size depends on the desired precision at domain level and the number of domains. If a reasonable precision is required at domain level, experience from the MEASURE DHS program shows that a minimum number of 800 completed interviews with women is necessary for some of the woman-based indicators for high fertility countries (e.g. total fertility rate, contraceptive prevalence rate, childhood mortality rates); for low fertility countries, the minimum domain sample size can reach 1,000 completed interviews or more. Table 1.1 below illustrates the calculation of sample size for a domain according to different levels of desired RSE for estimating the indicator "the proportion of currently married women who are current users of a modern contraceptive method".

Table 1.1 Sample size determination for estimating current use of a modern contraceptive method among currently married women

Estimated proportion p		0.20	Total target population		
Estimated design effect (Deft)		1.40	# of target individuals/HH		1.05
Individual response rate		0.96	HH gross response rate		0.92
Desired RSE	**Net Sample size individual**	**Sample size Household**	**Expected SE**	**95% confidence limits**	
				Lower	**Upper**
0.20	196	212	0.040	0.120	0.280
0.19	217	234	0.038	0.124	0.276
0.18	242	261	0.036	0.128	0.272
0.17	271	293	0.034	0.132	0.268
0.16	306	330	0.032	0.136	0.264
0.15	348	376	0.030	0.140	0.260
0.14	400	432	0.028	0.144	0.256
0.13	464	501	0.026	0.148	0.252
0.12	544	587	0.024	0.152	0.248
0.11	648	699	0.022	0.156	0.244
0.10	784	846	0.020	0.160	0.240
0.05	3136	3382	0.010	0.180	0.220

Note: The confidence limits are calculated as P±2*SE.

Assuming the domain size is large enough such that the finite population correction is negligible, Table 1.1 gives the required gross sample size in terms of number of households with estimated parameters from a DHS survey. The target population is currently married women age 15-49; the estimated parameters are:

- the proportion of currently married women who are current users of any modern contraceptive method,
- the design effect (Deft),
- the number of target individuals (number of currently married women 15-49) per household,
- the individual and the household response rates.

For example, with an estimated prevalence of 20%, if we require a RSE of 10%, we should select 846 households in this particular domain. With a gross household response rate (the number of households completed over the total number selected) of 92% and an individual response rate of 96%, we expect to obtain 784 completed interviews of currently married women age 15-49.

The estimated quantities at the top of the table used as input to the calculation can usually be obtained from previous surveys or from administrative records. The total sample size for a survey with several domains is the sum of the sample sizes obtained in the above table for each domain. If the same precision required and the same indicator level apply to all domains, then the total sample size is the sample size calculated for one domain multiplied by the number of domains. With this example, the total sample size for a survey having six domains with approximately the same level of modern contraceptive use among currently married women and the same precision request for each domain would be 5076 households. The "Sample size determination" template located in the Appendix can be used to determine required sample sizes.

Table 1.2 Sample size determination for estimating the prevalence of full vaccination coverage among children aged 12-23 months

Estimated proportion p		0.29	Total target population		
Estimated design effect (Deft)		1.22	# of target individuals/HH		0.11
Individual response rate		0.96	HH gross response rate		0.92
Desired RSE	**Net Sample size individual**	**Sample size household**	**Expected SE**	**95% confidence limits Lower**	**Upper**
0.20	91	937	0.058	0.174	0.406
0.19	101	1040	0.055	0.180	0.400
0.18	112	1153	0.052	0.185	0.395
0.17	126	1297	0.049	0.191	0.389
0.16	142	1462	0.046	0.197	0.383
0.15	162	1668	0.043	0.203	0.377
0.14	186	1915	0.041	0.209	0.371
0.13	216	2224	0.038	0.215	0.365
0.12	253	2605	0.035	0.220	0.360
0.11	301	3099	0.032	0.226	0.354
0.10	364	3747	0.029	0.232	0.348
0.05	1458	15008	0.014	0.261	0.319

Note: The default value of Deft is set to be 1.5. Specify if different.

The confidence limits are calculated as P±2*SE.

If response rate is not provided, the sample size calculated is net sample size.

Table 1.2 shows a similar example for the indicator "proportion of children aged 12-23 months who are fully immunized". In this case, the target population is children aged 12-23 months. The estimated number of target individuals per household is much smaller than the number of currently married women per household given in Table 1.1. So for the same sample size calculated in Table 1.1, we can only get a RSE of above 20% at domain level. With a RSE of 10%, we need to select 3746 households in this particular domain which seems unrealistic if we have several domains for the survey.

This example shows that for a multi-indicator survey, the sample size required can be very different from indicator to indicator. So the choice of the reference indicator upon which the sample size is calculated is an important issue. The reference indicator which is used for sample size determination should have demographic importance, moderate value and moderate population coverage, i.e. apply to a sizable proportion of the population. With the same sample size calculated in Table 1.1 for a survey having six domains, the RSE for the whole sample for estimating full immunization among children 12-23 months is between 8% and 9%.

The domain sample sizes often need to be balanced between domains due to budget constraints. In practice it is often the case that the total sample size is fixed according to funding available and implementation capacity, and then the sample is allocated to each domain and to each stratum within the domain. In the case of very tight budget constraints, we may equally allocate the total sample to the domains. In some cases, we may want to oversample a specific domain to conduct some in-depth analysis for a certain rare phenomenon. The method (and the tables) presented in the following section may be used to allocate the sample at the domain level because the domains are usually first-level strata. Regardless of the method used for allocation, the calculation of domain sample size can give us an idea about the precision we may achieve in each domain with a given sample size.

1.7 Sample allocation

In cases where the total sample size or domain sample size has been fixed, we need to appropriately allocate the sample to different domains (or different strata within a domain). This allocation is aimed at strengthening the sampling efficiency at the national level or domain level and reducing sampling errors. Assuming a constant cost across domains/strata, the optimum allocation of the sample depends on the size of the domain/stratum N_h and the variability of the indicator to be estimated S_{xh}

$$n_h \propto N_h S_{xh}$$

For a given total sample size n the optimum allocation for variable x is given by:

$$n_h = n\frac{N_h S_{xh}}{\sum_{h=1}^{H} N_h S_{xh}}$$

The optimum allocation is only optimal for the indicator on which the allocation is based; that allocation may not be appropriate for other indicators. For a multipurpose survey, if the domains/strata are not too different in size, a safe allocation that is good for all indicators is a proportional allocation, with sample size proportional to the domain/stratum size.

$$n_h = n\frac{N_h}{\sum_{h=1}^{H} N_h} = n\frac{N_h}{N}$$

This allocation introduces a constant sampling fraction across domain/strata with:

$$f_h = \frac{n_h}{N_h} = \frac{n}{N}$$

Because DHS surveys are multipurpose surveys, a proportional allocation of sample is recommended if the domains/strata are not too different in size. However, if the domains/strata sizes are very different, the smaller domains/strata may receive a very small sample size.

If a desired precision is required at domain/stratum level, by assuming equal relative variations across strata, a power allocation (Bankier, 1988) with an appropriate power value α $(0 \leq \alpha \leq 1)$ may be used to guarantee sufficient sample size in small domains/strata.

$$n_h = n \frac{M_h^\alpha}{\sum_{h=1}^{H} M_h^\alpha}$$

A power allocation is an allocation proportional to the power of a size measure *M*. A power value of 1 gives proportional allocation; a power value of 0 gives equal size allocation; a power value between 0 and 1 gives an allocation between proportional allocation and equal size allocation. Proportional allocation is good for national level indicators, but may not meet the precision request at domain level; while an equal size allocation is good for comparison across domains, but may affect the precision at national level. A power allocation with power values between 0 and 1 is a tradeoff between the national level precision and the domain level precision. Since the sample size is usually large at the national level, the national level precision is not a concern.

In Table 1.3 below, we give an example of a proportional sample allocation of 15,000 individuals to 11 domains and to their urban-rural areas. The minimum domain sample size is 384 for domain 2, which is too small for estimating the total fertility rate (TFR) and childhood mortality rates. The largest sample size is for domain 11 which may be unnecessarily large. The actual total sample size given in the total row may be slightly different from the desired sample size because of rounding.

Table 1.3 Sample allocation: Proportional allocation

Serial Num	Total sample size =>	15000	Power value domain=>			Power value urban=>		
	Domain/Stratum Name/ID	Domain/ stratum size	Proportion urban	Sample Allocation			Specific Allocation	
				Urban	Rural	Domain	Urban	Rural
1	Domain 1	0.072	0.352	382	701	1083		
2	Domain 2	0.026	0.317	122	262	384		
3	Domain 3	0.070	0.568	597	454	1051		
4	Domain 4	0.142	0.275	586	1544	2130		
5	Domain 5	0.060	0.323	292	611	903		
6	Domain 6	0.046	0.135	92	593	685		
7	Domain 7	0.048	0.194	141	586	727		
8	Domain 8	0.094	0.251	354	1055	1409		
9	Domain 9	0.164	0.288	709	1749	2458		
10	Domain 10	0.091	0.191	262	1104	1366		
11	Domain 11	0.187	1.000	2803	0	2803		
Total		**1.000**	**0.423**	**6339**	**8660**	**14999**		

If we impose a condition such that the sample size should not be smaller than 1000 in each domain, after trying various power values, we find that a power value of 0.25 is appropriate, as shown in Table 1.4. In this case, we would have a minimum sample size of 1,022 for domain 2. Since domain 11 has only urban areas, the power allocation among the domains brought down the urban percentage in the sample. In order for urban areas to be properly represented, over sampling is applied in the urban areas of the other domains. With a power value of 0.65, the urban proportion in the sample is close to the proportion of the target population.

Table 1.4 Sample allocation: Power allocation

Serial Num	Total sample size =>	15000	Power value domain=>	0.25		Power value urban=>	0.65	
	Domain/Stratum Name/ID	Domain/ stratum size	Proportion urban	Sample Allocation			Specific Allocation	
				Urban	Rural	Domain	Urban	Rural
1	Domain 1	0.072	0.352	533	791	1324		
2	Domain 2	0.026	0.317	386	636	1022		
3	Domain 3	0.070	0.568	716	599	1315		
4	Domain 4	0.142	0.275	546	1023	1569		
5	Domain 5	0.060	0.323	484	782	1266		
6	Domain 6	0.046	0.135	271	910	1181		
7	Domain 7	0.048	0.194	341	858	1199		
8	Domain 8	0.094	0.251	466	949	1415		
9	Domain 9	0.164	0.288	581	1045	1626		
10	Domain 10	0.091	0.191	395	1009	1404		
11	Domain 11	0.187	1.000	1680	0	1680		
Total		**1.000**	**0.423**	**6399**	**8602**	**15001**		

In Table 1.4, the small domains are oversampled compared with a proportional allocation. Oversampling some small domains is frequently practiced if domain level precision is required.

However, oversampling a small domain too much will harm the precision at national level. To prevent this, it is recommended to regroup the small domains to form domains of moderate size, especially when there is a very unequal population distribution among geographic domains, however, this is sometimes not possible due to political considerations.

The above discussion also applies to sample size allocation to strata within a domain where the domain sample size is fixed. A proportional allocation with sample size proportional to stratum size is good for all indicators and provides the best precision for the domain as a whole.

1.8 Two-stage cluster sampling procedure

The MEASURE DHS program utilizes a convenient and practical sample selection procedure for household based surveys developed on the basis of experience from past surveys—a *two-stage cluster sampling* procedure. A *cluster* is a group of adjacent households which serves as the PSU for field work efficiency. Interviewing a certain number of households in the same cluster can reduce greatly the amount of travel and time needed during data collection. In most cases, a cluster is an EA with a measure of size equal to the number of households or the population in the EA, provided by the population census.

At the first stage, a stratified sample of EAs is selected with *probability proportional to size* (PPS): in each stratum, a sample of a predetermined number of EAs is selected independently with probability proportional to the EA's measure of size. In the selected EAs, a listing procedure is performed such that all dwellings/households are listed. This procedure is important for correcting errors existing in the sampling frame, and it provides a sampling frame for household selection.

At the second stage, after a complete household listing is conducted in each of the selected EAs, a fixed (or variable) number of households is selected by equal probability *systematic sampling* in the selected EAs. In each selected household, a household questionnaire is completed to identify women age 15-49, men age 15-59 (15-54 or 15-49 in some surveys) and children under age five. Every eligible woman will be interviewed with an individual questionnaire, and every eligible man will be interviewed with an individual men's questionnaire in those households selected for the men's interview.

The advantages of this two-stage cluster sampling procedure can be summarized as follows:

1) It guarantees a representative sample of the target population when a list of all target individuals is not available which prohibits a direct sampling of target individuals;

2) A household listing procedure after the selection of the first stage and before the main survey provides a sampling frame for household selection in the central office;

3) The use of residential households as the second-stage sampling unit guarantees the best coverage of the target population; and

4) It reduces unnecessary sampling errors by avoiding more than two stages of selection (which usually uses a large PSU in the first stage of selection).

See more details in Sections 1.10 and 1.11 on household listing and selection, Chapter 2 on household listing, and Sections 3.2 and 3.3 of Chapter 3 on systematic sampling and sampling with probability proportional to size (PPS).

1.9 Sample "take" per cluster

Once the total sample size is determined and allocated to different survey domains/strata, it should be decided how many individuals (sample take) should be interviewed per sample cluster and then convert the domain/stratum sample size to number of clusters. Since the survey cost can be very different across the survey domains/strata, the sample take can have a big influence on the total survey budget. With a fixed sample size, a small sample take is good for survey precision because of the reduction of the design effect, but is expensive because more clusters are needed. The number of clusters affects the survey budget more than the overall sample size due to the travel between clusters during data collection, which represents an important part of field costs in rural areas. The MEASURE DHS program proposes a sample "take" of about 25-30 women per rural cluster. In urban areas, the cost advantage of a large "take" is generally smaller, and MEASURE DHS recommends a "take" of about 20-25 women per urban cluster. Since in most DHS surveys, the number of eligible women age 15-49 is very close to one per household, the sample take of individuals is equivalent to the sample take of households; therefore, in the following sections we refer to the sample take (or cluster take) as the number of sample households per cluster.

1.9.1 Optimum sample take

The optimum number of households to be selected per cluster depends on the variable under consideration, the intracluster correlation ρ, and the survey cost ratio c_1/c_2, where c_1 represents the cost per cluster including mainly the cost associated with travelling between the clusters for survey implementation (household listing and interview); while c_2 represents the cost per individual interview (the interviewing cost) and other costs of doing fieldwork within a cluster. A larger sample take per cluster and fewer clusters reduces survey field costs if the cost ratio is high, but it could also reduce the survey precision if the intracluster correlation is strong.

The MEASURE DHS Program has accumulated information on sampling errors for selected variables for many surveys throughout the world. Using this information, Aliaga and Ren (2006) conducted a research study to determine the optimum sample take per cluster. The results of the study have informed current practice in DHS surveys. If the average cluster size is around 250 households, a sample take of 20-30 households per cluster is within the acceptable range in most surveys. The research also supports the practice of setting a larger sample take in rural clusters than in urban clusters. Usually, the cost ratio in urban areas is smaller than that in rural areas. This would lead to a smaller sample take in an urban cluster than in a rural cluster. In sum, this research indicates that for the most important survey indicators, a sample take between 20 to 25 households is appropriate in urban clusters and a sample take between 25 to 30 households is appropriate in rural clusters.

Based on values of c_1/c_2 and ρ obtained from eight surveys, Table 1.5 below shows optimal sample takes for the indicator "proportion of currently married women 15-49 currently using any contraceptive method." This indicator has a moderate intracluster correlation relative to other important survey indicators.

Table 1.5 Optimal sample take for currently married women 15-49 currently using any contraceptive method based on intracluster correlation ρ and survey cost ratio c_1 / c_2 from past surveys

Country	Survey cost ratio c_1 / c_2	Intracluster correlation ρ	Optimal sample take
Country 1	10	0.025	20
Country 2	10	0.037	16
Country 3	12	0.067	13
Country 4	12	0.052	15
Country 5	15	0.084	13
Country 6	27	0.031	29
Country 7	48	0.058	28
Country 8	52	0.023	47
Average	**23**	**0.047**	**23**

1.9.2 Variable sample take for self-weighting

A fixed sample take per cluster is easy for survey management and implementation, but it requires sampling weights that vary within a stratum. Different sampling weights result in larger sampling errors compared with a similar sample of constant weight within a sampling stratum, i.e., a *self-weighting sample*. A self-weighting sample consists of a sample of individuals in which each individual has the same probability of being selected, and therefore a constant sampling weight is used. In some cases a self-weighting sample is preferred for various reasons:

- it is equally representative for every individual of the target population;
- it reduces sampling errors.

Since the sample for DHS surveys is usually the result of a two-stage cluster sampling design, it is necessary to coordinate the sample take for each of the selected clusters. In an overall self-weighting sample, every individual in the target population has an equal probability of selection, which results in a proportional allocation. However, proportional allocation is not feasible when sampling domains are very different in size. Self-weighting at domain/stratum level, by contrast, is easy to achieve.

Let n be the total number of clusters selected for a DHS survey, let n_h be the number of clusters allocated to the h^{th} stratum; let X_h be the total number of households in the stratum h, let x_{hk} be the number of households in cluster k of stratum h, given by the sampling frame; then the selection probability of cluster k in stratum h is given by:

$$\pi_{hk} = \frac{n_h x_{hk}}{X_h}$$

Let x^*_{hk} be the number of households listed in the cluster in the household listing operation, let m_h be the number of households to be selected from the cluster for a fixed sample take, then the overall selection probability of a household in the cluster is given by:

$$f_{hk} = \pi_{hk} \times \frac{m_h}{x^*_{hk}} = \frac{n_h x_{hk}}{X_h} \times \frac{m_h}{x^*_{hk}}$$

If $x^*_{hk} = x_{hk}$ exactly for all k in stratum h, then it is easy to see that self-weighting is achieved in stratum h by a constant sample take m_h in all clusters since $f_h = \frac{n_h m_h}{X_h}$ is a constant in stratum h.

In practice, it is not possible that $x^*_{hk} = x_{hk}$ for all h and k, especially when the last population census is no longer new. Therefore there is a need for sample coordination in order to achieve self-weighting. Let f_h and m_h be the calculated sampling fraction and average sample take in stratum h according to the sample allocation with $m_h = \frac{f_h X_h}{n_h}$; the number of households needed to achieve self-weighting in cluster k of stratum h is given by

$$m_{hk} = \frac{f_h X_h}{n_h} \times \frac{x^*_{hk}}{x_{hk}} = m_h \times \frac{x^*_{hk}}{x_{hk}}$$

which is a function of the ratio of the number of households listed over the number of households given in the sampling frame for every cluster: take more if more are listed or take fewer if fewer are listed. The above formula also shows that the sampling fraction is not a necessary parameter for sample take calculation. Using the designed average sample take is a more direct method because the sampling fraction is an abstract number. This formula is used in the self-weighting household selection templates presented in Chapter 3, Section 3.2. The relationship between the sample take and the cluster selection probability is given by

$$m_{hk} = \frac{f_h x^*_{hk}}{\pi_{hk}}$$

For practical considerations, the sample take calculated above needs to be adjusted if is it too small or too large. Usually, we apply a cut-off to control the sample take within the range of a minimum of 10 households and a maximum of 50 households per cluster. For the clusters where the cut-off is applied, the sample is no longer self-weighting.

The advantages and disadvantages of a self-weighting sample can be summarized as:

Advantages:

1) Equally representative for every individual within a sampling stratum.

2) Reduced sampling errors.

Disadvantages:

1) Difficult for survey management (for example, to distribute the work-load) because of the variant sample take by cluster.

2) Difficult to control the expected sample size because of possible cut-offs, especially when the upper limit cut-offs are employed.

3) The self-weighting is not exact because of the rounding of the sample takes and this will bring bias in the survey estimation.

4) Self-weighting at the national level will break down the specific sample allocation at the domain/stratum level and bring the sample allocation back to a proportional allocation.

It is possible to overcome the second and the third disadvantages through a recursive calculation of sample take by re-distributing the cut-offs to the rest of the clusters in the stratum or control area, and by using a randomized sample take which allows non-integer numbers as sample size. Excel templates for both the traditional procedure and revised procedure are available.

1.10 Household listing

The household listing operation is a fundamental operation in DHS surveys. After the EAs are selected for the survey, a complete listing of dwelling units/households in the selected EAs is conducted prior to the selection of households. The listing operation consists of visiting each of the selected clusters, collecting geographic coordinates of the cluster, drawing a location map of the cluster as well as a sketch map of the structures in the cluster, recording on listing forms a description of every structure together with the names of the heads of the households in the structures and other characteristics. Mapping and listing of households represents a significant field cost, but it is essential to guarantee the exactness of sample implementation.

The listing operation is an important procedure for reducing non-sampling errors in the survey, especially when the sampling frame is outdated. The listing operation provides a complete list of occupied residential households in the EA. This information is necessary for an equal probability random selection of households in the second stage. With the household listing prior to the main survey, it is possible to pre-select the sample households in advance and the interviewers are asked to interview only the pre-selected households without replacement of non-responding households. With the sketch map and the household listing of the cluster produced in the household listing operation, the sampled households can be easily relocated by interviewers later. The fieldwork procedure for DHS surveys is designed to be replicable and therefore allows easy supervision; all these elements are designed to prevent serious bias during data collection.

It is sometimes suggested that listing could be avoided by making segments so small that they are equal to the required sample “take” per cluster. One could then use a “take-all” rule at the last stage of sampling. Such small segments, however, will generally be difficult to delineate. In planned urban areas, this difficulty may be reduced—one could adopt blocks, or even single buildings, as segments—but urban units of this kind are likely to be homogeneous, containing similar households, and therefore less than ideal as sampling clusters.

It is also not acceptable to attempt to avoid listing altogether by having interviewers create clusters as they go along, or by selecting the sample households at fixed intervals during a random walk up to a predetermined quota. Such methods are not acceptable because first, they do not guarantee a nonzero probability to every potential respondent; second, the procedure is not replicable, which complicates the field work supervision; and third, it can end up with a sample of *easy units* because of the lack of effort to make call backs to households or individuals who were not available at the first attempt to interview.

Listing costs can be reduced by using segmentation to decrease the size of the area which has to be listed; however, segmentation generates its own costs, and skill in map making and map interpretation is required. Segmentation becomes progressively more difficult as segments become smaller because there are not enough natural boundaries to delineate very small segments. Moreover, concentration of the sample into smaller segments increases the sampling error. Since neighbors’ characteristics are correlated, a smaller segment captures less of the variety existing in the population; this leads to less efficient sampling. There is a point beyond which it is not useful to attempt further segmentation. As a general rule the average segment size should not be less than 500 in population (approximately 100 households) in both urban and rural areas. However, segmentation has less economical effect in urban areas because the urban EAs are in general small geographic areas.

It is quite probable that some traditional tools in the household listing process will be modified in the future by using more sophisticated technology such as the *geographic positioning systems* (GPS) in order to collect more precise location information for the selected EAs. With this new tool we can produce more precise distribution maps of the structures with less supervision than in the traditional approach. The main feature is that every selected EA and every selected structure/dwelling can be located with high precision and thus relocated later, if desirable. In addition, GPS information is used more and more in DHS data analysis and presentation. At present, though, the recommended protocol for collecting GIS information in DHS surveys is to collect one coordinate for every selected cluster. See Chapter 2 for more details of the household listing operation.

1.11 Household selection in the central office

After the household listing operation, once the central office receives the completed listing materials for a cluster, they must first create a serial number for each of the occupied residential households, beginning with 1 and continuing to the total number of occupied residential households listed in the cluster. An occupied residential household designates those households occupied at the time of the listing, even if the occupant refused to cooperate at the time of listing, and those households where the occupants were absent at the time of listing but neighbors confirmed that they would not be absent for a long period and would be at home during the period of the main survey. Only occupied residential households should be numbered. This serial number is an ID number for the households. The household selection procedure will be performed based on this serial number. Whether or not a household is considered occupied at the time of the listing is very important because this fact will be related to the proportion of vacant households in the main survey.

The MEASURE DHS program has used several methods[3] for selecting households within clusters including:

1) Systematic selection: From a random starting point select every nth household (see Chapter 3 Section 3.2 for more details).

2) Systematic selection with runs: From a random starting point, select a group of sequential households called a "run". Several runs may be used within a cluster. Runs are selected with systematic selection. Selecting households in runs can greatly reduce the amount of travel within cluster during data collection, especially in rural clusters where households can be far apart.

The advantages of household selection in the central office can be summarized as:

1) It allows for a check of coverage of the household listing results before the main survey and for the review and possible relisting of problematic clusters in advance.

2) Sampled households are pre-determined which prevents potential bias introduced by allowing the interviewers to select in the field which households are to be interviewed.

[3] The MEASURE DHS program has developed various Excel templates for household selection in the central office: systematic selection, systematic selection with runs, self-weighting selection with and without control of sample size and with or without runs. Once the household listing is completed, it is possible to just copy the number of households listed in a cluster into the spreadsheet and the spreadsheet will show the selected household numbers automatically. See Chapter 3 Section 3.2.2 for details.

3) The field work procedure is exactly replicable which provides the possibility of easy and close supervision of the field work.

4) It is easier to control the work load for each interviewing team.

However, in cases when travelling between clusters represents a substantial cost, it is possible to forego the step of selecting households in the central office. In such cases, the household listing operation and the main survey can be combined into a single field operation. No essential changes are needed in the household listing procedure or household numbering, but making a detailed sketch map for the cluster may not be necessary because the listing team and the interviewing team are the same, and the household interview will begin immediately after the listing, so identifying the exact selected households during a separate visit is no longer a problem. The household selection must be done in the field manually if portable computers are not available. Some manual selection procedures have been developed for this purpose. Household listing and interviewing are two very different jobs, so in surveys where listing, selection and interviewing takes place in the same visit by the same staff, it may be necessary to conduct more extensive training of field teams before the field work begins and to supervise the teams more closely during the fieldwork. See Chapter 3 Section 3.2.2 for more details for manual household selection.

1.12 Household interviews

The household interview procedure is out of the scope of this manual since it is explained in detail in the interviewer's manual. This section will briefly discuss the main statistical points of the household interview. After the household selection, interviewers will be recruited and trained for the household and individual interviews. The training of the interviewer is an intensive training lasting at least four weeks for a standard DHS survey, and longer if the survey includes many biomarkers. Prior to the training, a pretest of the questionnaire will be conducted in a small number of clusters not selected for the main survey to assess the quality of the questionnaires and the understanding of the translations by interviewers and respondents. Problems and potential errors observed in the pretest will be addressed and resolved prior to fieldwork training. Finally, the interviewing team will be sent to selected clusters with a certain work load per team.

Once training is complete, teams of interviewers will be assigned a list of clusters and deployed to the field. Upon arrival in a new area, the interviewer team must first contact the local authorities for help to identify the correct cluster and to solicit cooperation during the field work. A team leader or supervisor is assigned for each interviewing team. The supervisor is responsible for cluster identification and should guarantee that the correct cluster will be interviewed. After checking the listing materials and verifying with the local authorities, the supervisor will distribute the sampled households among the interviewers. After locating a selected household, the interviewer will begin with a brief household interview, listing household members and visitors, and identifying among them all eligible women and men for the individual interview. Eligible individuals are defined as those who are in the specified age group (15-49), and are either usual members of the selected household or who slept in the household the night before the interviewer's visit.

Conscious omission of eligible individuals on the part of an interviewer by mis-reporting their age outside of the eligible age group is a real concern. Measures to eliminate this problem should be undertaken. For example, the field editor should check the consistency of each completed questionnaire and, if suspicious things are identified, should return to the household for further verification of key items such as the number of household members, number of eligible individuals and number of children under age five.

In the event of failure to contact a household or an eligible person in the first visit, the interviewer is required to make at least two repeat visits, or call backs, on different days and at different times of the day before the interview is abandoned. The process of making call backs requires the teams to stay in a cluster for at least two to three days. Some countries propose large interviewing teams in order to try to cover an entire cluster in one day. This process is not acceptable for a DHS survey, even when the designed sample size can bear a large non-response rate, because non-response biases the survey results. A quick survey usually ends up with poor data quality. Both theory and practice prove that call backs and efforts to get difficult units to respond to the survey are the best way to remove bias and reduce the non-sampling errors to a minimum. For more details, refer to the DHS Survey Organization Manual and the Interviewer's Manual.

1.13 Sampling weight calculation

1.13.1 Why we need to weight the survey data

A DHS sample is a representative sample randomly selected from the target population. Each interviewed unit (household and individual) represents a certain number of similar units in the target population. In order for any statistical inferences drawn from the survey data to be valid, this representativeness of the sample must be taken into account. In general terms, sampling weights are used to make the sample more like the target population. All analyses should use the sampling weights calculated for each interviewed household and for each interviewed individual.

A sampling weight is an inflation factor which extrapolates the sample to the target population. For example, if equal probability sampling (or a self-weighting sample) is applied in a domain with a sampling fraction 1/500, this means that each sampled individual represents 500 similar individuals in the target population. Therefore, if we observed one particular individual having secondary education, we would conclude that there are 500 individuals in the target population having secondary education, corresponding to this particular individual. The total number of individuals with secondary education in the target population would be 500 times the total number of interviewed individuals having secondary education observed in the sample. This explanation also applies to unequal probability sampling. It is very important that sampling weights are properly calculated and applied in data analysis; otherwise, serious bias may be introduced, leading to incorrect conclusions.

Although all of the DHS indicators are means, proportions, rates or ratios, since a nationwide self-weighting sample is not usually feasible due to study domains as explained in Section 1.9, sampling weights are always necessary. Even when a survey is designed to be nationally self-weighting, it is necessary to correct for the different response patterns across domains/strata (see Section 1.13.4 for more details). Therefore, even surveys with self-weighting sample designs require the use of sampling weights.

Though the effect of sampling weights on survey indicators may be small, it is necessary to use sampling weights for the following reasons:

1) For valid statistical inference.

2) For correcting or reducing bias; weighting can reduce bias introduced by non-response or other non-sampling errors.

3) For keeping the weighted sample distribution close to the target population distribution, especially when oversampling is applied in certain domains/strata.

1.13.2 Design weights and sampling weights

The MEASURE DHS program calculates both *design weights* and *sampling weights* (or *survey weights*) for both households and individuals. The *design weight* of a sampling unit (household or individual) is the inverse of the overall probability with which the unit was selected in the sample. The *sampling weight* of a sampling unit is the design weight corrected for non-response or other calibrations.

Since is the DHS protocol involves no selection of eligible individuals within a sampled household (except for the domestic violence module, in which one eligible woman is selected from a sampled household), all eligible individuals from the same household share the same design weight, which is the same as the household's design weight. Therefore, the design weight is the basic weight for DHS surveys. All other weights are calculated based on the design weight. In calculating the sampling weight, it is possible to correct for both *unit non-response* (a sampling unit is not interviewed at all) and *item non-response* (the sampling unit does not provide answer for a specific question). The policy of the MEASURE DHS program is to correct for unit non-response at the stratum level (see Section 1.13.4) and leave the correction of item non-response to data users because it is variable specific. Correction of unit non-response at cluster level will increase the variability of sampling weights and therefore increase sampling errors. Because the correction for unit non-response is the same for an entire cluster and because household selection within a cluster is an equal probability selection, all the households in the same cluster share the same design weight and sampling weight, and the same is true for all individuals in the same cluster. This means that the DHS weights (both design weights and sampling weights) are cluster weights.

1.13.3 How to calculate the design weights

Assuming that a DHS survey sample is drawn with two-stage, stratified cluster sampling, design weights will be calculated based on the separate sampling probabilities for each sampling stage and for each cluster. We use the following notations:

P_{1hi}: first-stage sampling probability of the i^{th} cluster in stratum h
P_{2hi}: second-stage sampling probability within the i^{th} cluster (household selection)

Let n_h be the number of clusters selected in stratum h; let M_{hi} be the measure of size of the cluster used in the first stage's selection, usually the measure of size is the number of households residing in the cluster according to the sampling frame; let $\sum M_{hi}$ be the total measure of size in the stratum h. The probability of selecting the i^{th} cluster in the sample is calculated as follows:

$$P_{1hi} = \frac{n_h M_{hi}}{\sum M_{hi}}$$

Let b_{hi} be the proportion of households in the selected cluster compared to the total number of households in EA i in stratum h if the EA is segmented, otherwise $b_{hi} = 1$. Then the probability of selecting cluster i in the sample is:

$$P_{1hi} = \frac{n_h M_{hi}}{\sum M_{hi}} \times b_{hi}$$

Let L_{hi} be the number of households listed in the household listing operation in cluster i in stratum h; let t_{hi} be the number of households selected in the cluster. The second stage selection probability for each household in the cluster is calculated as follows:

$$P_{2hi} = \frac{t_{hi}}{L_{hi}}$$

The overall selection probability of each household in cluster *i* of stratum *h* is therefore the product of the selection probabilities of the two stages:

$$P_{hi} = P_{1hi} \times P_{2hi}$$

The design weight for each household in cluster *i* of stratum *h* is the inverse of its overall selection probability:

$$d_{hi} = 1 / P_{hi}$$

The calculation of the design weight is not complicated; however, difficulties often result from not having of all the design parameters involved in the above calculation because they are not well documented, especially when the sampling frame is a master sample. See Chapter 5 for more details on sample documentation.

1.13.4 Correction of unit non-response and calculation of sampling weights

The design weight calculated above is based on sample design parameters. If there is no non-response at the cluster level, at the household level, or at the individual level, the design weight is enough for all analyses, for both household indicators and individual indicators. However, non-response is inevitable in all surveys, and different units have different response behaviors. The experience of the MEASURE DHS program shows that urban households are less likely to respond to the survey than their counterparts in rural areas, households in developed regions are less likely to respond to the survey than their counterparts in less-developed regions, rich households are less likely to respond to the survey than poor households, individuals with higher levels of education are less likely to respond to the survey than those with lower levels of education, men are less likely to respond to the survey than women, and so forth.

The idea of correcting for unit non-response is to calculate a response rate for each homogeneous response group, then inflate the design weight by dividing it by the response rate for each response group. The construction of homogeneous response groups depends on the knowledge of the response behavior of the sampling units. DHS surveys always use the sampling stratum as the response group because the stratification is usually achieved by regrouping homogeneous sampling units in a single stratum. It is possible to use a cluster as a response group, but the disadvantage is that the response rates may vary too much at the cluster level, which will increase the variability of the sampling weight; which in turn increases the sampling variance. Furthermore, correction of non-response at the cluster level will interfere with self-weighting if a self-weighting sample has been designed.

By assuming that the response groups coincide with the sampling strata, the following steps explain how to calculate the sampling weight by first calculating the various response rates for unit non-response. Please note that the response rates calculated here are different from the response rates calculated in Appendix A of DHS survey final reports. In Appendix A, household and individual response rates are calculated as ratios of the number of interviewed units over the number of eligible units because the aim is just to show the results of survey implementation. Here we use weighted ratios because the aim is to correct the design weight to compensate for non-response, therefore the design weight should be involved. Because a non-responding unit with a large sampling weight will have a larger impact on survey estimates than a non-responding unit with a small design weight, a weighted response rate for correction of non-response is better than an un-weighted response rate.

1. Cluster level response rate

Let n_h be the number of clusters selected in stratum h; let n_h^* be the number of clusters interviewed. The cluster level response rate in stratum h is therefore

$$R_{ch} = n_h^* / n_h$$

2. Household level response rate

Let m_{hi} be the number of households found (see Chapter 2, Section 2.10 for definition) in cluster i of stratum h; let m_{hi}^* be the number of households interviewed in the cluster. The household response rate in stratum h is calculated by

$$R_{hh} = \sum d_{hi} m_{hi}^* / \sum d_{hi} m_{hi}$$

where d_{hi} is the design weight of cluster i in stratum h; the summation is over all clusters in the stratum h.

3. Individual response rate

Let k_{hi} be the number of eligible individuals found in cluster i of stratum h; let k_{hi}^* be the number of individuals interviewed. The individual response rate in stratum h is calculated as

$$R_{ph} = \sum d_{hi} k_{hi}^* / \sum d_{hi} k_{hi}$$

where d_{hi} is the design weight of cluster i in stratum h; the summation is over all clusters in the stratum h.

The household sampling weight of cluster i in stratum h is calculated by dividing the household design weight by the product of the cluster response rate and the household response rate, for each of the sampling stratum:

$$D_{hi} = d_{hi} / (R_{ch} \times R_{hh}), \text{ for cluster } i \text{ of stratum } h.$$

The individual sampling weight of cluster i in stratum h is calculated by dividing the household sampling weight by the individual response rate, or equivalently, by dividing the household design weight by the product of the cluster response rate, the household response rate and the individual response rate, for each of the sampling strata:

$$W_{hi} = D_{hi} / R_{ph} = d_{hi} / (R_{ch} \times R_{hh} \times R_{ph}), \text{ for cluster } i \text{ of stratum } h.$$

It is easy to see that the difference between the household sampling weights and the individual sampling weights is introduced by individual non-response.

The sampling weights for households selected for the men's survey and for men can be calculated similarly. We need a separate household sampling weight for the men's survey in cases where the men's survey is conducted in a sub-sample of households selected for the women's survey, and we suppose that the response behavior of households in the men's survey sub-sample may be different from the overall household response rate.

If no normalization is requested, we can stop here. The above calculated household sampling weight and individual sampling weight can be used to produce any indicators at the household level and the individual level, respectively. As we mentioned earlier in Section 1.13.1, a sampling weight is an inflation or extrapolation factor. The weighted sum of households interviewed

$$T = \sum \sum D_{hi} m_{hi}^{*}$$

is an unbiased estimate of the total number of ordinary residential households of the country; where m_{hi}^{*} is the number of households interviewed in the i^{th} cluster of stratum *h*, and the summation is over all clusters and strata in the total sample. Similarly, the weighted sum of all interviewed women

$$W = \sum \sum W_{hi} k_{hi}^{*}$$

is an unbiased estimate of the total women in the target population (women age 15-49) of the country; where k_{hi}^{*} is the number of women interviewed in the i^{th} cluster of stratum *h*, and the summation is over all clusters and strata in the total sample.

1.13.5 Normalization of sampling weights

Normalization of sampling weights is not necessary for survey data analysis. In order to prevent large numbers for the number of weighted cases in the tables in DHS survey final reports, it is the MEASURE DHS tradition to calculate *normalized standard weights* for both households and individuals. With the normalized standard weight, the number of unweighted cases coincides with the number of weighted cases at the national level for both total households and total individuals. The normalized standard weight of a sampling unit is calculated based on its sampling weight, by multiplying the sampling weight with a unique constant at the national level. The constant or the *normalization factor* is the total number of completed cases divided by the total number of weighted cases (based on the sampling weight). This number is equal to the estimated total sampling fraction because the total number of weighted cases with the sampling weight is an estimation of the total target population. Therefore the standard weights in the DHS data files are relative weights. Relative weights can be used to estimate means, proportions, rates and ratios because the normalization factor is cancelled out when used in both numerator and denominator, so it has no effect on the calculated indicator values. This point also explains why the normalization must be done at the national level and not the regional level: at the regional level, the normalization factor cannot be cancelled out, and bias will be introduced in the calculated indicator values. Because the normalized standard weights have no scale, they are not valid for estimating totals. Also the normalized weight is not valid for pooled data, even for data pooled for women and men in the same survey, because the normalization factor is country and sex specific.

1. Normalized household standard weight[4]

The normalization factor for calculating household standard weight is calculated as

$$FH = \sum \sum m_{hi}^{*} / \sum \sum D_{hi} m_{hi}^{*}$$

The household standard weight for cluster *i* in stratum *h* is calculated by

$$HV005_{hi} = D_{hi} \times FH = D_{hi} \times \sum \sum m_{hi}^{*} / \sum \sum D_{hi} m_{hi}^{*}$$

[4] The MEASURE DHS program has developed Excel templates for facilitating standard weight calculations. If all design parameters and the survey results (number of households found and interviewed, number of eligible women found and interviewed, number of eligible men found and interviewed, number of eligible women and men found and tested, by cluster) are provided in the input page, the standard weights will be calculated automatically in different pages.

where HV005 is the household standard weight variable in the DHS Recode data files.

It is easy to see that the weighted sum of households interviewed by using the standard weight equals the unweighted sum of households interviewed for the total sample. This condition will not be met at the domain level or for sub-populations. At the domain level, the weighted sum of households interviewed may be larger or smaller than the unweighted sum of households interviewed, depending on whether the domain is undersampled or oversampled.

2. Normalized women's standard weight

The normalization factor for calculating the women's standard weight is calculated as

$$FW = \sum\sum k_{hi}^{*} / \sum\sum W_{hi} k_{hi}^{*}$$

The women's standard weight for cluster *i* in stratum *h* is calculated by

$$V005_{hi} = W_{hi} \times FW = W_{hi} \times \sum\sum k_{hi}^{*} / \sum\sum W_{hi} k_{hi}^{*}$$

where V005 is the women's standard weight variable in the DHS Recode data files.

The standard weights for households selected for the men's survey and for men can be calculated in a similar way.

1.13.6 Standard weights for HIV testing

The sampling weights for HIV testing are calculated separately for women and men, but they are calculated using the same methodology. The only difference is in the calculation of the normalization factors, if a normalized weight is requested. In order to calculate the weighted HIV prevalence for women and men together using a normalized weight, the standard weight for HIV testing must be normalized for women and men together. In most DHS surveys, HIV testing is conducted in the same subsample of households selected for men's survey, and every woman or man in the household who is eligible for the individual interview is eligible for HIV testing. Once the household sampling weight for the men's survey is calculated using the procedures stated in Section 1.13.5, the sampling weights for HIV testing for women and men may be calculated separately by correcting the household sampling weight for the non-response rates of women and men for HIV testing, respectively. For simplicity, let MD_{hi} be the household sampling weight in cluster *i* of stratum *h* for the men's survey sub-sample, the response rates to HIV testing for women and men are calculated respectively by

$$WR_{hi} = \sum MD_{hi} WHIV_{hi}^{*} / \sum MD_{hi} WHIV_{hi}$$
$$MR_{hi} = \sum MD_{hi} MHIV_{hi}^{*} / \sum MD_{hi} MHIV_{hi}$$

where $WHIV_{hi}$ is the number of women eligible for HIV testing, and $WHIV_{hi}^{*}$ is the number of women tested with a valid test result, in cluster *i* of stratum *h*; $MHIV_{hi}$ and $MHIV_{hi}^{*}$ are the number of men eligible and the number of men tested with a valid test result, respectively, in cluster *i* of stratum *h*.

The sampling weights for HIV testing for women and men, respectively, are calculated by

$$HIV_{hi}^{W} = MD_{hi} / WR_{hi}, \quad HIV_{hi}^{M} = MD_{hi} / MR_{hi}$$

In cluster *i* of stratum *h*, the normalized standard weights for HIV testing for women and men, respectively, are calculated by

$$HIV05_{hi}^{W} = HIV_{hi}^{W} \times \left(\sum\sum WHIV_{hi}^{*} + \sum\sum MHIV_{hi}^{*}\right) / \left(\sum\sum HIV_{hi}^{W} \times WHIV_{hi}^{*} + \sum\sum HIV_{hi}^{M} \times MHIV_{hi}^{*}\right)$$
$$HIV05_{hi}^{M} = HIV_{hi}^{M} \times \left(\sum\sum WHIV_{hi}^{*} + \sum\sum MHIV_{hi}^{*}\right) / \left(\sum\sum HIV_{hi}^{W} \times WHIV_{hi}^{*} + \sum\sum HIV_{hi}^{M} \times MHIV_{hi}^{*}\right)$$

where the double summations are over all clusters and strata in the total sample.

1.13.7 De-normalization of standard weights for pooled data

For all of the DHS data, the weight variables HV005 (household standard weight), V005 (women's standard weight) and MV005 (men's standard weight) are relative weights which are normalized so that the total number of weighted cases is equal to the total number of unweighted cases, for the three kinds of units. In some situations, such as analyses involving data from more than one survey, data users may need the un-normalized sampling weight for analyzing pooled data. As mentioned in Section 1.13.5, since normalization is country specific and sex specific, it is necessary to de-normalize the standard weights provided in the DHS Recode data files for analyzing pooled data.

The normalization procedure consists of multiplying the sampling weight by a normalization factor for the total sample. The normalization factor is the estimated total sampling fraction: the number of completed cases divided by the number of weighted cases by using the sampling weight, for each kind of sampling unit. The weighted number of cases with sampling weight is an estimation of the total target population. Therefore, in order to de-normalize a normalized weight, simply divide the normalized weight by the total sampling fraction. The estimated total sampling fraction is usually not provided in the DHS data file or in the final report. In order to calculate the total sampling fraction, it is necessary to know the total target population at the time of the survey. The total target population at the time of the survey is easy to get from various sources. The country's statistical office, the United Nations Population Division's (UNPD) World Population Prospects[5], and the United Nations Population Fund (UNFPA) are three sources that may be easy to access.

As mentioned above, if pooled data analysis is required, the standard weight variables HV005, V005 and MV005 must be rescaled or de-normalized. The de-normalization procedure is the inverse of the normalization procedure: that is, multiply the standard weight by the target population and divide by the number of completed cases, for each survey. The de-normalized weights for households, women and men (HV005*, V005*, and MV005*, respectively) can be calculated using the following formulas:

HV005* = HV005 × (total number of residential households in the country)/
(total number of households interviewed in the survey)

V005* = V005 × (total female population 15-49 in the country)/
(total number of women 15-49 interviewed in the survey)

MV005* = MV005 × (total male population 15-49 (15-59) in the country)/
(total number of men 15-49 (15-59) interviewed in the survey)

[5] http://esa.un.org/unpd/wpp/index.htm

If normalized weights are preferred, the above re-scaled weights can be re-normalized by multiplying by the total number of completed women's and men's interviews combined, dividing by the total number of weighted cases combined, and applying the above re-scaled weights to the pooled data.

Note that the normalization of sampling weights is done for the total sample for households, women and men separately. If the aim is to tabulate indicators for a certain sub-population from pooled data, for example, vaccination coverage for children 12-23 months, the de-normalization has nothing to do with the total population of children 12-23 months because there is no standard weight calculated for children 12-23 months in DHS surveys. If the indicator is tabulated at the household level using the household weight, the household standard weights must be de-normalized for all of the surveys included in the analysis as explained above; likewise, if the indicator is tabulated at the individual level using the women's (or child's mother's) weight, the women's standard weights must be de-normalized for each of the surveys.

1.14 Calibration of sampling weights in case of bias

Generalized calibration (Deville and Särndal, 1992; Deville et al, 1993) has now become a popular and powerful framework in survey data analysis for statistical offices in many countries. It allows for the utilization of different sources of auxiliary information to improve estimates from sample surveys. Calibration can reduce sampling errors, can correct bias caused by non-response and other non-sampling errors, and can reduce the influence of extreme values. Calibration is a "weight tuning" procedure such that the tuned sampling weight can produce estimates without error for known population characteristics. The precision of an estimator using a calibrated weight is equivalent to a regression estimator but is much easier to calculate with the help of calibration software such as CALMAR, a SAS Macro procedure developed by the French Institute of Statistics and Economic Studies (INSEE), and the SPSS procedure developed by Statistics Belgium. DHS surveys employ calibration of sampling weights only in cases where serious bias is observed in the collected data, and there is reliable auxiliary information available for the calibration.

Let X be a multivariate auxiliary variable with p components such that the population totals of each of the component variables are known beforehand from the recent population census, that is, $t_x = \sum_{i \in U} X_i = (t_{x_1}, t_{x_2}, \ldots, t_{x_p})^\tau$ is known. Let x_i be the observations of the auxiliary variables from the survey $x_i = (x_{1i}, x_{2i}, \ldots, x_{pi})^\tau$ for the respondent sampling unit i. Let D_i be the sampling weight for unit i. The calibration procedure consists of modifying the sampling weight slightly from D_i to W_i such that a given distance measure between the sampling weights D_i and the calibrated weights W_i

$$\sum_{i \in s} g(W_i, D_i)$$

is minimized under the constraints

$$\sum_{i \in s} W_i x_i = t_x$$

where g is a distance function which measures the distance between D_i and W_i. The constraints imposed are that the known auxiliary variable totals are estimated without error with the calibrated weights. If the variable of interest is well correlated with the auxiliary variables, then we expect that the precision can be greatly improved for estimating the variable of interest. The calibration theory states that the calibrated weights have the following formula

$$W_i = D_i F\left(q_i x_i^\tau \lambda(s)\right)$$

where $F(\bullet)$ is called the calibration function which is the reciprocal of the derivative of the distance function g; q_i is a calibration weight which is usually set to 1 in the lack of prior knowledge; $\lambda(s)$ is a constant depending on the particular sample s which is to be solved. When $F(x_i^\tau \lambda(s)) = (1 + q_i x_i^\tau \lambda(s))$, which corresponds to one of the five proposed calibration functions in Deville et al, 1993, it is easy to solve, $\lambda(s)$ is given by

$$\lambda(s) = T_s^{-1}(t_x - \hat{t}_{\pi x})$$

with

$$T_s = \sum_{i \in s} D_i q_i x_i x_i^\tau$$

For a given variable of interest y, the calibrated estimator of the population total is equivalent to the generalized regression estimator

$$\hat{t}_y = \sum_{i \in s} W_i y_i = \hat{t}_{\pi y} + \hat{B}_s^\tau (t_x - \hat{t}_{\pi x})$$

where $\hat{B}_s = T_s^{-1} \sum_{i \in s} q_i D_i x_i y_i$ is the sample estimation of the regression coefficient; $\hat{t}_{\pi y}$ and $\hat{t}_{\pi x}$ are the simple estimators using the sampling weight

$$\hat{t}_{\pi y} = \sum_{i \in s} D_i y_i, \quad \hat{t}_{\pi x} = \sum_{i \in s} D_i x_i$$

A mean estimation of the variable of interest y can be calculated by

$$\hat{\bar{Y}} = \frac{\sum_{i \in s} W_i y_i}{\sum_{i \in s} W_i}$$

The calibration estimator can be equivalently formulated with known proportions of one or more auxiliary variables. The calibration can be conducted at the individual level, which will result in an individual specific weight, or it can be conducted at the cluster level with aggregated data, which will result in a cluster weight. For more details see the related references given in the end of this document.

1.15 Data quality and sampling error reporting

Data quality is always a major concern for all MEASURE DHS projects. Though numerous efforts are made in implementing DHS surveys to maximize the quality of the data collected, non-sampling errors are always the main concerns for data quality. Data quality of a survey directly affects the reliability of the statistics produced. Many countries have laws that require reports of survey findings to include an evaluation of data quality and reliability. Data quality can be measured by total survey error including bias introduced by various sampling and non-sampling errors.

DHS survey final reports usually include tables in an appendix for data quality evaluation purposes, including: age distributions of household population by sex; age distributions of eligible and interviewed women and men; completeness of reporting on date of birth, age at death, age/date at first union, education and anthropometric measures, etc. The MEASURE DHS program also conducts some in-depth studies on data quality for specific topics, which are provided in published reports.

Apart from the data quality tables, DHS survey final reports provide sampling errors for selected indicators in Appendix B. Sampling errors are important reliability measures which tell the user the degree of error associated with a particular estimated indicator value, the number of cases involved in the calculation of the indicator, the efficiency or clustering effects of the sample design compared to a simple random sampling and the range for the true value of an indicator at a certain confidence level. The reader is referred to Chapter 4, Section 4.2 for more details on sampling errors and their calculation.

DHS survey final reports also provide an appendix on the sample design of the survey. The sample design document reports the survey methodology used for the survey, including the aim of the survey, the target population, the sample size, the reporting domains, the stratification and sample allocation, sample selection procedure, sampling weight calculation, correction for non-response, calibration of sampling weights, and the results of survey implementation. See Chapter 5, Section 5.2 for more details on sample design.

1.16 Sample documentation

The task of a sampling statistician does not end with the selection of the sample. The preservation of sampling documentation is an essential requisite for sampling weight calculation, for sampling error computation, for data quality evaluation, for linkage with other data sources, and for various kinds of checks and supplementary studies. Special efforts are needed at the time of the sample design, at the end of the fieldwork, and at the completion of the data file if the task of sample documentation is to be carried out effectively. If preservation of documentation is delayed, considerable effort will be required to reconstitute the missing information when it is needed.

The sample documentation must comply with the survey confidentiality requirements. When HIV testing is conducted in a DHS or AIS (AIDS Indicator Survey), the confidentiality guidelines require the complete destruction of all intermediate documents which can potentially be used to identify any single household or individual who participated in the testing. This requirement reinforces the importance of timely sample documentation. See Chapter 5 for detailed requirements in sample documentation.

1.17 Confidentiality

The final data files for DHS surveys are made available to interested researchers. Therefore, the confidentiality of private information collected from individual respondents is a major concern, especially when sensitive information such as sexual activity and HIV status are collected. Protecting the confidentiality of the individual respondent is not only an ethical obligation, but it also promotes more accurate data because respondents are more likely to provide truthful responses if they feel confident their information will be kept private.

DHS surveys follow strict rules imposed at various steps during the survey implementation to prevent the direct or indirect disclosure of the identity of individual respondents. The principal pieces of information that can indirectly identify an individual respondent are cluster number, household number, the cluster selection probability and the sampling weights. The cluster number is an important identifier for sampling error calculations; the household number is important for household level and individual level data management and tabulation; the cluster selection probability is useful for cluster level modeling; and sampling weights are necessary for all analysis. So these variables must be present in the final data file. The household number in the final DHS data file is not informative, and sampling weights are not informative after correction of non-response and normalization. The cluster selection probability is potentially informative only if lower level identification information such as district and locality are present, and DHS survey final data files do not provide geographic information below the level of region or survey domain, especially when HIV testing is conducted. Thus the only concern is the disclosure of the cluster. For DHS or AIS surveys with HIV testing, the final data files provide scrambled cluster and household numbers for further insurance against disclosure.

2 HOUSEHOLD LISTING OPERATION

2.1 Introduction

DHS surveys are nationwide sample surveys designed to provide information on the levels of fertility, infant and child mortality, use of family planning, knowledge and attitudes toward HIV/AIDS and other sexually transmitted infections (STI), and on other family welfare and health indicators. The surveys generally interview women age 15-49 and men age 15-59 (15-49 or 15-54 in some surveys). The women and men to be interviewed live in ordinary residential households which are randomly selected from a set of sample points consisting of clusters of households. Prior to interviewing, all households located in the selected clusters will be listed. The listing of households for each cluster will be used in selecting the final sample of households to be included in the DHS survey.

The listing operation consists of visiting each cluster, recording on listing forms a description of every structure together with the names of the heads of the households found in the structure, and drawing a location map of the cluster as well as a detailed sketch map of all structures residing in the cluster. These materials will guide the interviewers to find the pre-selected households for interviewing and will allow field work supervisors to perform quality control during data collection.

The following sections present the general guidelines for conducting a household listing operation. Modifications may be needed to adapt to country specific situations.

2.2 Definition of terms

Following are brief definitions of the terms used in this document.

A census *Enumeration Area* (EA) is a geographical statistical unit created for a census and containing a certain number of households. An EA is usually a city block in urban areas and a village, a part of a village or a group of small villages in the rural areas with its location and boundaries well defined and recorded on census maps.

A *cluster* is the smallest geographical survey statistical unit for DHS surveys. It consists of a number of adjacent households in a geographical area. For DHS surveys, a cluster corresponds either to an EA or a segment of a large EA.

A *base map* is a reference map that describes the geographical location and boundaries of an EA.

A *structure* is a free-standing building or other construction that can have one or more dwelling units for residential or commercial use. Residential structures can have one or more dwelling units (for example: single house, apartment structure).

A *dwelling unit* is a room or a group of rooms normally intended as a residence for one household (for example: a single house, an apartment, a group of rooms in a house); a dwelling unit can also have more than one household.

A *household* consists of a person or a group of related or unrelated persons, who live together in the same dwelling unit, who acknowledge one adult male or female 15 years old or older as the head of the household, who share the same housekeeping arrangements, and are considered as one unit. In some cases one may find a group of people living together in the same house, but each person has separate eating arrangements; they should be counted as separate one-person households. Collective living arrangements such as army camps, boarding schools, or prisons will not be considered as households. Examples of households are:

- a man with his wife or his wives with or without children
- a man with his wife or his wives, his children and his parents
- a man with his wife or his wives, his married children living together for some social or economic reasons (the group recognize one person as household head)
- a widowed or divorced man or woman with or without children

The *head of household* is the person who is acknowledged as such by members of the household and who is usually responsible for the upkeep and maintenance of the household.

A *location map* is a map produced in the household listing operation which indicates the main access to a cluster, including main roads and main landmarks in the cluster. Sometimes it may be useful even to include some important landmarks in the neighboring cluster.

A *sketch map* is a map produced in household listing operation, with location or marks of all structures found in the listing operation which helps the interviewer to relocate the selected households. A sketch map also contains the cluster identification information, location information, access information, principal physical features and landmarks such as mountains, rivers, roads and electric poles.

2.3 Responsibilities of the listing staff

Persons recruited to participate in the household listing operation will work in teams consisting of two enumerators. A coordinator will monitor the entire operation.

The responsibilities of the coordinator are to:

1) obtain base maps for all the clusters included in the survey;

2) arrange for the reproduction of all listing materials (listing manuals, mapping and listing forms); the map information forms and the household listing forms must be prepared in sufficient numbers to cover all of the clusters to be visited.

3) assign teams to clusters;

4) monitor the reception of the completed listing forms at the central office; and

5) verify that the quality of work is acceptable.

If GPS coordinates are being collected during the listing operation, the coordinator must also:

6) obtain one GPS receiver per listing team, plus two backup receivers, and tag each GPS receiver with a number;

7) ensure that all GPS receivers have the correct settings (see Section 2.6 below) and distribute a receiver to each field team;

8) obtain and copy all GPS training materials for listing staff; and

9) train all listing staff to record GPS waypoints in the GPS units as well as on Form DHS/1.

The responsibilities of the enumerators are to:

1) identify the boundaries of the cluster;

2) draw a location map showing the location of the cluster;

3) draw a detailed sketch map of the cluster showing the locations of all structures residing in the cluster;

4) list all the households in the cluster in a systematic manner;

5) communicate to the coordinator problems encountered in the field and follow his instructions.

6) transfer the completed listing forms to the coordinator or to the central office;

If GPS coordinates are being collected during the listing operation, enumerators must also:

7) capture and record the GPS waypoint of the center of the cluster; and

8) complete the portion of form DHS/1 designated for GPS information for each cluster.

The two enumerators in each team should work together at the same time in the same area. They will first identify the cluster boundaries together. Then one enumerator prepares the location and the sketch map while the other does the household listing. The materials needed for the household listing operation are:

- Manual for Household Listing
- Base map of the area containing the cluster
- Map Information Form (Form DHS/1)
- Household Listing Form (Form DHS/2)
- Segmentation form (Form DHS/3)

If GPS coordinates are to be recorded during the listing operation, the following additional materials are needed:

- GPS receivers, batteries and cables
- GPS training manuals and handouts

2.4 Locating the cluster

The coordinator will provide the listing team with a base map containing the cluster assigned to the team. The listing team will typically make two tours of the cluster: the first to identify the cluster boundaries and to create the location map, and the second to create the listing and draw the sketch map. Upon arrival in a cluster, the team should first contact the local authorities for help in identifying the boundaries and get general information on the cluster, for example, the rough number of residential households in the cluster. In most cases, the cluster boundaries follow easily recognizable natural features such as streams or rivers, and construction features such as roads or railroads. In some cases, the boundaries may not be marked with visible features (especially in rural areas), attention should be paid to locate the cluster boundaries as precisely as possible according to the detailed description of the cluster and its base map.

Before doing the listing, the team should tour the cluster to determine an efficient route of travel for listing all of the structures. The cluster should be divided into parts if possible. A part can be a block of structures. The listing team will make a location map of the cluster indicating the boundaries of the parts, as well as the relative location of landmarks, public structures (e.g., schools, religious structures, public offices and markets) and main roads. This location map will serve as a guide for the interviewing team when they begin data collection.

2.5 Preparing location and sketch maps

The coordinator will designate one enumerator of the team as the *mapper*. The second enumerator will be the *lister*. Although the two have separate tasks to perform, they must move together and work in close cooperation; the mapper prepares the maps, and the lister collects information on the structures (and corresponding households) indicated on the sketch map.

The mapping of the cluster and the listing of the households should be done in a systematic manner so that there are no omissions or duplications. If the cluster consists of a number of blocks, then the team should finish each block before going to the next adjacent block. Within each block, start at one corner of the block and move clockwise around it. In rural areas where structures are frequently found in small groups, the team should work in one group of structures at a time and in each group they can start at the centre (choosing any landmark, such as a school, to be the centre) and move around it clockwise.

In the first tour of the cluster, the mapper will prepare a location map of the cluster on the Map Information Form (Form DHS/1). First, fill in the identification box for the cluster on the first page. All information needed for filling in the identification box is provided by the coordinator. In the space provided on the second page, draw a map showing the location of the cluster and include instructions on how to get to the cluster. Include all useful information to find the cluster and its boundaries directly on the map and in the space reserved for observations if necessary.

In the second tour of the cluster, using the third page of the Map Information Form, the mapper will draw a sketch map of all structures found in the cluster, including vacant structures and structures under construction. It is important that the mapper and lister work together and coordinate their activities, since the structure numbers that the mapper indicates on the sketch map must correspond to the serial numbers assigned by the lister on the listing form for the same structures.

On the sketch map, mark the starting point with a large X. Place a small square at the spot where each structure in the cluster is located. For any non-residential structure, identify its use (for example, a store or factory). Number all structures in sequential order beginning with "1". Whenever there is a break in the numbering of structures (for example, when moving from one block to another), use an arrow to indicate how the numbers proceed from one set of structures to another. Although it may be difficult to pinpoint the exact location of the structure on the map, even an approximate location is useful for finding the structure in the future. Add to the sketch map all landmarks (such as a park), public structures (such as a school or church), and streets or roads. Sometimes it is useful to add to the sketch map landmarks that are found outside the cluster boundaries, if they are helpful in identifying other structures inside the cluster.

Use the marker or chalk provided to write on the entrance to the structure the number that has been assigned to the structure. Remember that this is the serial number of the structure as assigned on the household listing form, which is the same as the number indicated on the sketch map. In order to distinguish the number from other numbers that may exist already on the door of the structure, write “DHS” in front of the number, for example, for the structure number 5, write “DHS/5,” similarly on the door of structure number 44 write “DHS/44.”

A structure is called a *multi-unit structure* if it contains more than one household in the structure. Otherwise it is called a single-unit structure. All households found in a structure or multi-unit structure must be numbered from 1 to m, within the structure[6]. The structure number plus the household number form a unique identification number for a household, and for all of the households in the cluster. For example, household number 3 in structure number 44 would be uniquely identified with ID number DHS/44-3. It is very useful to write the household ID number at the entrance of the household to later assist the interviewer to identify the household for interview.

2.6 Collecting a GPS waypoint for each cluster

A GPS waypoint is a latitude and longitude reading that represents a location. For some surveys, GPS data for EAs are available from the census. However, if the data are not available, or are of questionable quality, one GPS waypoint for each cluster should be recorded during the listing phase of the survey. These waypoints are recorded using a GPS unit (a Garmin ETREX unit is used in this guide) and data collection forms. If GPS units other than the Garmin ETREX are used, this guide will still be useful; however, some of the instructions may not apply due to differences in design and menus. The Garmin ETREX owner's manual may be useful to consult on the basics of the GPS unit.

Take one reading for each cluster. The GPS waypoints will be captured by the mapper while he is mapping the clusters. One GPS waypoint must be taken for each cluster, and in the case of large clusters which are being segmented, one point should be taken for each segment selected for listing. In DHS surveys, clusters are usually census EAs, sometimes villages in rural areas or city blocks in urban areas. Collecting only one waypoint for the cluster greatly reduces the chance of compromising confidentiality of the respondents and at the same time is sufficient to allow for the integration of multiple datasets for further analysis. The DHS cluster waypoint should always be taken at the geographic center of the cluster or segment. If the cluster is segmented, the point should be taken for the segment chosen by the Mapping and Listing Coordinator to be included in the survey.

***Save the waypoint and record the latitude, longitude, and altitude*.** The latitude, longitude, and altitude reading for a location are stored in two places: in the GPS unit's memory and on the DHS/1 paper form. GPS units can be broken or lost, and experience has shown that a hardcopy backup is essential. In addition, the paper form provides a backup should the data in the GPS unit be changed, deleted, or misidentified (i.e., the operator names the cluster incorrectly in the unit). Each position saved in the GPS unit is called a waypoint, and each waypoint has a unique name. If possible, the waypoint ID should be the same as the DHS cluster number. If it is not possible, the waypoint ID should be unique to the cluster and recorded on Form DHS/1 (do not record the same waypoint ID for two different clusters). When a waypoint is saved, the GPS unit assigns it a default name. The mapper must edit the default name and change it to the 6-digit DHS cluster ID number. For example, the waypoint for DHS cluster 101 would be named "000101". Cluster 1101 would be named "001101". After saving the waypoint, the mapper will use the identification box of the Map Information Form (Form DHS/1) to record the latitude, longitude, and altitude for the cluster and segment on paper. First, the mapper will write down the latitude and longitude coordinates in decimal degree format and altitude in meters in the Identification Box on the "Location Map Cluster" Form (DHS/1). Second, the mapper will draw a *circle,* in the middle of the cluster/segment, at the location where he/she captured the waypoint.

After the listing is complete, the GPS units must be collected as soon as possible and returned to the sampling office by the Mapping and Listing Coordinator. The waypoints will then be downloaded and examined for problems by the designated sampling staff. The Sampling Coordinator should designate one member of the Data Processing Team to receive and process the GPS waypoint file and then give the file to survey manager.

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[6] This number is different from the household number later given to all of the households listed in the whole cluster just prior to household selection.

In most situations, the Mapping and Listing Coordinator will be responsible for providing the listing teams with a GPS unit prior to the listing. Before these units are distributed they should be set up for use by the listers. For DHS surveys, the only format which is acceptable is Decimal Degrees, regardless of what geographic standards may be in use for other purposes. To set the format, enter the SETUP menu and in the UNITS sub-menu, select the item POSITION FRMT and press the ENTER button. Select "hddd.ddddd" Decimal Degrees, which is the first item. Once "hddd.ddddd" is highlighted, press the ENTER button. It is important that all the GPS units be set up in the same way so that the waypoints returned at the end of the survey are all in the same format. For more details on how to properly prepare the GPS units for waypoint collection, please refer to the DHS *Manual for GPS Data Collection.*

2.7 Listing of households

The lister will use the Household Listing Form (Form DHS/2) to record all households found in the cluster. Begin by entering the identification information for the cluster. The first two columns are reserved for office use only—leave them blank.

Complete the rest of the form as follows:

Column (1) [*Serial Number of Structure*]: For each structure, record the same structure serial number that the mapper enters on the sketch map. All the structures recorded on the sketch map (except the landmarks) must be recorded on the listing form and numbered.

Column (2) [*Address/description of Structure*]: Record the street address of the structure. Where structures do not have visible street addresses (especially in rural areas), give a description of the structure and any details that help in locating it (for example, in front of the school, next to the store, etc.).

Column (3) [*Residence Y/N*]: Indicate whether the structure is used for residential purposes (eating and sleeping) by writing Y for "Yes". In cases where a structure is used for commercial or other purposes, write N for "No". Structures used both for residential and commercial purposes (for example, a combination of store and home) should be classified as residential (i.e. mark Y in column 3). Make sure to list any household unit found in a nonresidential structure (for example, a guard living inside a factory or in a church). Also do not forget to list vacant structures and structures under construction, and in Column (6) give some explanation (for example: vacant, under construction, etc.) All structures seen in the cluster should be recorded on the sketch map of the cluster and in the listing.

Column (4) [*Serial Number of Household in Structure*]: This is the serial number assigned to each household found in the structure; there can be more than one household in a structure. The first household in the structure will always have number "1". If there is a second household in the structure, then this household should be recorded on the next line, a "2" is recorded in Column (4), and Columns (1) to (3) repeat the structure number and address or are left blank.

Column (5) [*Name of Head of Household*]: Write the name of the head of the household. There can only be one head per household. If no one is home or the household refuses to cooperate, ask neighbors for the name of the head of the household. If a name cannot be determined, leave this column blank. Note that it is not the name of the landlord or owner of the structure that is needed, but the name of the head of the household that lives there.

Column (6) [*Observations/Occupied or not*]: This space is provided for any special remarks that might help the coordinator decide whether to include a household in the household selection or not, and might also help the interviewing team locate the structure or identify the household during the main survey fieldwork.

If the structure is an apartment block or block of flats, assign one serial number to the entire structure (only one square with one number appears on the sketch map), but complete Columns (2) through (6) for each apartment in the structure individually. Each apartment should have its own address, which is the apartment number within the structure.

The listing team should be careful to locate hidden structures. In some areas, structures may have been built so haphazardly that they are easily missed. In rural areas, structures may be hidden by tall grasses and trees. If there is a pathway leading from the listed structure, check to see if the pathway goes to another structure. Talking with people living in the area may help in identifying the hidden structures.

2.8 Segmentation of large clusters

A certain number of the selected EAs may be very large in population size. A complete listing of EAs that are very large may not be feasible for the survey. These EAs should be subdivided into several smaller segments, only one of which will be included in the survey and listed. In this case, the DHS cluster corresponds to a segment of an EA. When the team arrives in a large EA that may need segmentation, it should first tour the EA and make a quick count to get the estimated number of households residing in the EA. There is no standard threshold for the size of an EA that needs to be segmented, or for segment size. But for efficiency and accuracy considerations, DHS recommends that if the EA size is bigger than 300 households, then the team should communicate to the coordinator the cluster number, the estimated number of households and the suggested number of segments to be created. The final decision to segment an EA, and the number of segments to be created, can only be taken by the coordinator. Ideally, for ease of operation, an EA would only need to be segments into 2 segments, with an ideal segment size of 150-200 households in each segment. Dividing an EA into a large number of segments (more than 3) should be avoided if it is not really necessary in order to minimize errors.

In dividing an EA into segments, the ideal would be to have segments of approximately equal size, but it is also important to adopt segment boundaries that are easily identifiable. In the first tour of the cluster draw a location map of the entire cluster. Using identifiable boundaries such as roads, streams, and electric power lines, divide the EA into the designated number of roughly equal-sized segments. On the location map of the EA, show clearly the boundaries of the segments created. Number the segments sequentially. Estimate the relative size of each segment in the following manner: quickly count the number of dwellings in each segment, add up the total number of dwellings in the EA and calculate the proportion of the dwellings in the whole EA that are located in each segment.

Example 2.1: A cluster of 620 dwellings has been divided into 3 segments and the results are as follows:

Segment 1:	220 dwellings,	or	220/620	=	35 percent
Segment 2:	190 dwellings,	or	190/620	=	31 percent
Segment 3:	210 dwellings,	or	210/620	=	34 percent
Total:	620 dwellings,	or	620/620	=	100 percent

On Form DHS/3 (Segmentation Form) write the size of the segments in the appropriate columns (number and percent) and calculate the cumulative size of all of the segments in terms of a percentage. The cumulative size of the last segment on the list must be equal to 100.

Segment number	Number of dwellings	Percent	Cumulative percent
1	220	35	35
2	190	31	66
3	210	34	100

For each large EA to be segmented, a random number between 0 and 100 will be selected in the central office and included in the file. Compare this random number with the cumulative size. Select the first segment for which the cumulative size is greater than or equal to the random number.

Random number: 67
Segment selected: Segment number 3

Proceed with the household listing operation in segment number 3 as described in the above sections (see Appendix 2.3 for an example of how to complete the segmentation form.) Draw a detailed sketch map of the selected segment and list all the households found in the selected segment.

2.9 Quality control

To ensure that the work done by each listing team is acceptable, quality checks should be performed. The coordinator should tour the regions during the household listing operation, and assess the quality of the finished clusters. The coordinator should select a finished cluster and do an independent listing of 10 percent of the cluster. If important errors are found, the whole cluster should be relisted. If the problem is related to systematic errors, and it is not possible to do corrections on the listing forms, then all of the listed clusters should be relisted.

2.10 Prepare the household listing forms for household selection

Once the central office receives the completed listing materials for a cluster, they must first assign a serial number to all of the households in the cluster in the second column of the form DHS/2. Only occupied residential households (including households that refused to cooperate at the time of listing and households where the occupants were absent at the time of listing but would return shortly and would be at home during the period of household interview) will be numbered. This is a continuous serial number from 1 to the total number of occupied residential households listed in the cluster. Leave the cell in the second column blank if the household is not occupied, or if the structure is not a residential structure. Fill in the second column only if the structure on that row is an occupied household. Make sure that the numbering of all occupied households follows sequentially from the previous occupied household on the list, with no gaps or repetitions in the numbering. See the example of a completed listing form in Appendix 2.3.

After assigning the serial numbers to all households listed in the cluster, copy the total number of households listed to the column "Number of households listed" in the Excel file prepared for household selection. Make sure this number is recorded in the correct row for the cluster number. In the column "Segmentation information" record the percentage of the entire EA population that is included in the selected segment. The segmentation information is important for correctly calculating the sampling weights. After the total number of households listed in the cluster has been entered in the Excel file, the spreadsheet automatically generate the household numbers of those households selected to be interviewed. Copy the numbers of the selected households to the first column of the form DHS/2, corresponding to the serial number of the households in the listing form. These are the households that must be interviewed. It is recommended to use a different colored pen on the listing forms to indicate the households selected for interviewing. It is also very helpful to use color on the cluster's sketch map to mark the structures where the selected households are located.

In many surveys, a sub-sample of households will be selected for the men's survey. The household selection spreadsheet uses shaded columns to indicate which households are selected for the men's survey. Put a mark in the first column on the form DHS/2 next to the number of the selected household to indicate the households selected for the men's survey, or use a different colored pen for the households selected for both men's and women's surveys. Make a copy of the whole package of files (sketch maps and the listing forms with household selection). Give the original to the interviewing team for the household interview and keep the other copy in the central office.

Appendix 2.1 Example listing forms

Form DHS/1 **PAGE 1 of 3**

Map Information Form

Identification Label	***Code***
Locality ______________________________	
DHS Cluster Number	
Urban/Rural (Urban=1/Rural=2)	
EA Number	
District ______________________________	
Region ______________________________	
Name of Mapper ________________________	
Name of Lister _________________________	

GPS Unit Tracking Number	
Waypoint name (entered in GPS unit)	
Latitude (North/South) .... N / S	.
Longitude (East/West) .... E / W	.
Altitude / Elevation (Meters)	

Observations:

Road access ______________________________

____

____

Other useful information ______________________________

____

____

Form DHS/1 ***Map Information Form*** **PAGE 2 of 3**

Locality ______________________________ **District** ______________________________

Location map **DHS Cluster:** | | | |

Form DHS/1 ***Map Information Form*** **PAGE 3 of 3**

Locality ______________________________ **District** ______________________________

Sketch map of cluster **DHS Cluster:** | | | |

Form DHS / 2

Page /__/__/ of /__/__/ pages

Form of cartography

DHS CLUSTER: /__/__/__/   Urban-Rural : ....../__/   Village : .... /__/__/

Province : .... /__/__/   Commune : .... /__/__/   Mapper : .... /__/__/

District : .... : /__/__/   EA Number : .... /__/__/   Lister : .... /__/__/

Leave blank		Serial number of structure (1)	Address / Description of structure (2)	Residence Y/N (3)	Serial number of household in the structure (4)	Name of household head (5)	Observation/Occupancy status (6)
Male Survey	Serial number of household						

Form DHS/3 ***Segmentation Form***

Identification Label	***Code***
Locality ____________________	
DHS Cluster Number	☐☐☐
Urban/Rural (Urban=1/Rural=2)	☐
EA Number	☐☐☐
District ____________________	☐☐
Region ____________________	☐☐
Name of Mapper ____________________	☐☐
Name of Lister ____________________	☐☐

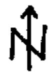
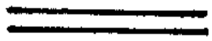
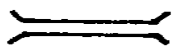
Number of segments: ☐

Segment number	Number of households	Percent	Cumulative percent
1			
2			
3			
4			
5			

Random number: ____________________

Segment selected: ____________________

Appendix 2.2 Symbols for mapping and listing

Orientation to the North	
Boundaries of the cluster	
Paved road	
Unpaved (dirt) road	
Footpath	
River, creek, etc.	
Bridge	
Lake, pond, etc.	
Mountains, hills	
Water point (wells, fountain, etc.)	
Market	
School	
Administrative structure	
Church, temple	
Mosque	
Cemetery	
Residential structure	

Non-residential structure	
Vacant structure	
Hospital, clinic, etc.	
Electric pole	
Tree or bush	

Appendix 2.3 Examples of completed mapping and listing forms

Form DHS/1

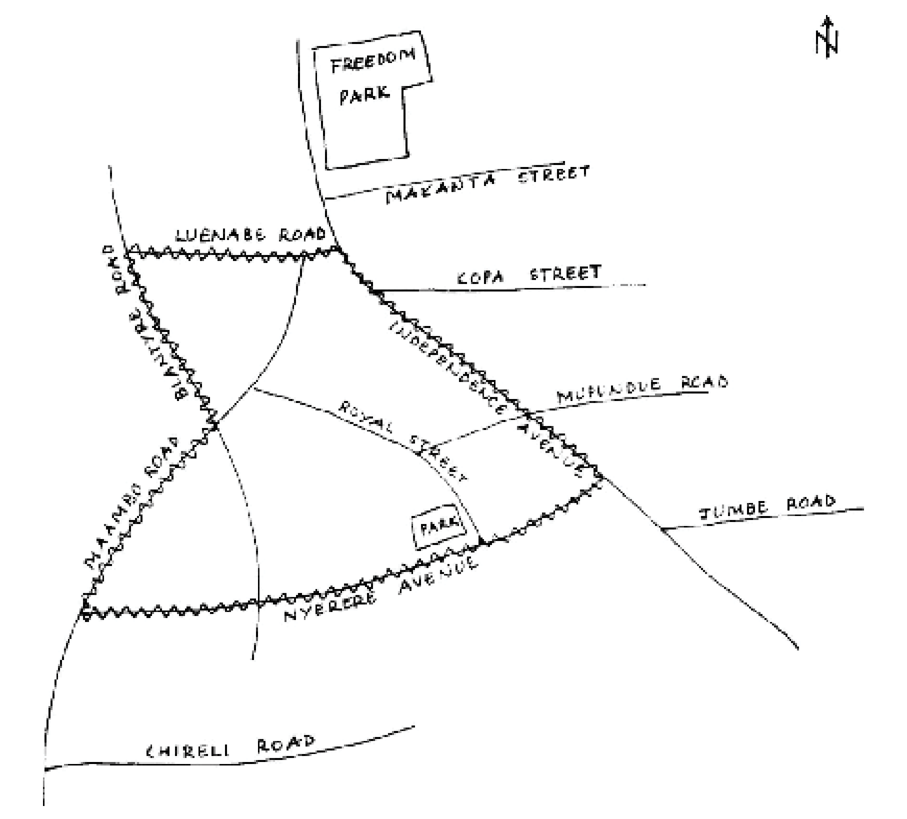
DEMOGRAPHIC AND HEALTH SURVEY
MAP INFORMATION

Page 1

IDENTIFICATION			
PROVINCE	KAYES	PROVINCE CODE	1
DISTRICT	DIEMA	DISTRICT CODE	0 4
TOWN/VILLAGE	DIEMA	TOWN/VILLAGE CODE	0 2
NAME OF MAPPER	Harrison Sidibe	CLUSTER CODE	0 1 7
NAME OF LISTER	John Melaku	DHS CLUSTER Nº	0 0 1

OBSERVATIONS:

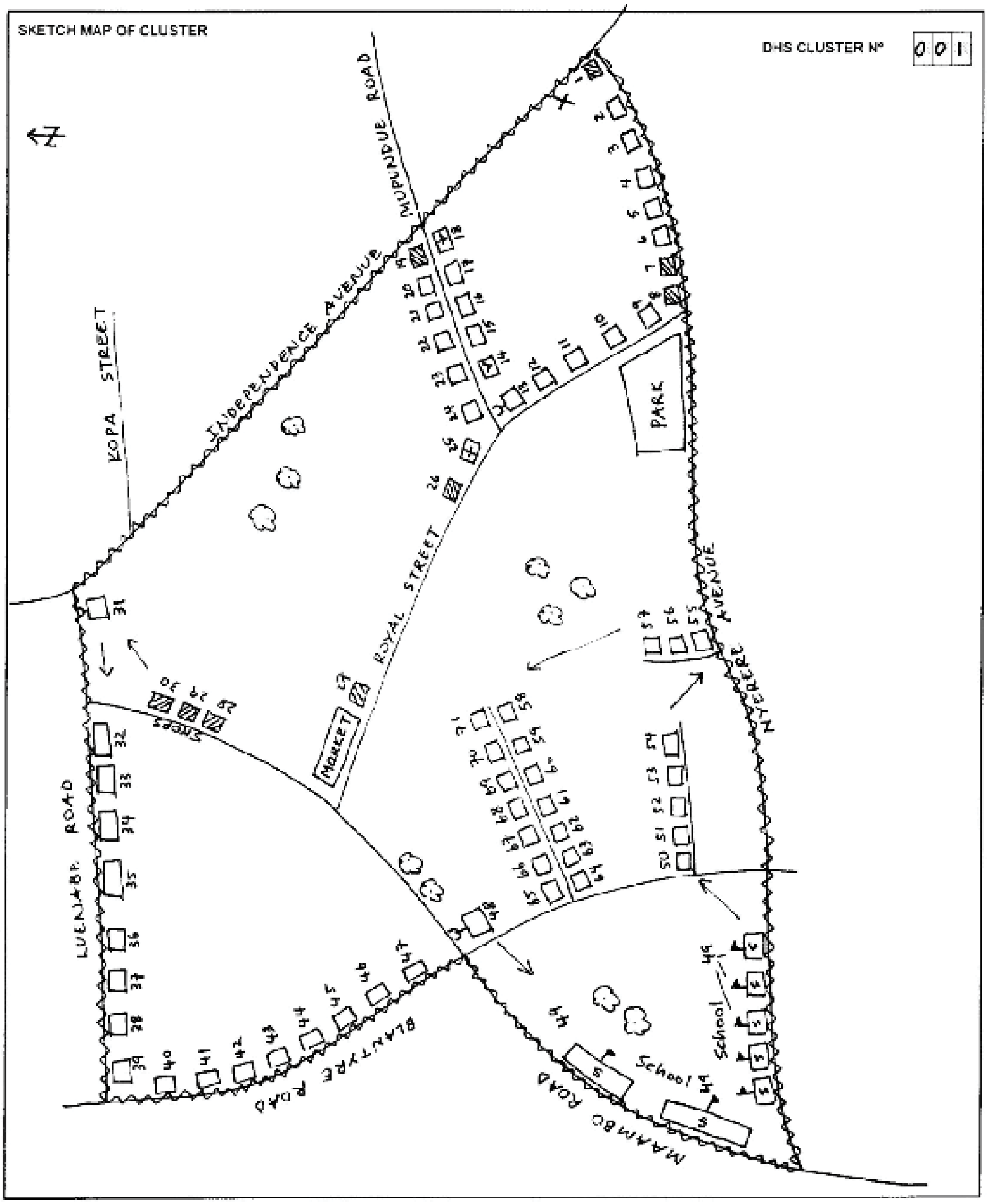
LOCATION MAP OF CLUSTER



Form DHS/1

DEMOGRAPHIC AND HEALTH SURVEY
MAP INFORMATION

Page 2



Form DHS/2

DEMOGRAPHIC AND HEALTH SURVEY
HOUSEHOLD LISTING FORM

Page 1 of 7 pages

DHS CLUSTER Nº 0 0 1

LEAVE BLANK		SERIAL Nº OF STRUC-TURE (1)	ADDRESS/DESCRIPTION OF STRUCTURE (2)	RESIDENCE Y/N (3)	SERIAL Nº OF HOUSEHOLD IN STRUCTURE (4)	NAME OF HEAD OF HOUSEHOLD (5)	OBSERVATIONS (6)
HH TO INTERVIEW	HH NUMBER						
		1	Nyerere Avenue	N			Pharmacy Star
	1	2	6 Nyerere Avenue	Y	1	Diane Obote	
	2	3	8 Nyerere Avenue	Y	1	Eugene Kariba	
	3				2	Dorothy Ucheh	
		4	10 Nyerere Avenue	Y	1		No one at home
	4	5	12 Nyerere Avenue	Y	1	Sam Lowa	
	5	6	14 Nyerere Avenue	Y	1	Harrison Coulibali	
	6				2	Paul Liande	
	7				3	Harry Fiwale	
		7	Avenue Nyerere	N			In construction
		8	Nyerere Avenue	N			In construction
	8	9	22 Royal Street	Y	1	George Sidibi	
	9	10	20 Royal Street	Y	1		Refused
	10	11	18 Royal Street	Y	1	Chief Seidou	
	11	12	16 Royal Street	Y	1	Ann Tonde	
		13	Mupundue Road	N			Mosque
		14	4 Mupundue Road	N			Vacant
	12	15	6 Mupundue Road	Y	1	Suzanne Ibenga	
	13	16	8 Mupundue Road	Y	1	David Chouta	
	14	·			2	Joseph Lupiya	
	15	17	10 Mupundue Road	Y	1	Eleni Fahmi	
	16	18	10ᴬ Mupundue Road	Y	1	Doctor Tadesse	Home upstairs, clinic downstairs
	17	19	12 Mupundue Road	Y	1	Sam Sidibi	

Form DHS/3

DEMOGRAPHIC AND HEALTH SURVEY
SEGMENTATION FORM

IDENTIFICATION			
PROVINCE	KOULIKORO	PROVINCE CODE	4
DISTRICT	DIOLA	DISTRICT CODE	02
TOWN/VILLAGE	DIONGAGA	TOWN/VILLAGE CODE	06
NAME OF MAPPER	WOLDE CONATE	CLUSTER CODE	023
NAME OF LISTER	ANDRE LUENA	DHS CLUSTER Nº	015

NUMBER OF SEGMENTS TO BE CREATED: 03

Segment Number	Number of dwellings	Percent	Cumulative percent
1	220	35%	35%
2	190	31%	66%
3	210	34%	100%
4			
5			

RANDOM NUMBER BETWEEN 1 AND 100: 067

SEGMENT SELECTED: 03

3 SELECTED SAMPLING TECHNIQUES

In this section, some of the most commonly used sampling techniques and their application are presented. The presentation will focus mainly on practical rather than theoretical aspects. However, the chapter does touch on some basic theoretical properties of the techniques used in the DHS surveys.

We focus on without replacement sampling rather than with replacement sampling procedures, since the latter represents a reduction of efficiency for samples of a fixed size due to the potential that some sampling units may be repeated. When this occurs, the amount of information carried in a fixed size sample is reduced because the same sampling unit is selected several times. For readers who are interested in the theoretical aspects of the selected sampling techniques, please refer to the textbooks dealing with survey sampling theory listed in the references.

3.1 Simple random sampling

We begin with *simple random sampling without replacement* (*SRSWOR*) since this is a fundamental sampling procedure that is used as standard to which the efficiency of other sampling procedures is compared. Simple random sampling without replacement is a selection procedure where every unit has an equal chance of being selected. Selection can be performed through successive draws without replacement from a well-mixed container containing all sampling units, or using certain computerized algorithms to select from a list of all sampling units.

Let N be the total number of sampling units, let n be the total sample size, n<N. The probability of selection for every i^{th} unit is given by:

$$P_i = \frac{n}{N}$$

The design weight (assuming no non-response) is given by:

$$D_i = 1 / P_i = \frac{N}{n}$$

The probability for any particular n different units selected together in a sample s is given by:

$$P_s = 1 / \binom{n}{N}$$

where $\binom{n}{N}$ is the total number of combinations of n elements out of N. Let $y_1, y_2, \dots y_n$ be the observations made from the selected units on a variable of interest, then the weighted sample mean which is the same as the unweighted sample mean,

$$\bar{y} = \sum_1^n D_i y_i / \sum_1^n D_i = \frac{1}{n} \sum_1^n y_i ,$$

is an unbiased estimator of the population mean, $\bar{Y} = \frac{1}{N} \sum_1^N y_i$, with its sampling variance given by

$$V_{srs}(\bar{y}) = \frac{1-f}{n} S_y^2$$

where $S_y^2 = \frac{1}{N-1} \sum_1^N \left(y_i - \bar{Y}\right)^2$ is the finite population variance of the variable y and f=n/N is the sampling fraction. An unbiased estimation of this variance can be made using

$$\upsilon_{srs}(\bar{y}) = \frac{1-f}{n} s_y^2$$

where $s_y^2 = \frac{1}{n-1}\sum_1^n (y_i - \bar{y})^2$ is the sample variance. When n and N are large, the standardized variable

$$\frac{\bar{y} - \bar{Y}}{SE(\bar{y})}$$

follows a *student-t* distribution with n-1 degrees of freedom and $SE(\bar{y})$ is the square root of $\upsilon_{srs}(\bar{y})$. Therefore the confidence limits of the population mean $\bar{Y}$ can be constructed based on sample observations allowing for 95% confidence that the true value of $\bar{Y}$ will lie within the range of $\bar{y} - 1.96 * SE(\bar{y})$ and $\bar{y} + 1.96 * SE(\bar{y})$. DHS reports use $\bar{y} \pm 2 * SE(\bar{y})$ for a conservative estimate of 95% confidence limits.

Given a complete list of all sampling units in a computerized file, the easiest way to draw a simple random sample of size n is to first generate a uniformly distributed random number between 0 and 1 and associate a number with each of the sampling units. Next, sort the file based on the generated random numbers in ascending order, and the first n units associated with the n smallest random numbers are the selected units. This procedure provides a *SRSWOR* sample of size n. This procedure is easy to implement, but requires sorting of the sampling frame. Since sorting is time consuming, the following algorithm (Tillé, 2001) may be used with the sampling frame without sorting:

<table>
<tr><td colspan="2">Definition of terms and the initial step
k: the k^{th} unit of the frame file; j: the j^{th} selected unit
$k = 0$
$j = 0$</td></tr>
<tr><td>repeat if
$j < n$</td><td>generate a uniformly distributed random number between [0,1)
if $u < \frac{n-j}{N-k}$ then
unit $k + 1$ is selected; $j = j + 1$
else unit $k + 1$ is not selected
$k = k + 1$</td></tr>
</table>

3.2 Equal probability systematic sampling

3.2.1 Sampling theory

Systematic sampling (*SYS*) is the selection of sampling units at a fixed interval from a list, starting from a randomly determined point. Selection is systematic because selection of the first sampling unit determines the selection of the remaining sampling units. Compared with *SRSWOR,* systematic sampling has the following advantages:

1) It is easier to perform;

2) It allows easy verification of the selection;

3) If the sampling frame is in some order, it provides a stratification effect with respect to the variables on which the frame is sorted, and with a proportional allocation. This stratification is called *implicit stratification*.

4) Implicit stratification prevents unexpected concentration of sample points in certain areas such as is possible with *SRSWOR*.

Because of these advantages, especially (3) and (4), systematic selection is more often used than simple random sampling.

Systematic sampling is normally carried out as follows: assuming a whole number interval $I=N/n$, where N is the number of units in the frame list and n is the number of units to be selected. The procedure begins with an integer random number S that is less than or equal to I. The units to be selected are S, $S+I$, $S+2*I$, ..., $S+(n-1)*I$. When I is not a whole number there may be appreciable errors in rounding it to the nearest whole number, it is suggested that the decimal interval method be used. Selection with a decimal interval may be carried out as follows:

1) Calculate the interval I rounded to two decimal places.

2) Generate a random number R between 0 and 1 with two decimal points.

3) Compute the sequence of sampling numbers: $R*I$, $R*I + I$, $R*I + 2*I$, ..., $R*I + (n - 1)*I$

4) Round up the above calculated sampling numbers to the next highest whole numbers; these are the selected units' numbers.

Example 3.2.1:

Let N=100, n=14, so that I=7.14; let the generated random number be R=0.96. The sampling numbers and the corresponding selected unit numbers are as follows:

6.85	13.99	21.13	28.27	35.41	42.55	49.69	56.83	63.97	71.11	78.25	85.39	92.53	99.67
7	14	22	29	36	43	50	57	64	72	79	86	93	100

In this example, the decimal interval method gives a selection interval which is sometimes 7 or sometimes 8. The household selection templates are all programmed with decimal sampling intervals.

Often sample design requires numerous systematic samples as is the case when a systematic sample of households is needed within each selected cluster. In this situation a separate random start R should be determined independently for each cluster.

With *SYS*, the probability of selection for any unit i is given by

$$P_i = \frac{1}{I} = \frac{n}{N}$$

The design weight (assuming no non-response) is given by

$$D_i = 1 / P_i = \frac{N}{n}$$

Let $y_1, y_2, \ldots y_n$ be the observations made from the selected units on a variable of interest, then the weighted sample mean which is the same as the unweighted sample mean

$$\bar{y} = \sum_1^n D_i y_i \,/\, \sum_1^n D_i = \frac{1}{n}\sum_1^n y_i$$

is an unbiased estimator of the population mean $\bar{Y} = \frac{1}{N}\sum_1^N y_i$. For simplicity, assuming an integer sampling interval I, the sampling variance of the sample mean is given by

$$V_{sys}(\bar{y}) = \frac{(1-1/N)}{n} S_y^2 [1 + (n-1)\rho_w]$$

where $S_y^2 = \frac{1}{N-1}\sum_1^N (y_k - \bar{Y})^2$ is the population variance; ρ_w is the correlation coefficient between pairs of units in the same systematic sample. When ρ_w is negative, *SYS* is more precise than *SRSWOR*; when ρ_w is positive, *SYS* is less precise than *SRSWOR*. Unlike the case of *SRSWOR*, the variance estimate

$$\upsilon_{sys}(\bar{y}) = \frac{1-f}{n} s_y^2$$

is not an unbiased estimate of the sampling variance; where $s_y^2 = \frac{1}{n-1}\sum_1^n (y_i - \bar{y})^2$ is the sample variance. However, $\upsilon_{sys}(\bar{y})$ is the special case of the recommended Hartley-Rao (1962) estimator in the case of un-equal probability systematic sampling. $\upsilon_{sys}(\bar{y})$ is equivalent to treating the systematic sample as if it was drawn by *SRSWOR*, and therefore is called an "estimator with simple random sampling approximation".

Theoretically, with SYS there is no unbiased estimator for the variance of the sample mean since systematic sampling is equivalent to randomly selecting one sample among the I possible samples. This is a major drawback for the *SYS*. However, when the sampling units in the frame file do not present any linear trend in the variable of interest, nor periodic changes, or the units are randomly ordered, $\upsilon_{sys}(\bar{y})$ is a good approximation of the sampling variance $V_{sys}(\bar{y})$. When there is a linear trend in the variable of interest, assuming the selection of the k^{th} systematic sample, where the summation is over non-overlapping successive units, the following estimator (Wolter, 1984; Wolter 1985) is a better approximation of $V_{sys}(\bar{y})$:

$$\upsilon_{sys}^*(\bar{y}) = \frac{1-f}{n}\frac{1}{n}\sum_1^{[n/2]} (y_{k+(j-1)*I} - y_{k+j*I})^2$$

However, when confidence limits are required, $\upsilon_{sys}(\bar{y})$ is preferred because of its high coverage rates of the true population mean. It should be noted that the properties of $\upsilon_{sys}^*(\bar{y})$ are different from the collapsed strata estimator for stratified sampling with one unit per stratum because the successive observations in a *SYS* sample are probability-one correlated, while the collapsed strata estimator for stratified sampling has a set of completely independent observations.

When *n* and *N* are large, the sample mean has the same asymptotic properties as that of the simple random sample mean; therefore confidence intervals can be constructed in a similar way to those for a simple random sample.

3.2.2 Excel templates for systematic sampling

The MEASURE DHS program has developed Excel templates that can be used for equal probability systematic sampling of households. The templates can be used to perform simple selection, selection with runs, self-weighting selection without sample size control and self-weighting selection with sample size control. Figure 3.1 below shows a portion of the simple selection procedure with a sample take of 20 households per cluster. The darker shaded areas require data input. The area to the left of the column labeled, "Num HH listed" is reserved for cluster IDs. Numbers for the selected households are shown to the right of the column labeled "Random (0-1)". Figure 3.2 below shows a portion of the selection procedure with runs of 4 households. Both selections incorporate a selection of a sub-sample. Figure 3.3 shows a simple self-weighting selection with an average sample take of 20 households, without sample size control, but with the minimum and maximum number of sample takes of 10 and 30 households respectively.

Figure 3.4 shows a self-weighting selection, with runs, with an average sample take of 20 households per cluster, without sample size control, but with minimum and maximum sample takes of 10 and 30 households respectively; both of the selections incorporate a sub-sample of 10 households per cluster. Note that the selection procedure with runs is circular, meaning that when the selection interval is not an integer, and when the run is not a divisor of the total number of households listed, then the last selected household number may be smaller than the first selected household number.

Figures 3.5 and 3.6 show self-weighting selections with sample size control; the control area is the sampling stratum. The disadvantage of the self-weighting selection with sample size control is that the selection procedure will do the household selection only if the household listing results are entered for the entire control area. This condition may represent a constraint in some situations.

Figure 3.7 shows a manual selection carried out in the field that can be performed easily using a simple calculator. If household selection at the central office is not feasible; the interviewer can perform the household selection in the field. The numbers in red represent information that is entered and the calculated terms. This procedure requires a traditional household listing operation where households are numbered and listed on household listing forms. Using the total number of households listed and the number of households to be selected, the interviewer can first calculate the selection interval then use the random number, R, associated with the selected cluster, to calculate the first sampling number or term t_1 and enter the first term to the cell for t_1. For the subsequent sampling numbers or terms, the interviewer adds the sampling interval to the previous sampling number or term. After the calculation of the sampling numbers, the interviewer should round the sampling numbers to integers in the next column; these are the selected household numbers. The interviewer is asked to copy the address and the name of the head of household of the selected households from the household listing form. The household selection form is subject to review by the field work supervisor.

Figure 3.1 Simple household selection with a sub-sample

				Run size	1	HOUSEHOLD SELECTION																			
		Sub-sample take per cluster			10	1		2		3		4		5		6		7		8		9		10	
Cluster Num		Num HHs Listed	Num Selected	Select interval	Random (0-1)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1		**138**	**20**	6.90	0.03800	1	8	15	21	28	35	42	49	56	63	70	77	84	90	97	104	111	118	125	132
2		**151**	**20**	7.55	0.65268	5	13	21	28	36	43	51	58	66	73	81	88	96	104	111	119	126	134	141	149
3		**182**	**20**	9.10	0.97489	9	18	28	37	46	55	64	73	82	91	100	109	119	128	137	146	155	164	173	182
4		**129**	**20**	6.45	0.41931	3	10	16	23	29	35	42	48	55	61	68	74	81	87	94	100	106	113	119	126
5		**180**	**20**	9.00	0.53756	5	14	23	32	41	50	59	68	77	86	95	104	113	122	131	140	149	158	167	176
6		**173**	**20**	8.65	0.70405	7	15	24	33	41	50	58	67	76	84	93	102	110	119	128	136	145	154	162	171
7	**C**	**140**	**20**	7.00	0.51868	4	11	18	25	32	39	46	53	60	67	74	81	88	95	102	109	116	123	130	137
8	**l**	**69**	**20**	3.45	0.25579	1	5	8	12	15	19	22	26	29	32	36	39	43	46	50	53	57	60	63	67
9	**u**	**176**	**20**	8.80	0.96775	9	18	27	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	167	176
10	**s**	**90**	**20**	4.50	0.40192	2	7	11	16	20	25	29	34	38	43	47	52	56	61	65	70	74	79	83	88
11	**t**	**131**	**20**	6.55	0.32702	3	9	16	22	29	35	42	48	55	62	68	75	81	88	94	101	107	114	121	127
12	**e**	**92**	**20**	4.60	0.76363	4	9	13	18	22	27	32	36	41	45	50	55	59	64	68	73	78	82	87	91
13	**r**	**126**	**20**	6.30	0.41681	3	9	16	22	28	35	41	47	54	60	66	72	79	85	91	98	104	110	117	123
14		**199**	**20**	9.95	0.84599	9	19	29	39	49	59	69	79	89	98	108	118	128	138	148	158	168	178	188	198
15		**225**	**20**	11.25	0.91906	11	22	33	45	56	67	78	90	101	112	123	135	146	157	168	180	191	202	213	225
16	**I**	**205**	**20**	10.25	0.12089	2	12	22	32	43	53	63	73	84	94	104	114	125	135	145	155	166	176	186	196
17	**D**	**148**	**20**	7.40	0.88941	7	14	22	29	37	44	51	59	66	74	81	88	96	103	111	118	125	133	140	148
18		**146**	**20**	7.30	0.25095	2	10	17	24	32	39	46	53	61	68	75	83	90	97	105	112	119	126	134	141
19		**139**	**20**	6.95	0.14534	2	8	15	22	29	36	43	50	57	64	71	78	85	92	99	106	113	120	127	134
20		**201**	**20**	10.05	0.84172	9	19	29	39	49	59	69	79	89	99	109	120	130	140	150	160	170	180	190	200

Figure 3.2 Selection of runs with a sub-sample

				Run size	4									HOUSEHOLD	SELECTION										
		Sub-sample take per cluster			10		1		2		3		4		5		6		7		8		9		10
Cluster Num		Num HHs Listed	Num Selected	Select interval	Random (0-1)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1		**138**	**20**	6.90	0.77576	21	22	23	24	49	50	51	52	77	78	79	80	105	106	107	108	129	130	131	132
2		**151**	**20**	7.55	0.05693	1	2	3	4	29	30	31	32	61	62	63	64	93	94	95	96	121	122	123	124
3		**182**	**20**	9.10	0.10590	1	2	3	4	41	42	43	44	77	78	79	80	113	114	115	116	149	150	151	152
4		**129**	**20**	6.45	0.64741	17	18	19	20	41	42	43	44	69	70	71	72	93	94	95	96	117	118	119	120
5		**180**	**20**	9.00	0.60810	21	22	23	24	57	58	59	60	93	94	95	96	129	130	131	132	165	166	167	168
6		**173**	**20**	8.65	0.96364	33	34	35	36	65	66	67	68	101	102	103	104	137	138	139	140	169	170	171	172
7	**C**	**140**	**20**	7.00	0.11160	1	2	3	4	29	30	31	32	57	58	59	60	85	86	87	88	113	114	115	116
8	**l**	**69**	**20**	3.45	0.15540	1	2	3	4	13	14	15	16	29	30	31	32	41	42	43	44	57	58	59	60
9	**u**	**176**	**20**	8.80	0.00870	1	2	3	4	33	34	35	36	69	70	71	72	105	106	107	108	141	142	143	144
10	**s**	**90**	**20**	4.50	0.32205	5	6	7	8	21	22	23	24	41	42	43	44	57	58	59	60	77	78	79	80
11	**t**	**131**	**20**	6.55	0.69849	17	18	19	20	45	46	47	48	69	70	71	72	97	98	99	100	121	122	123	124
12	**e**	**92**	**20**	4.60	0.51119	9	10	11	12	25	26	27	28	45	46	47	48	65	66	67	68	81	82	83	84
13	**r**	**126**	**20**	6.30	0.31826	9	10	11	12	33	34	35	36	57	58	59	60	81	82	83	84	109	110	111	112
14		**199**	**20**	9.95	0.69129	25	26	27	28	65	66	67	68	105	106	107	108	145	146	147	148	185	186	187	188
15		**225**	**20**	11.25	0.67523	29	30	31	32	73	74	75	76	121	122	123	124	165	166	167	168	209	210	211	212
16	**I**	**205**	**20**	10.25	0.30267	13	14	15	16	53	54	55	56	93	94	95	96	133	134	135	136	177	178	179	180
17	**D**	**148**	**20**	7.40	0.53373	13	14	15	16	45	46	47	48	73	74	75	76	105	106	107	108	133	134	135	136
18		**146**	**20**	7.30	0.32483	9	10	11	12	37	38	39	40	65	66	67	68	97	98	99	100	125	126	127	128
19		**139**	**20**	6.95	0.69275	17	18	19	20	45	46	47	48	73	74	75	76	101	102	103	104	129	130	131	132
20		**201**	**20**	10.05	0.34629	13	14	15	16	53	54	55	56	93	94	95	96	133	134	135	136	173	174	175	176

Figure 3.3 Simple self-weighting selection without sample size control

Household selection

Average sample take	20	Ave. take for sub-sample	10
Col name for PSU proba		Min sample take	10
Col name for EA proba	b	Max sample take	30
Col name Num HH in base	c	Run size	1

Cluster num	EA Proba	HH in base	Overall proba	Segment info	HH lsited	Sample take	Selection interval	Random (0-1)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
									1		2		3		4		5		6		7		8		9		10		11		12		13		14		15	
1	0.089851	456	0.003941		345	15	23.00	0.13710	4	27	50	73	96	119	142	165	188	211	234	257	280	303	326															
2	0.037832	192	0.003941		103	11	9.36	0.94140	9	19	28	37	47	56	65	75	84	94	103																			
3	0.026009	132	0.003941		127	19	6.68	0.74823	6	12	19	26	32	39	46	52	59	66	72	79	86	92	99	106	112	119	126											
4	0.029753	151	0.003941		127	17	7.47	0.47966	4	12	19	26	34	41	49	56	64	71	79	86	94	101	109	116	124													
5	0.019507	99	0.003941		98	20	4.90	0.35329	2	7	12	17	22	27	32	37	41	46	51	56	61	66	71	76	81	86	90	95										
6	0.026601	135	0.003941		132	20	6.60	0.35072	3	9	16	23	29	36	42	49	56	62	69	75	82	89	95	102	108	115	122	128										
7	0.034679	176	0.003941		218	25	8.72	0.14457	2	10	19	28	37	45	54	63	72	80	89	98	106	115	124	133	141	150	159	167	176	185	194	202	211					
8	0.033103	168	0.003941		92	11	8.36	0.74902	7	15	23	32	40	49	57	65	74	82	90																			
9	0.088471	449	0.003941	0.46	247	24	10.29	0.65592	7	18	28	38	48	59	69	79	90	100	110	120	131	141	151	162	172	182	193	203	213	223	234	244						
10	0.101279	514	0.003941	0.55	245	17	14.41	0.15798	3	17	32	46	60	75	89	104	118	132	147	161	176	190	205	219	233													
11	0.019507	99	0.003941		122	25	4.88	0.85734	5	10	14	19	24	29	34	39	44	49	53	58	63	68	73	78	83	88	93	97	102	107	112	117	122					
12	0.009939	76	0.002615		40	11	3.64	0.18437	1	5	8	12	16	19	23	27	30	34	38																			
13	0.012424	95	0.002615		160	30	5.33	0.66882	4	9	15	20	25	31	36	41	47	52	57	63	68	73	79	84	89	95	100	105	111	116	121	127	132	137	143	148	153	159
14	0.008893	68	0.002615		69	20	3.45	0.26100	1	5	8	12	15	19	22	26	29	32	36	39	43	46	50	53	57	60	64	67										
15	0.018439	141	0.002615		133	19	7.00	0.69656	5	12	19	26	33	40	47	54	61	68	75	82	89	96	103	110	117	124	131											
16	0.013731	105	0.002615		120	23	5.22	0.51406	3	8	14	19	24	29	34	40	45	50	55	61	66	71	76	81	87	92	97	102	108	113	118							
17	0.018178	139	0.002615		165	24	6.88	0.00231	1	7	14	21	28	35	42	49	56	62	69	76	83	90	97	104	111	117	124	131	138	145	152	159						
18	0.008239	63	0.002615		90	29	3.10	0.87493	3	6	9	13	16	19	22	25	28	31	34	37	40	44	47	50	53	56	59	62	65	68	71	75	78	81	84	87	90	
19	0.016608	127	0.002615		98	15	6.53	0.87072	6	13	19	26	32	39	45	52	58	65	72	78	85	91	98															
20	0.009416	72	0.002615		75	21	3.57	0.29377	2	5	9	12	16	19	23	27	30	34	37	41	44	48	52	55	59	62	66	69	73									

Figure 3.4 Self-weighting selection with runs and without sample size control

Average sample take	20	Ave. take for sub-sample	10
Col name for PSU proba		Min sample take	10
Col name for EA proba	b	Max sample take	30
Col name Num HH in base	c	Run size	5

Household selection

									1		2		3		4		5		6		7		8		9		10		11		12		13		14		15	
Cluster num	EA Proba	HH in base	Overall proba	Segment info	HH lsited	Sample take	Selection interval	Random (0-1)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	0.089851	456	0.003941		345	15	23.00	0.06005	6	7	8	9	10	121	122	123	124	125	236	237	238	239	240															
2	0.037832	192	0.003941		103	11	9.36	0.51677	21	22	23	24	25	71	72	73	74	75	13																			
3	0.026009	132	0.003941		127	19	6.68	0.83579	26	27	28	29	30	61	62	63	64	65	91	92	93	94	95	126	127	1	2											
4	0.029753	151	0.003941		127	17	7.47	0.85753	31	32	33	34	35	66	67	68	69	70	106	107	108	109	110	14	15													
5	0.019507	99	0.003941		98	20	4.90	0.55776	11	12	13	14	15	36	37	38	39	40	61	62	63	64	65	86	87	88	89	90										
6	0.026601	135	0.003941		132	20	6.60	0.29854	6	7	8	9	10	41	42	43	44	45	76	77	78	79	80	106	107	108	109	110										
7	0.034679	176	0.003941		218	25	8.72	0.82987	36	37	38	39	40	76	77	78	79	80	121	122	123	124	125	166	167	168	169	170	211	212	213	214	215					
8	0.033103	168	0.003941		92	11	8.36	0.77278	31	32	33	34	35	71	72	73	74	75	24																			
9	0.088471	449	0.003941	0.46	247	24	10.29	0.85756	41	42	43	44	45	96	97	98	99	100	146	147	148	149	150	196	197	198	199	200	246	247	1	2						
10	0.101279	514	0.003941	0.55	245	17	14.41	0.99471	71	72	73	74	75	141	142	143	144	145	216	217	218	219	220	41	42													
11	0.019507	99	0.003941		122	25	4.88	0.14094	1	2	3	4	5	26	27	28	29	30	51	52	53	54	55	76	77	78	79	80	101	102	103	104	105					
12	0.009939	76	0.002615		40	11	3.64	0.11903	1	2	3	4	5	21	22	23	24	25	36																			
13	0.012424	95	0.002615		160	30	5.33	0.03859	1	2	3	4	5	26	27	28	29	30	51	52	53	54	55	81	82	83	84	85	106	107	108	109	110	131	132	133	134	135
14	0.008893	68	0.002615		69	20	3.45	0.28596	1	2	3	4	5	21	22	23	24	25	36	37	38	39	40	56	57	58	59	60										
15	0.018439	141	0.002615		133	19	7.00	0.05647	1	2	3	4	5	36	37	38	39	40	71	72	73	74	75	106	107	108	109											
16	0.013731	105	0.002615		120	23	5.22	0.26691	6	7	8	9	10	31	32	33	34	35	56	57	58	59	60	86	87	88	89	90	111	112	113							
17	0.018178	139	0.002615		165	24	6.88	0.00029	1	2	3	4	5	31	32	33	34	35	66	67	68	69	70	101	102	103	104	105	136	137	138	139						
18	0.008239	63	0.002615		90	29	3.10	0.57751	6	7	8	9	10	21	22	23	24	25	36	37	38	39	40	56	57	58	59	60	71	72	73	74	75	86	87	88	89	
19	0.016608	127	0.002615		98	15	6.53	0.89801	26	27	28	29	30	61	62	63	64	65	91	92	93	94	95															
20	0.009416	72	0.002615		75	21	3.57	0.71086	11	12	13	14	15	31	32	33	34	35	46	47	48	49	50	66	67	68	69	70	6									

Figure 3.5 Self-weighting selection with sample size control

Num of HHs expected		Num of HHs selected	
Main sample	620	Main sample	619
Subsample 1	310	Subsample 1	302

Household selection

Cluster num	EA Probability	HH in base	Stratum	Segment info	Num HHs listed	Num of HHs selected	Overall Probability	Random (0, 1)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
										1		2		3		4		5		6		7		8		9		10		11		12		13		14		15
1	0.089851	456	1	-	345	16	0.004276	0.99090	22	43	65	87	108	130	151	173	194	216	237	259	281	302	324	345														
2	0.037832	192	1	-	103	11	0.004275	0.75239	8	17	26	36	45	54	64	73	82	92	101																			
3	0.026009	132	1	-	127	21	0.004274	0.86458	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	103	109	115	121	127									
4	0.029753	151	1	-	127	18	0.004276	0.99072	7	15	22	29	36	43	50	57	64	71	78	85	92	99	106	113	120	1												
5	0.019507	99	1	-	98	22	0.004276	0.04095	1	5	10	14	18	23	27	32	36	41	45	50	54	59	63	67	72	76	81	85	90	94								
6	0.026601	135	1	-	132	21	0.004274	0.85131	6	12	18	25	31	37	44	50	56	62	69	75	81	88	94	100	106	113	119	125	132									
7	0.034679	176	1	-	218	27	0.004274	0.04537	1	9	17	25	33	41	49	57	65	73	82	90	98	106	114	122	130	138	146	154	162	170	178	186	195	203	211			
8	0.033103	168	1	-	92	12	0.004275	0.60119	5	13	20	28	36	43	51	59	66	74	82	89																		
9	0.088471	449	1	0.46	247	26	0.004274	0.60089	6	16	25	35	44	54	63	73	82	92	101	111	120	130	139	149	158	168	177	187	196	206	215	225	234	244				
10	0.101279	514	1	0.55	245	19	0.004274	0.15320	2	15	28	41	54	67	80	93	106	118	131	144	157	170	183	196	209	222	234											
11	0.019507	99	1	-	122	26	0.004276	0.83106	4	9	14	18	23	28	33	37	42	47	51	56	61	65	70	75	79	84	89	94	98	103	108	112	117	122				
12	0.009939	76	2	-	40	10	0.002572	0.47381	2	6	10	14	18	22	26	30	34	38																				
13	0.012424	95	2	-	160	30	0.002329	0.92044	5	11	16	21	27	32	37	43	48	53	59	64	69	75	80	85	91	96	101	107	112	117	123	128	133	139	144	149	155	160
14	0.008893	68	2	-	69	20	0.002573	0.88266	4	7	10	14	17	21	24	28	31	35	38	41	45	48	52	55	59	62	66	69										
15	0.018439	141	2	-	133	19	0.002572	0.02506	1	8	15	22	29	36	43	50	57	64	71	78	85	92	99	106	113	120	127											
16	0.013731	105	2	-	120	23	0.002573	0.19580	2	7	12	17	22	28	33	38	43	49	54	59	64	69	75	80	85	90	95	101	106	111	116							
17	0.018178	139	2	-	165	23	0.002573	0.84644	7	14	21	28	35	42	50	57	64	71	78	85	93	100	107	114	121	128	136	143	150	157	164							
18	0.008239	63	2	-	90	28	0.002573	0.53018	2	5	9	12	15	18	21	25	28	31	34	38	41	44	47	50	54	57	60	63	66	70	73	76	79	82	86	89		
19	0.016608	127	2	-	98	15	0.002572	0.54311	4	11	17	24	30	37	43	50	56	63	69	76	82	89	95															
20	0.009416	72	2	-	75	20	0.002574	0.52813	2	6	10	14	17	21	25	29	32	36	40	44	47	51	55	59	62	66	70	74										

Figure 3.6 Self-weighting selection with runs and with sample size control

Num of HHs expected		Num of HHs selected	
Main sample	620	Main sample	624
Subsample 1	310	Subsample 1	319

Household selection

									1		2		3		4		5		6		7		8		9		10		11		12		13		14		15	
Cluster num	EA Probability	HH in base	Stratum	Segment info	Num HHs listed	Num of HHs selected	Overall probability	Random (0, 1)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.089851	456	1	-	345	17	0.004276	0.37154	36	37	38	39	40	136	137	138	139	140	241	242	243	244	245	341	342													
2	0.037832	192	1	-	103	12	0.004275	0.17906	6	7	8	9	10	51	52	53	54	55	91	92																		
3	0.026009	132	1	-	127	21	0.004274	0.37346	11	12	13	14	15	41	42	43	44	45	71	72	73	74	75	101	102	103	104	105	4									
4	0.029753	151	1	-	127	18	0.004276	0.97771	31	32	33	34	35	66	67	68	69	70	106	107	108	109	110	14	15	16												
5	0.019507	99	1	-	98	22	0.004276	0.25939	6	7	8	9	10	26	27	28	29	30	51	52	53	54	55	71	72	73	74	75	91	92								
6	0.026601	135	1	-	132	22	0.004274	0.17919	6	7	8	9	10	36	37	38	39	40	66	67	68	69	70	96	97	98	99	100	126	127								
7	0.034679	176	1	-	218	27	0.004274	0.85089	31	32	33	34	35	71	72	73	74	75	116	117	118	119	120	156	157	158	159	160	196	197	198	199	200	18	19			
8	0.033103	168	1	-	92	12	0.004275	0.50068	16	17	18	19	20	56	57	58	59	60	4	5																		
9	0.088471	449	1	0.46	247	26	0.004274	0.31150	11	12	13	14	15	61	62	63	64	65	106	107	108	109	110	156	157	158	159	160	201	202	203	204	205	4				
10	0.101279	514	1	0.55	245	19	0.004274	0.58240	36	37	38	39	40	101	102	103	104	105	166	167	168	169	170	231	232	233	234											
11	0.019507	99	1	-	122	27	0.004276	0.58464	11	12	13	14	15	36	37	38	39	40	56	57	58	59	60	81	82	83	84	85	101	102	103	104	105	4	5			
12	0.009939	76	2	-	40	11	0.002572	0.00559	1	2	3	4	5	16	17	18	19	20	36																			
13	0.012424	95	2	-	160	30	0.002329	0.28430	6	7	8	9	10	31	32	33	34	35	61	62	63	64	65	86	87	88	89	90	111	112	113	114	115	141	142	143	144	145
14	0.008893	68	2	-	69	20	0.002573	0.16263	1	2	3	4	5	21	22	23	24	25	36	37	38	39	40	51	52	53	54	55										
15	0.018439	141	2	-	133	18	0.002572	0.83721	31	32	33	34	35	66	67	68	69	70	101	102	103	104	105	8	9	10												
16	0.013731	105	2	-	120	22	0.002573	0.78642	21	22	23	24	25	46	47	48	49	50	76	77	78	79	80	101	102	103	104	105	11	12								
17	0.018178	139	2	-	165	23	0.002573	0.44707	16	17	18	19	20	51	52	53	54	55	86	87	88	89	90	121	122	123	124	125	156	157	158							
18	0.008239	63	2	-	90	28	0.002573	0.80425	11	12	13	14	15	26	27	28	29	30	46	47	48	49	50	61	62	63	64	65	76	77	78	79	80	1	2	3		
19	0.016608	127	2	-	98	15	0.002572	0.18038	6	7	8	9	10	36	37	38	39	40	71	72	73	74	75															
20	0.009416	72	2	-	75	21	0.002574	0.01884	1	2	3	4	5	16	17	18	19	20	36	37	38	39	40	51	52	53	54	55	71									

Figure 3.7 Manual household selection in the field

Form DHS/4 **Household Selection Form**

Cluster ID I__I__I__I Locality:............................ Urban-Rural : .... I I

EA number: I I I I Region : ....I I I District : ....I I I

Number of households listed N= 126 Number of households to be selected n= 25

Random number (0, 1) R = 0.43 Selection interval I= N/n = 5.04 Term t_1 = IxR = 2.17

SN° of selection k	Term (k>1) $t_k = t_{k-1} + I$	Selected HH number	Address of household	Name of household head
1	2.17	3		
2	7.21	8		
3	12.25	13		
4	17.29	18		
5	22.33	23		
6	27.37	28		
7	32.41	33		
8	37.45	38		
9	42.49	43		
10	47.53	48		
11	52.57	53		
12	57.61	58		
13	62.65	63		
14	67.69	68		
15	72.73	73		
16	77.77	78		
17	82.81	83		
18	87.85	88		
19	92.89	93		
20	97.93	98		
21	102.97	103		
22	108.01	109		
23	113.05	114		
24	118.09	119		
25	123.13	124		
26				
27				
28				
29				
30				

Notes:
Random number R is between 0 and 1, with two decimal places

3.3 Probability proportional to size sampling

3.3.1 Sampling theory

In order to increase sampling efficiency, a sampling procedure can attribute different selection probabilities to different sampling units. In general, a "large" sampling unit will contribute more to the sampling variance if equal probability selection is used. If large sampling units are selected with larger chances, sampling variance may be greatly reduced. To the extreme, a good strategy is to select very large sampling units with certainty or with a probability of one. Assuming that each sampling unit has some kind of known measure of size which is positively correlated with the variable of interest, a *Probability Proportional to the measure of Size* (*PPS*) selection has the same four advantages as *SYS* sampling. This procedure assigns each sampling unit a specific chance to be selected in the sample before the sampling begins, and the chance is proportional to its measure of size.

Let M_i be the measure of size of unit *i*; let $\sum_1^N M_i$ be the total measure of size; let *n* be the design sample size. A *PPS* sampling procedure will select unit *i* with a probability π_i such that

$$\pi_i = \frac{nM_i}{\sum M_i}$$

The design weight (assuming no non-response) is given by

$$D_i = 1/\pi_i = \frac{\sum M_i}{nM_i}$$

Let $y_1, y_2, \ldots y_n$ be the observations made from the selected units on a variable of interest, then the weighted sum of the observations

$$\hat{y}_{PPS} = \sum_1^n D_i y_i = \sum_1^n \frac{y_i}{\pi_i}$$

is an unbiased estimator of the population total $Y = \sum_1^N y_i$. The variance of this estimator is given by

$$V(\hat{y}_{PPS}) = \frac{1}{2}\sum_{i=1}^{N}\sum_{j\neq i, j=1}^{N}(\pi_i\pi_j - \pi_{ij})\left(\frac{y_i}{\pi_i} - \frac{y_j}{\pi_j}\right)^2 \quad \text{(Yates-Grundy, 1953)}$$

where π_{ij} is the joint probability of selecting units *i* and *j* together in a sample. If all the joint probabilities $\pi_{ij} > 0$, then the above variance can be estimated unbiased by:

$$\hat{V}(\hat{y}_{PPS}) = \frac{1}{2}\sum_{i=1}^{n}\sum_{j\neq i, j=1}^{n}\left(\frac{\pi_i\pi_j - \pi_{ij}}{\pi_{ij}}\right)\left(\frac{y_i}{\pi_i} - \frac{y_j}{\pi_j}\right)^2 \quad \text{(Yates-Grundy, 1953)}$$

However, the above estimator is not calculable because the joint probabilities π_{ij} are usually unknown. Hartley and Rao (1962) provided an approximation of the above estimator which involves only the first order selection probabilities π_i:

$$\hat{V}_{HR}(\hat{y}_{PPS}) \cong \frac{1}{2}\frac{1}{n-1}\sum_{i=1}^{n}\sum_{j\neq i, j=1}^{n}\left(1 - (\pi_i + \pi_j) + \frac{1}{n}\sum_1^N \pi_k^2\right)\left(\frac{y_i}{\pi_i} - \frac{y_j}{\pi_j}\right)^2 \quad \text{(Hartley-Rao, 1962)}$$

But the Hartley-Rao estimator requires knowledge of the selection probability of all sampling units in the population (through $\sum_1^N \pi_k^2$) which is usually not calculated in the sample selection. The general documentation just keeps the selection probability for the selected units. By replacing $\sum_1^N \pi_k^2$ by its sample estimation $\sum_1^n \frac{\pi_i^2}{\pi_i} = \sum_1^n \pi_i$, the Hartley-Rao estimator can be further simplified (Ren, 2003)

$$\hat{V}_R(\hat{y}_{PPS}) = \frac{n}{n-1}\sum_1^n (1-\pi_i)\left(\frac{y_i}{\pi_i} - \frac{\hat{y}_{PPS}}{n}\right)^2$$

In the case of equal probability sampling, both $\hat{V}_{HR}(\hat{y}_{PPS})$ and $\hat{V}_R(\hat{y}_{PPS})$ will be reduced to the variance estimator with simple random sampling approximation. Suppose that $\pi_i < 1$ for all *i*, both Yates-Grundy and Hartley-Rao estimators may produce negative variance estimation, while $\hat{V}_R(\hat{y}_{PPS})$ is always positive.

Wolter (1984; 1985) conducted an extensive study on the variance estimation for systematic sampling, including the successive difference estimator similar to $\upsilon_{sys}^*(\bar{y})$. He recommends the use of the Hartley-Rao estimator if the population does not present any trends in the measure of size variable and the variable of interest, especially when a confidence interval is required.

The above results for population total estimation can be adapted to mean estimation:

$$\bar{y}_{PPS} = \sum_1^n D_i y_i \,/\, \sum_1^n D_i = \sum_1^n \frac{y_i}{\pi_i} \,/\, \sum_1^n \frac{1}{\pi_i}$$

$\bar{y}_{PPS}$ is an approximately unbiased estimator for the population mean with approximate variance given by:

$$V(\bar{y}_{PPS}) = \frac{1}{N^2}\sum_{i=1}^{N}\sum_{j=1}^{N}(\pi_i\pi_j - \pi_{ij})\left(\frac{y_i - \bar{Y}}{\pi_i}\right)\left(\frac{y_j - \bar{Y}}{\pi_j}\right)$$

If the units are not specially ordered according to the variable of interest in the sampling frame, the approximate sample variance of the estimator can be estimated by

$$\hat{V}_R(\bar{y}_{PPS}) = \frac{1}{\left(\sum_1^n D_i\right)^2}\frac{n}{n-1}\sum_1^n (1-\pi_i)\left(\frac{y_i}{\pi_i} - \frac{\hat{y}_{PPS}}{n}\right)^2$$

The above estimator will be reduced to the simple random sampling approximation $\upsilon_{sys}(\bar{y})$ in case of equal probability systematic sampling.

3.3.2 Operational description and examples

There are many ways to draw a *PPS* sample, but the easiest way is the *PPS* systematic sampling summarized in the following:

1) List the sampling units with their measure of size M_i

2) Calculate the cumulative measure of size $C_k = \sum_1^k M_i$ for each unit *k*, and check that the last entry C_N equals the total measure of size $\sum_1^N M_i$

3) Let n be the number of units to be selected. Compute the sampling interval $I = \frac{\sum_1^N M_i}{n}$

4) Generate a random number R between 0 and *1*

5) Compute the sampling numbers $R*I$, $R*I+I$, $R*I+2*I$, ..., $R*I+(n-1)*I$

6) For each sampling number $R*I+(j-1)*I$, the j^{th} sampled unit is unit k if C_k is the first cumulative size bigger than the sampling number $R*I+(j-1)*I$

7) Calculate the selection probability of each selected unit j: $\frac{n*M_j}{\sum_1^N M_i}$

The following example demonstrates how manual selection is done.

Example 3.3.1:

Let N=20, n=5, $\sum_1^{20} M_i = 4004$; therefore the sampling interval $I = 801$; let the generated random number be $R = 305$. The sampling numbers and the selected unit numbers are as follows:

ID number	Size measure M_i	Cumulative C_k	Sampling number	j^{th} selected unit	Selection probability
1	139	139			
2	101	240			
3	184	424	305	1	0.22977
4	184	608			
5	104	712			
6	259	971			
7	219	1190	1106	2	0.273477
8	192	1382			
9	224	1606			
10	197	1803			
11	150	1953	1907	3	0.187313
12	257	2210			
13	270	2480			
14	195	2675			
15	296	2971	2707	4	0.36963
16	178	3149			
17	256	3405			
18	227	3632	3508	5	0.283467
19	247	3879			
20	125	4004			

The PPS sampling has the same advantages as equal probability systematic sampling, but with this procedure a unit may be selected more than once if the unit's measure of size is bigger than the sampling interval. These large units are said to have been selected with certainty, or are *self-representing units*. A unit selected more than once should be segmented to form a number of smaller units corresponding to the number of times the unit is selected. The selection probabilities should be recalculated using the sizes of the segmented units. With this strategy, the total sample size is kept the same as designed and the selection probabilities of the non-certainty units do not need to be adjusted.

Another way to deal with large units consists of examining the list of units before sampling begins. Computation of the interval will reveal whether there are any units of size greater than I. The simplest solution to prevent repetition during sampling might be to split each such unit into two or more approximately equal subunits of size less than I. The split would be made first on paper only. The measure of size for the original unit is divided equally among the subunits before sampling proceeds. Later the split is "materialized," either by drawing a line on the map of the unit, or by identifying a suitable dividing line during the first field visit to the unit.

If a substantial number of the units chosen to serve as PSUs are larger than the interval I, then the choice of such units to serve as PSUs was clearly incorrect. One solution to this problem is to place all PSUs with a measure of size larger than a threshold (not necessarily greater than or equal to I) before sampling and to give them special treatment, and call them self-representing units. They are not, therefore, sampling units but strata by definition. A new type of sampling unit has to be designated to serve as PSU within these areas. For the purpose of sampling error computation, it is important to realize that the term self-representing PSU is misleading. The self-representing units are in fact strata, while the new, smaller units or sub-units within them are the true PSUs. This treatment requires re-calculating the sample allocation, and then proceeding with sample selection independently in each stratum.

An Excel template for stratified PPS or equal probability systematic sampling has been developed. Figure 3.8 below shows a portion of a blank template. Figure 3.9 shows an example of stratified PPS sampling with the strata being the urban and rural areas within each province.

Figure 3.8 Part of an Excel template for stratified sampling

Stratified systematic sampling with probability proportional to size

	Random (0, 1)								
	Stratum num								
	Stratum size								
	St Sample size								
	Stratum num								
	Stratum size								
	St Sample size								
	Stratum num								
	Stratum size								
	St Sample size								
	Stratum num								
	Stratum size								
	St Sample size								
	Col name of Dom/Region			Col name of urban/rural			Col name of PSU size		
	Total number of strata			Total sample size			# of Diff PSU selected		
Serial numb	Dom/Region name/code	Urban/ rural	PSU Size	Stratum number	Selection Probability	# of times Selected	Stratum size	Stratum sample size	Measure size: stratum
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Paste the frame file below

Figure 3.9 Part of an example for a province crossed urban-rural stratified PPS sampling

Stratified systematic sampling with probability proportional to size
ICF Macro
by Ruilin Ren

Random (0, 1)								
Stratum num	1	2	3	4	5	6	7	8
Stratum size	15	200	15	233	19	279	35	247
St Sample size	3	10	3	17	3	20	3	17
Stratum num	9	10	11	12	13	14	15	16
Stratum size	11	151	17	215	90	292	3	116
St Sample size	2	6	4	16	5	20	2	8
Stratum num								
Stratum size								
St Sample size								
Stratum num								
Stratum size								
St Sample size								
Col name of Dom/Reg		m	Col name of urbrural		r	Col name of PSU size		q
Total number of strata		16	Total sample size		139	# of Diff PSU selected		139

Serial numb	Dom/Reg name/code	Urban/ rural	PSU Size	Stratum number	Selection Proba	# of times Selected	Stratum size	Stratum sam-size	Measure size-strat	Province	Code	Commune	Code	EA	HH	type
1	1	1	163	1	0.168330	0	15	3	2905	BALE	1	BOROMO	3	A001	163	1
2	1	1	250	1	0.258176	0	15	3	2905	BALE	1	BOROMO	3	A002	250	1
3	1	1	109	1	0.112565	0	15	3	2905	BALE	1	BOROMO	3	A003	109	1
4	1	1	205	1	0.211704	0	15	3	2905	BALE	1	BOROMO	3	A004	205	1
5	1	1	203	1	0.209639	0	15	3	2905	BALE	1	BOROMO	3	B005	203	1
6	1	1	155	1	0.160069	1	15	3	2905	BALE	1	BOROMO	3	B006a	155	1
7	1	1	167	1	0.172461	0	15	3	2905	BALE	1	BOROMO	3	B006b	167	1
8	1	1	170	1	0.175559	0	15	3	2905	BALE	1	BOROMO	3	B006c	170	1
9	1	1	138	1	0.142513	0	15	3	2905	BALE	1	BOROMO	3	B007	138	1
10	1	1	308	1	0.318072	0	15	3	2905	BALE	1	BOROMO	3	B008	308	1
11	1	1	240	1	0.247849	1	15	3	2905	BALE	1	BOROMO	3	B009	240	1
12	1	1	303	1	0.312909	0	15	3	2905	BALE	1	BOROMO	3	C010	303	1
13	1	1	191	1	0.197246	0	15	3	2905	BALE	1	BOROMO	3	C011	191	1
14	1	1	130	1	0.134251	0	15	3	2905	BALE	1	BOROMO	3	C012	130	1
15	1	1	173	1	0.178657	1	15	3	2905	BALE	1	BOROMO	3	C013	173	1
16	1	2	139	2	0.038038	0	200	10	36542	BALE	1	BAGASSI	1	A001	139	2
17	1	2	101	2	0.027639	0	200	10	36542	BALE	1	BAGASSI	1	A002	101	2
18	1	2	184	2	0.050353	0	200	10	36542	BALE	1	BAGASSI	1	A003	184	2
19	1	2	184	2	0.050353	0	200	10	36542	BALE	1	BAGASSI	1	A004	184	2
20	1	2	104	2	0.028460	0	200	10	36542	BALE	1	BAGASSI	1	A005	104	2
21	1	2	259	2	0.070877	0	200	10	36542	BALE	1	BAGASSI	1	B006	259	2
22	1	2	219	2	0.059931	1	200	10	36542	BALE	1	BAGASSI	1	B007	219	2
23	1	2	192	2	0.052542	0	200	10	36542	BALE	1	BAGASSI	1	B008	192	2
24	1	2	224	2	0.061299	0	200	10	36542	BALE	1	BAGASSI	1	B009	224	2
25	1	2	197	2	0.053911	0	200	10	36542	BALE	1	BAGASSI	1	B010	197	2

In Figure 3.9 above, the number of times in which an EA is selected is indicated in the column labeled "# of times selected". Use the filter to locate the selected units and copy them to a new file. Figure 3.10 below gives an example of a portion of a prepared sample file. This is an example; it does not reflect any actual clusters selected for a DHS. The first column gives the cluster number which is assigned by the statistician. The clusters are sorted in the original order as in the sampling frame. The last six columns are the sampling parameters calculated by the program including:

- EA selection probability "Selection Proba",
- number of EAs by stratum "Stratum size",
- number of EAs selected by stratum "Stratum sam-size",
- total measure of size by stratum (total number of households) "Measure size-strat",
- stratum number and
- number of times the unit has been selected.

These are important sampling parameters which must be present in a sample file.

Figure 3.10 Part of an example sample file from a stratified PPS sampling

Cluster number	Province	Code	Commune	Code	EA	HH	type	Selection Proba	Stratum size	Stratum sam-size	Measure size-strat	Stratum number	# of times Select
1	BALE	1	BAGASSI	1	B007	219	2	0.059931	200	10	36542	2	1
2	BALE	1	BAGASSI	1	E026	136	2	0.037217	200	10	36542	2	1
3	BALE	1	BANA	2	B007	301	2	0.082371	200	10	36542	2	1
4	BALE	1	BOROMO	3	B006a	155	1	0.160069	15	3	2905	1	1
5	BALE	1	BOROMO	3	B009	240	1	0.247849	15	3	2905	1	1
6	BALE	1	BOROMO	3	C013	173	1	0.178657	15	3	2905	1	1
7	BALE	1	FARA	4	A001	143	2	0.039133	200	10	36542	2	1
8	BALE	1	FARA	4	E023	193	2	0.052816	200	10	36542	2	1
9	BALE	1	OURY	5	B009	146	2	0.039954	200	10	36542	2	1
10	BALE	1	PA	6	A001	213	2	0.058289	200	10	36542	2	1
11	BALE	1	PA	6	D017	150	2	0.041049	200	10	36542	2	1
12	BALE	1	POURA	8	C011	186	2	0.050900	200	10	36542	2	1
13	BALE	1	YAHO	10	A004	230	2	0.062941	200	10	36542	2	1
14	BANWA	2	BALAVE	11	A002	109	2	0.044718	233	17	41437	4	1
15	BANWA	2	BALAVE	11	D017	209	2	0.085745	233	17	41437	4	1
16	BANWA	2	KOUKA	12	B010	205	2	0.084104	233	17	41437	4	1
17	BANWA	2	KOUKA	12	F027	156	2	0.064001	233	17	41437	4	1
18	BANWA	2	KOUKA	12	I043	117	2	0.048001	233	17	41437	4	1
19	BANWA	2	KOUKA	12	K056	184	2	0.075488	233	17	41437	4	1
20	BANWA	2	SANABA	14	B008	92	2	0.037744	233	17	41437	4	1
21	BANWA	2	SANABA	14	E025	211	2	0.086565	233	17	41437	4	1
22	BANWA	2	SOLENZO	15	A004	93	2	0.038154	233	17	41437	4	1
23	BANWA	2	SOLENZO	15	D019	144	2	0.059078	233	17	41437	4	1
24	BANWA	2	SOLENZO	15	G034	362	2	0.148515	233	17	41437	4	1
25	BANWA	2	SOLENZO	15	J047	240	2	0.098463	233	17	41437	4	1
26	BANWA	2	SOLENZO	15	M062	190	2	0.077950	233	17	41437	4	1
27	BANWA	2	SOLENZO	15	P078	128	1	0.131823	15	3	2913	3	1
28	BANWA	2	SOLENZO	15	Q084	136	1	0.140062	15	3	2913	3	1
29	BANWA	2	SOLENZO	15	R088	274	1	0.282183	15	3	2913	3	1
30	BANWA	2	SOLENZO	15	S090	226	2	0.092719	233	17	41437	4	1
31	BANWA	2	SOLENZO	15	U104	187	2	0.076719	233	17	41437	4	1
32	BANWA	2	TANSILA	16	A005	203	2	0.083283	233	17	41437	4	1
33	BANWA	2	TANSILA	16	D018	233	2	0.095591	233	17	41437	4	1
34	KOSSI	3	BARANI	17	C012	210	2	0.089815	279	20	46763	6	1
35	KOSSI	3	BARANI	17	E026	203	2	0.086821	279	20	46763	6	1
36	KOSSI	3	BARANI	17	G038	158	2	0.067575	279	20	46763	6	1
37	KOSSI	3	BOMBOROKU	18	A004	223	2	0.095375	279	20	46763	6	1
38	KOSSI	3	BOURASSO	19	A002	152	2	0.065009	279	20	46763	6	1
39	KOSSI	3	DJIBASSO	20	A003	234	2	0.100079	279	20	46763	6	1
40	KOSSI	3	DJIBASSO	20	D018	176	2	0.075273	279	20	46763	6	1

3.4 Complex sampling procedures

The sampling procedures used in DHS surveys are usually complex involving multi-stage selection, clustering and stratification, with a combination of *PPS* sampling in the first stage and an equal probability systematic sampling in the second stage. Multi-stage selection is employed due to the lack of a sampling frame at the individual level; clustering is used for implementing efficiency and stratification for the reduction of sampling errors. The DHS sampling procedure has been discussed in some detail in Section 1.8; here we give the basic theoretical properties of the estimator, the variance and variance estimation for a two–stage cluster sampling.

Consider a two-stage stratified cluster sampling, with n_h PSUs selected in stratum *h* in the first stage with *PPS* sampling, and for each of the selected PSUs, an equal probability systematic sample of *m* SSUs is selected. Let $y_{hj1}, y_{hj2},\ldots,y_{hjm}$ be observations from the j^{th} PSU in stratum *h*. An unbiased estimator of the population total is given by

$$\hat{Y}_{PPS} = \sum_h \sum_j \frac{\hat{Y}_{hj}}{\pi_{Phj}}, \text{ with } \hat{Y}_{hj} = \frac{M_{hj}}{m} \sum_i y_{hji}$$

where π_{Phj} is the selection probability of the j^{th} PSU in stratum h; M_{hj} is the number of SSUs in the j^{th} PSU in stratum h. The variance of this estimator is given by

$$V(\hat{Y}_{PPS}) = \underbrace{\frac{1}{2} \sum_h \sum_k \sum_j (\pi_{Phk}\pi_{Phj} - \pi_{Phkj}) \left(\frac{Y_{hk}}{\pi_{Phk}} - \frac{Y_{hj}}{\pi_{Phl}} \right)^2}_{(V_P)} + \underbrace{\sum_h \sum_j \frac{1}{\pi_{Phj}} \frac{1-1/M_{hi}}{m} S_h^2 (1+(m-1)\rho_{hw})}_{(V_s)}$$

The first part (V_P) represents the sampling variance of the selection of a PSU, the summation is over all strata for different PSU j and k within the same stratum; the second part (V_S) represents the sampling variance of the selection of an SSU, the summation is over all strata and PSU. Estimators for the first part and second part are obtained from the results in previous sections

$$\hat{V}_P = \frac{1}{2} \sum_h \sum_k \sum_j \frac{\pi_{Phk}\pi_{Phj} - \pi_{Phkj}}{\pi_{Phkj}} \left(\frac{\hat{Y}_{hk}}{\pi_{Phk}} - \frac{\hat{Y}_{hj}}{\pi_{Phl}} \right)^2, \quad \hat{V}_S = \sum_h \sum_j \frac{1}{\pi_{Phj}} \frac{1-f_{hj}}{m} s_h^2$$

Since the $\hat{V}_P$ is not an unbiased estimate of V_P and it usually over estimates V_P, and that V_S is usually smaller compared to V_P, therefore the second part is usually dropped in the variance estimation, this gives an approximate variance estimation given by

$$\hat{V}(\hat{Y}_{PPS}) = \frac{1}{2} \sum_h \sum_k \sum_j \frac{\pi_{Phk}\pi_{Phj} - \pi_{Phkj}}{\pi_{Phkj}} \left(\frac{\hat{Y}_{hk}}{\pi_{Phk}} - \frac{\hat{Y}_{hj}}{\pi_{Phl}} \right)^2$$

The above estimator can be simplified as $\hat{V}_R(\hat{y}_{PPS})$ in Section 3.3.1

$$\hat{V}_R(\hat{Y}_{PPS}) = \sum_h \frac{n_h}{n_h - 1} \sum_j (1 - \pi_{Phj}) \left(\frac{\hat{Y}_{hj}}{\pi_{Phj}} - \frac{\hat{Y}_h}{n_h} \right)^2$$

which is reduced to the Woodruff (1971) estimator if $\pi_{Phj} \cong f_h$ for all h:

$$\hat{V}_W(\hat{Y}_{PPS}) = \sum_h \frac{n_h(1-f_h)}{n_h - 1} \sum_j \left(\frac{\hat{Y}_{hj}}{\pi_{Phj}} - \frac{\hat{Y}_h}{n_h} \right)^2$$

where $\hat{Y}_h = \sum_j \frac{\hat{Y}_{hj}}{\pi_{Phj}}$ is the sample estimation of the population total of stratum h.

The above estimator can be expanded to estimate a mean or a ratio by using Woodruff's (1971) linearization approach: let $\hat{R} = \hat{Y}_{PPS} / \hat{X}_{PPS}$, where $\hat{Y}_{PPS}$ represents the total weighted sample value for variable y, and $\hat{X}_{PPS}$ represents the total weighted sample value for variable x or the total number of weighted cases in the group or subgroup under consideration. The approximate variance of $\hat{R}$ can be computed using Woodruff's formula:

$$\hat{V}_W(\hat{R}) = \frac{1}{\hat{X}_{PPs}^2} \sum_h \frac{n_h(1-f_h)}{n_h - 1} \sum_{i=1}^{n_h} \left(z_{hi} - \frac{z_h}{n_h} \right)^2$$

in which

$$z_{hi} = \left(\hat{Y}_{hj} - \hat{R}\hat{X}_{hj}\right) / \pi_{Phj} \text{, and } z_h = \hat{Y}_h - \hat{R}\hat{X}_h$$

The above estimator is widely used in commercial statistical software such as SAS, SPSS and Stata. Repeated replication methods such as Bootstrap and Jackknife (Efron, 1982; Efron 1993) can also be used to estimate the variance of $\hat{R}$, as explained in Section 4.2 for estimating sampling errors for complex demographic rates. It should be noted that the DHS survey sampling error calculation procedure has traditionally used the Taylor linearization method (Woodruff, 1971) to calculate the sampling variance for means and ratios because the linearization method is faster computationally than the replication methods.

4 SURVEY ERRORS

The estimates from a sample survey are affected by two types of errors: non-sampling errors and sampling errors. Non-sampling errors are the results of problems occurring during data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts are made during the implementation of a DHS to minimize this type of error, non-sampling errors are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in a DHS is only one of many samples that could have been selected from the same population, using the same design and expected size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability between all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results. Sampling errors are addressed in some detail in Section 1.6. The following sections of this chapter concentrate on non-sampling errors, including the nature and the sources of errors and the strategies to control them.

As mentioned in Section 1.6, non-sampling errors are usually the main source of errors in a sample survey, and they are difficult to evaluate statistically after the survey is complete. Therefore it is best to minimize this type of error throughout the whole survey implementation process.

4.1 Errors of coverage and non-response

A *coverage error* occurs when a sampling unit is mistakenly excluded from or included in the survey during survey implementation. *Over-coverage* occurs when a non-eligible or a non-sampled sampling unit is deliberately or mistakenly included in the sample; *under-coverage* occurs when a sampled eligible sampling unit is deliberately or mistakenly excluded from the sample. *Non-response*, on the other hand, relates to a failed attempt to interview a sampled sampling unit. This section deals with problems in the definition and estimation of such error rates.

4.1.1 Coverage errors

In DHS surveys, errors of over-coverage (inclusion of units that do not belong in the sample), do not occur as often as under-coverage errors (errors due to exclusion of units that belong in the sample). A typical source of over-coverage occurs when vacant households or non-residential households are sampled for interview. This may occur if a household's occupancy status has changed between the time of the household listing and the household interview. Therefore, it is recommended that the time gap between the household listing and the main data collection should be reasonably small.

For under-coverage, several sources of error may be identified. The first source of under-coverage error arises in the listing stage when the listing staff covers less than the designated area. A second source of under-coverage error occurs when an age limit is used to determine eligibility for individual interview, field staff may misreport an individual's age to push them out of the eligible age range. A third source comes when surveys collect information only from *de facto* individuals (i.e., those who slept in the household the night before the survey). There may be deliberate omissions of eligible individuals by consciously misreporting their "residency" status as non *de facto*, which thereby disqualifies an individual from being eligible for interview. A fourth source comes when a series of questions in the questionnaire are only asked of a certain group. For example, questions related to pregnancy, delivery and child health are only asked for children born since a particular date—there may be omissions of children due to mis-recording of dates of birth as before the cutoff date—or questions regarding knowledge, attitudes and practices related to HIV are only asked if the respondent is recorded as knowing HIV or AIDS—there may be omissions of respondents due to mis-recording of their knowledge of HIV/AIDS. All four types of coverage errors may involve deliberate bias by fieldworkers seeking to reduce their workload.

Intentional errors can be controlled by intensive training and close supervision. Errors due to an outdated area frame can be reduced by scheduling the household listing operation before the main survey. Errors due to age distortion can be reduced by close supervision and routine quality control. Errors due to residency status can be reduced by changing the data collection strategy to interview all individuals within the age range regardless of their *de facto* status. For example, in DHS surveys, the interviewers are now instructed to interview all women age 15-49 regardless of whether they slept in the household the night before the survey. By requiring the interviewing of all women, the incentive for misreporting residency status has been eliminated. However, the de facto character of the surveys is maintained at the data analysis stage. Using different fieldworkers to conduct the household schedule and individual interviews will also help in eliminating age distortion, misreporting of residency status and mis-recording of dates and other key information. Active monitoring of fieldwork through fieldwork supervision visits and the early use of field check tabulations on collected data can also limit the scope and scale of under-coverage.

Coverage errors can be investigated after the survey fieldwork by a variety of methods. The sample can be extrapolated to the total population, and data from the last census can be extrapolated to the survey date for comparison. This check should be done separately for households and individuals. Age distortions can be investigated by studying the discontinuity in trends across the eligibility boundaries, for example, by looking at the ratio of women age 14 with those age 15, and those age 49 compared with those age 50. While it is tempting to introduce comparisons with males as a control, it should be noted that in most societies more males are educated than females, so more precise knowledge of their own age may reduce heaping at ages 15 and 50 among males compared with females.

4.1.2 Deliberate restrictions of coverage

In many surveys, whether in developed or developing countries, certain parts of the national territory are deliberately excluded from the survey for reasons of difficulty of access. Two distinct cases arise:

- Exclusion of clearly identified areas from the sampling frame—in this case, it is usual to state the coverage limitation in the survey report, which then becomes a report on the remainder of the country. Such exclusions are not regarded as coverage or response errors but simply as part of the definition of the survey domain.
- Ad hoc exclusions decided during or just prior to fieldwork—in many surveys it is not uncommon for the survey organization to abandon the attempt to conduct fieldwork in certain sampled clusters, whether due to floods, civil disturbance, or other practical constraints. Here the exclusions usually occur after sample selection. If such excluded areas form a meaningful domain, it may be acceptable to deal with the problem by redefining the survey domain. More commonly, however, the excluded areas will not form a meaningful domain and will have to be accepted as constituting errors. This type of exclusion should be classified as non-response rather than coverage error.

4.1.3 Non-response

The response rate provides information on the survey coverage problems and is an important survey parameter. At first sight, the concept of non-response seems simple and clear: it occurs when a sampled unit, household or individual, refuses to be interviewed; the non-response rate is the proportion of the number of non-interviewed units over the number of units selected. Taking into account the distinction between coverage error and non-response indicated earlier, this can be modified by saying that the information desired is the percentage of attempted interviews that failed.

In practice, there are two features found in some sample designs which complicate this simple issue. First, in many surveys the final units for interview are identified through a progressive sifting process. For example, in a typical DHS survey, survey personnel list and select dwellings, interview the household currently in the dwelling, then interview any women age 15-49 in that household. If failure occurs at one of the earlier steps, the information which would enable us to classify the effects at the final level (i.e., the individual level) is lacking. For example, if the interviewer cannot find the selected dwelling, it is not known whether it contains a woman eligible for interview; if the household does not contain any eligible women, then the failure has no effect on the interview response rate.

To deal with this problem, take the women's survey as an example, and assume that there are only two steps in the sifting process, namely households and women. The tradition of DHS surveys is to compute the response rates for the household survey and the women's interview separately because of the way that sample weights are calculated. There are six quantities of potential interest in computing response rates:

A. Households selected

B. Households found or eligible (excluding vacant, destroyed, etc.)

C. Households interviewed

D. Women selected

E. Women found or eligible (all *de facto* women 15-49 found)

F. Women interviewed

Since the survey primarily concerns women, the relevant response rate is F/D (i.e., women interviewed divided by women selected). However, the quantity D is unknown because of the non-responding households. It is of interest to know the total number of eligible women in all selected households but, only the number the number of women found in the households interviewed (E) is known. Therefore D must be estimated by taking the household non-response into account. Assuming that the number of eligible women per household is the same among non-responding households as it is among interviewed households, the number of women selected can be estimated as:

$$D = E \div \frac{C}{B}$$

where C / B is the effective household response rate. The reason to use the effective household response rate is that the non-eligible (vacant, destroyed or other) households A-B is considered as over-coverage, assuming that same over-coverage exists in the household listing. These assumptions may not be very convincing, but the effect of any departure from them on the estimate of D is likely to be very small. On this basis the overall response rate for the women's survey, R=F/D, becomes:

$$R = \frac{F}{D} = \frac{F}{E} \times \frac{C}{B}$$

This response rate is the product of the response rates observed at each of the two stages, households and women. This basic principle provides a solution for the problem of not knowing the total number of women sampled. Where two or more steps of sifting are involved, the overall response rate can be estimated by multiplying together the response rates observed at each step. In doing so, the assumption is made that the response/non-response outcomes at the different steps occur independently.

DHS surveys do not allow the replacement of non-responding households because of the potential bias which may result from the replaced households being easier to contact. However, when a sampled household in a selected dwelling moves away between the listing and the interview, the MEASURE DHS program recommends interviewing the new household (if any) that has moved in by the time of the main survey. This is not considered a replacement; in fact it reflects the fact that the sampling unit is defined as the dwelling structure rather than its occupants. The design calls for the listing and selection of dwellings, and then for the interview of the household found in the dwelling at the time of the survey. Since in many areas there is no address system, the initial listing operation has to identify the dwellings in terms of the names of the occupying households, but these merely serve as addresses. The fact that, in some cases, a new household moves in between the time of listing and interview does not mean that replacement of a sampling unit has occurred. Thus, such cases do not require any special treatment. Moreover, just as a new household moving in does not constitute a replacement, so the case of a household moving out after the listing without another moving in, creating a vacant household, does not constitute non-response. The eligible household sample is defined as the set of households existing at the time of interviewing in the dwellings selected from the dwelling list.

4.1.4 Response rates

As seen in the previous section, the women's overall response rate is the product of the observed household and women's response rates, therefore, it is meaningful to calculate these two response rates separately. As we mentioned in Section 1.13, non-response brings bias. Therefore, the different response rates reflect the data quality. A separate response rate is useful in sample size design and field work improvement. In order to categorize in detail the non-responding households and individuals, the MEASURE DHS program standardized the response codes to be entered on the questionnaires and field records, and expressed the formulae for response rates in terms of these codes. In DHS surveys, the following response categories are used at the household level:

1H Completed

2H No household member at home or no competent respondent at home

3H Entire household absent for extended period

4H Postponed

5H Refused

6H Dwelling vacant or address not a dwelling

7H Dwelling destroyed

8H Dwelling not found

9H Other

Note that household above refers to the household found in the dwelling at the time of the interview, not necessarily the household named at the time of the listing operation. The DHS survey final reports provide the household response rate calculated by:

$$R_H = \frac{1H}{1H + 2H + 4H + 5H + 8H}$$

The reason to include 8H in the denominator is that a household that is not found at the time of the fieldwork may not be a vacant household. It may be that the household was not found because of some error that occurred during the survey implementation. Note also that this response rate is different from the weighted response rate calculated in Section 1.13. In Section 1.13 the aim is to calculate the sampling weight, while here the response rate is used as a data quality indicator. It is also worth noting that the above calculated response rate is a *net response rate*. For the purpose of sample size determination, one should use the *gross response rate* which is the number of households interviewed over the number selected:

$$R_{HG} = \frac{1H}{1H + 2H + 3H + 4H + 5H + 6H + 7H + 8H + 9H}$$

If the net response rate is used to calculate sample size, the survey may not obtain the designed number of interviews because some of sampled households will always end up being non-eligible, especially when there is a long time lag between household listing and the main field work.

At the individual level the following response categories are used:

1I Completed

2I Not at home

3I Postponed

4I Refused

5I Partly completed

6I Incapacitated

7I Other

The individual response rate is thus:

$$R_I = \frac{1I}{1I + 2I + 3I + 4I + 5I + 6I + 7I}$$

The category "no eligible woman in the household" is not included in the list since it is irrelevant to the response rate, appearing neither in the numerator nor the denominator. The same is true for "non *de facto* women." Although an individual questionnaire is administered to non-*de facto* women who live in the household to reduce under-coverage errors as mentioned in Section 4.1.1, these interviews are not counted in the numerator or the denominator of the response rate because non-*de facto* women are not eligible according to the definition of eligibility.

Whenever the *other* code is used, the interviewers should specify the reason for non-response. At the household level, the analyst should review a printout of the other codes and recode as many as possible into the existing categories. Similarly, all other codes for the individual interview should be examined and recoded. Any questionnaire in which the household or the woman was deemed ineligible should be clearly marked as ineligible and removed from the data file. An ineligible household may be one in a dwelling unit that does not lie within the sample area or a neighboring household that was interviewed incorrectly as a replacement household. An ineligible woman may be one who was reported as 16 years old in the household questionnaire, but later turned out to be 14 (in which case her age in the household questionnaire should be corrected appropriately).

The overall response rate is obtained by multiplying the household and the individual level response rates:

$$R = R_h \times R_I$$

However, if there has been a deliberate exclusion of certain areas such as clusters which were not interviewed (see Section 1.13 on cluster level non-response), the overall response rate must also take the cluster response rate into account. In summary, the final overall estimated response rate is obtained from the formula:

$$R = R_h \times R_I \times R_C$$

where $R_c = n^* / n$ is the ratio of the number of clusters interviewed over the number selected.

Such response rates should be computed and published separately for the main geographic domains of the sample as well as the whole survey domain. If the sample is self-weighting within domain but has different weights across domains, the response rates should be computed and published for each differently weighted domain.

4.2 Sampling errors

We introduced the concept of sampling errors in Section 1.6 for sample size determination. In this section, we focus on the calculation of the sampling errors. Sampling errors are usually reported for selected indicators in Appendix B of the DHS final report.

A sampling error is usually measured in terms of the standard error for a particular statistic (mean, percentage, etc.), which is the square root of the variance. The standard error can be used to calculate confidence intervals within which the true value for the population can reasonably be assumed to fall. For example, for any given statistic calculated from a sample survey, the value of that statistic will fall within a range of plus or minus two times the standard error (DHS reports +/-2*SE instead of +/-1.96*SE as 95% confidence interval as explained in section 1.6.1) of that statistic in 95 percent of all possible samples of identical size and design.

If the sample of respondents were selected as a simple random sample, it would have been possible to use straightforward formulae to calculate sampling errors. However, DHS survey samples are the result of a multi-stage stratified design, so it is necessary to use more complex formulae. There is a variety of computer software which can be used to calculate sampling errors, such as the Integrated System for Survey Analysis (ISSA) sampling errors module and the ICF developed SAS macro as well as software such as Wesvar, Cenvar, and Sudaan. These software use the Taylor Linearization Method (Woodruff, 1971) of variance estimation for survey estimates that are means or proportions. This same method is widely used in commercialized statistical software such as SAS, SPSS and STATA. The Jackknife Repeated Replication Method (Efron, 1982, 1993) is used for variance estimation of more complex statistics such as fertility and mortality rates.

The Taylor Linearization Method treats any percentage or average as a ratio estimate, $r = y/x$, where y represents the total weighted sample value for variable y, and x represents the total weighted sample value for variable x or the total number of weighted cases in the group or subgroup under consideration. The variance of r is computed using the formula given below, with the standard error being the square root of the variance:

$$SE^2(r) = var(r) = \frac{1}{x^2} \sum_{h=1}^{H} \frac{n_h(1-f_h)}{n_h - 1} \sum_j \left(z_{hj} - \frac{z_h}{n_h} \right)^2$$

in which

$$z_{hi} = y_{hi} - rx_{hi} \text{ , and } \quad z_h = y_h - rx_h$$

where h represents the sampling stratum which varies from 1 to H,
n_h is the total number of clusters selected in the h^{th} stratum,
y_{hj} is the sum of weighted values of variable y in the j^{th} cluster in the h^{th} stratum,
x_{hj} is the sum of weighted values of variable x in the j^{th} cluster in the h^{th} stratum,
f_h is the sampling fraction in stratum h, it can be ignored when it is small
x is the sum of weighted values of variable x over the total sample

The Jackknife Repeated Replication Method derives estimates of complex rates from each of several replications of the parent sample, and calculates standard errors for these estimates using simple formulae. Each replication considers all but one cluster in the calculation of the estimates. Pseudo-independent replications are thus created. The variance of a rate r is calculated as follows:

$$SE^2(r) = Var(r) = \frac{1}{k(k-1)} \sum_{i=1}^{k} (r_i - r)^2$$

in which

$$r_i = kr - (k-1)r_{(i)}$$

where r is the estimate computed from the full sample of k clusters,
$r_{(i)}$ is the estimate computed from the reduced sample of k-1 clusters (with i^{th} cluster excluded), and
k is the total number of clusters.

In addition to the standard error, the procedure computes the design effect (*DEFT*) for estimates which are means, proportions or ratios. For complex demographic rates, the procedure computes an approximation of *DEFT*. *DEFT* is defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used. A *DEFT* value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design. The procedure also computes the relative error and confidence limits for the estimates.

Sampling errors are usually reported for the total sample, for the urban and rural areas, and for each of the survey domains.

5 SAMPLE DOCUMENTATION

5.1 Introduction

Sample documentation is an important part of a DHS survey. The documentation should include all useful information for data analysis, for data quality assessment, for sample design of subsequent surveys, and for data users. Basic sample documentation should be included in DHS survey final reports. Good sample documentation should include the following aspects from different stages of the survey implementation:

1) Target population
2) Expected sample size
3) Main indicators
4) Report domains
5) Sampling frame
6) Primary and the secondary sampling units
7) Stratification
8) Sample allocation
9) Sampling procedure
10) Selection probability
11) Household listing results
12) Sampling weights
13) Results of survey implementation
14) Sampling errors

Points 1 to 10 and point 12 are usually addressed in a Sample Design Document from the very beginning of the survey. For point 11, the number of households listed, the number of households selected, and segmentation information for each of the selected clusters should be provided. A full description sample design should be included in Appendix A of the DHS final reports. For point 13, the number of eligible sampling units selected, the number interviewed and the household and individual response rates should be presented. Sampling errors (point 14) are presented in Appendix B of DHS final reports for selected indicators.

5.2 Sample design document

A sample design document is an important document which records the purpose of the survey, the target population, the source of the sampling frame, the statistical methodology, the sample size and the sample allocation, and other related topics. This section gives an example of a sample design document to show the details which should be included in a sample design document.

5.2.1 Introduction

The Country Demographic and Health Survey 2012 (XDHS 2012) will be the fourth DHS following those implemented in 1995, 2000 and 2005. A nationally representative sample of 18,450 households will be selected. All women 15-49 who are usual residents of a selected household or who slept in a selected household the night before the survey are eligible for the survey. The survey will result in about 17,900 interviews of women 15-49. As with the prior surveys, the main objectives of the XDHS 2012 survey are to provide up-to-date information on fertility and childhood mortality levels; fertility preferences; awareness, approval and use of family planning methods; maternal and child health; knowledge and attitudes toward HIV/AIDS and other sexually transmitted infections (STI).

Apart from the women's survey, a men's survey will also be conducted at the same time in a sub-sample consisting of one household in every three selected for the women's survey. All men 15-59 who are usual residents of a selected household or who slept in a selected household the night before the survey are eligible for the men's survey. The survey will collect information on their basic demographic and social status; on their knowledge and use of family planning methods; and on their knowledge and attitudes toward HIV/AIDS and other sexually transmitted infections. The survey will result in about 5,000 interviews of men 15-49. In this sub-sample, all women 15-49, all children under 5 years of age will be weighed, measured and tested for anemia in order to study their nutritional status.

The survey is designed to produce representative estimates for most of the indicators for the country as a whole, for the urban and the rural areas separately, for the capital city of the country, and for each of the ten geographical regions.

5.2.2 Sampling frame

The sampling frame used for XDHS 2010 is the Country Population and Housing Census conducted in 2006 (XPHC 2006), provided by the Central Statistical Office (CSO). CSO has made available an electronic file consisting of 81,654 Enumeration Areas (EAs) created for the 2006 census in 9 of its 10 regions. An EA is a geographic area consisting of a convenient number of dwelling units which served as a counting unit for the census. The frame file contains information about the location, the type of residence and the number of residential households for each of the 81,654 EAs. Sketch maps are also available for each EA which delineate the geographic boundaries of the EA. It should be pointed out that this file does not include Region 10 because the census conducted in Region 10 used a different methodology due to difficulty of access. Therefore, the sampling frame for Region 10 is in a different file and uses a different format. It is also worth noting that the sampling frame excluded some special EAs which have disputed boundaries; this kind of EA represents only 0.1% of the total population.

The census cartographic work for Region 10 was conducted using two different methods. In two of its six districts, namely, Districts 2 and 4, traditional cartographical work similar to the other regions of the country was carried out, while in the other four districts, the cartographic work was carried out by using satellite photos without physical visits of the area. The census data could not be used to update the cartographic work in Region 10 because of coding problems. So in Region 10, a sampling frame with a similar format as in the other regions is available only for the three zones where a traditional cartographic work had been carried out. However, the number of households in the sampling frame for these three zones is based on the number of households estimated during the cartographic work preceding the census and not the actual number of households counted in the census. Due to security concerns, as in the XDHS 2000 and XDHS 2005, it has been decided that the XDHS 2012 will be conducted only in these two districts. These two districts together have 1,246 EAs, and they represent 53% of the regional total population. Taking into account the special EAs which are excluded from the census frame, the sampling frame used for the XDHS 2012 covered 98.4% of the country's total population.

Country is divided into 10 geographical regions; each region is sub-divided into districts, and each districts into wards. Table 5.1 shows the distribution of the EAs and the mean number of households per EA by region and by type of residence. The sampling frame includes 82,900 EAs, among them 17,346 are in urban areas and 65,554 are in rural areas. The average size of an EA in terms of number of households is 170 in an urban EA and 182 in a rural EA, for an overall average size of 180 households per EA. Table 5.2 shows the distributions of households by region and by type of residence. The distribution is a very skewed distribution since 83.4% of the country's households are concentrated in 3 regions, namely, Region 3, Region 4 and Region 6; while the five small regions

Region 2, Region 5, Region 7, Region 8 and Region 9 together represent only 3.8% of the country's total households.

Table 5.1 Distribution of EAs and average size of EA by region and by type of residence

Region	Number of EA			Average EA size		
	Urban	Rural	Total	Urban	Rural	Total
Region 1	1,541	4,139	5,680	153	177	171
Region 2	260	828	1,088	177	233	219
Region 3	3,391	18,016	21,407	183	182	182
Region 4	5,030	25,800	30,830	172	179	178
Region 5	188	786	974	140	152	150
Region 6	2,124	14,490	16,614	166	184	182
Region 7	133	347	480	145	129	134
Region 8	172	98	270	163	180	169
Capital City	3,865		3,865	167		167
Region 9	318	128	446	163	169	165
Region 10*	324	922	1,246	154	267	237
Country	**17,346**	**65,554**	**82,900**	**170**	**182**	**180**

Source: XPHC 2006; Region 10 has only two districts included.

Table 5.2 Distribution of households by region and by type of residence

Region	Number of households			% Urban	% of Country
	Urban	Rural	Total		
Region 1	235,530	734,357	969,887	0.243	0.065
Region 2	45,910	192,554	238,464	0.193	0.016
Region 3	619,796	3,284,512	3,904,308	0.159	0.262
Region 4	864,303	4,630,702	5,495,005	0.157	0.369
Region 5	26,314	119,446	145,760	0.181	0.010
Region 6	353,554	2,667,787	3,021,341	0.117	0.203
Region 7	19,275	44,879	64,154	0.300	0.004
Region 8	27,975	17,651	45,626	0.613	0.003
Capital City	646,216	0	646,216	1.000	0.043
Region 9	51,991	21,643	73,634	0.706	0.005
Region 10*	49,844	245,922	295,766	0.169	0.020
Country	**2,940,708**	**11,959,453**	**14,900,161**	**0.197**	**1.000**

Source: XPHC 2006; Region 10 has only two districts included.

5.2.3 Structure of the sample and the sampling procedure

The sample for the XDHS 2012 will be a stratified sample selected in two stages from the 2006 census frame. Stratification was achieved by separating each region into urban and rural areas. In total, 19 sampling strata have been created since the region of Capital has only urban areas. Samples will be selected independently in each sampling stratum, by two-stage selection. Implicit stratification and proportional allocation is achieved at each of the lower administrative levels by sorting the sampling frame according to administrative units in different levels and by using a probability proportional to size selection at the first stage of sampling.

In the first stage, 615 EAs have been selected with probability proportional to EA size and with independent selection in each sampling stratum with the sample allocation given in table 5.3 below. Taking into account the time passed since the last population census, a household listing operation will be carried out in all of the selected EAs before the main survey. The household listing operation consists of visiting each of the 615 selected EAs; drawing a location map and a detailed sketch map; and recording on the household listing forms all residential households found in the EA with the address and the name of the head of the household. The resulting list of households will serve as the sampling frame for the selection of households in the second stage. Some of the selected EAs may be found to be large in size in the household listing operation. In order to minimize the task of household listing, the selected EAs containing an estimated number of households greater than 300 will be segmented. Only one segment will be selected for the survey with probability proportional to the segment size. The methodology and the detailed household listing procedure are addressed in the Household Listing Manual (see Chapter 2).

At the second stage, a fixed number of 30 households will be selected from each EA. Table 5.3 shows the sample distribution of clusters and households by region and by type of residence. Among the 615 EAs selected, 185 are in urban areas and 430 are in rural areas. The total number of households to be selected is 18,450; among them, 5,550 will be in urban areas and 12,900 will be in rural areas.

In the sampling frame, the household distribution by region varies from 0.3 percent for Region 8, to 36.9 percent for Region 4 (see Table 5.2 in Section 5.2.2). To allocate the approximately 17,900 women interviews to different regions, a proportional allocation will provide the best precision for national level indictors, but not for regional level indicators. The small regions such as Region 7, Region 8 and Region 9 would receive a sample size which is too small to achieve the degree of precision desired for regional level estimates. In order for the precision of estimates to be acceptable across regions, experience shows that a minimum of 800 women's interviews are needed so that reliable estimations for most of the DHS indicators can be obtained. The final sample allocation reflects a power allocation which is between the proportional allocation and the equal size allocation. So that the survey precision in the urban areas is comparable with the rural areas, urban areas are slightly over-sampled.

The allocations of clusters and households by region and by type of residence are functions of the estimated average number of women age 15-49 per household and the household and individual response rates. Estimates for these parameters are obtained from the XDHS 2005 survey. According to the results of XDHS 2005, the average number of women age 15-49 per household is 1.20 in urban areas and 1.00 in rural areas. The number of men age 15-49 per household is 1.05 in urban areas and 0.95 in rural areas. The household response rates are 92 percent in urban areas and 94 percent in rural areas; the women's response rates are 94 percent and 96 percent in the urban and rural areas, respectively; the men's response rates are 85 percent and 90 percent in the urban and rural areas, respectively.

Table 5.3 Sample allocation of clusters and households by region and by type of residence

Region	Allocation of clusters			Allocation of households		
	Urban	Rural	Region	Urban	Rural	Region
Region 1	13	47	60	390	1,410	1,800
Region 2	10	38	48	300	1,140	1,440
Region 3	10	62	72	300	1,860	2,160
Region 4	13	62	75	390	1,860	2,250
Region 5	6	42	48	180	1,260	1,440
Region 6	7	65	72	210	1,950	2,160
Region 7	9	37	46	270	1,110	1,380
Region 8	25	17	42	750	510	1,260
Capital City	54	na	54	1,620	na	1,620
Region 9	27	15	42	810	450	1,260
Region 10	11	45	56	330	1,350	1,680
Country	**185**	**430**	**615**	**5,550**	**12,900**	**18,450**

Table 5.4 Expected number of interviews by region and by type of residence

Statistical Region	Women interviewed			Men interviewed		
	Urban	Rural	Region	Urban	Rural	Region
Region 1	434	1,280	1,714	98	358	456
Region 2	333	1,035	1,368	76	290	366
Region 3	333	1,689	2,022	76	472	548
Region 4	434	1,689	2,123	98	472	570
Region 5	200	1,144	1,344	45	320	365
Region 6	233	1,771	2,004	53	495	548
Region 7	299	1,008	1,307	69	282	351
Region 8	834	463	1,297	189	130	319
Capital City	1,800	na	1,800	408	na	408
Region 9	901	409	1,310	205	114	319
Region 10	367	1,226	1,593	83	342	426
Country	**6,168**	**11,714**	**17,882**	**1,400**	**3,275**	**4,676**

Men's survey will be carried out in one household in every three selected for women's survey.

5.2.4 Selection probability and sampling weight

Due to the non-proportional allocation of the sample to the different regions and to their urban and rural areas, sampling weights will be required for any analysis using XDHS 2012 data to ensure the survey results are representative at national and regional levels. Since the XDHS 2012 sample is a two-stage stratified cluster sample, sampling weights will be calculated based on the separate sampling probabilities for each sampling stage and for each cluster. We use the following notations:

P_{1hi}: first-stage sampling probability of the i^{th} cluster in stratum h

P_{2hi}: second-stage sampling probability within the i^{th} cluster (household selection)

Let n_h be the number of clusters selected in stratum h, M_{hi} the number of households according to the sampling frame in the i^{th} cluster, and $\sum M_{hi}$ the total number of households in the stratum. The probability of selecting the i^{th} cluster in the XDHS 2012 sample is calculated as follows:

$$P_{1hi} = \frac{n_h\ M_{hi}}{\sum M_{hi}}$$

A different formula must be used to calculate the probability of selecting a cluster that has been segmented. Let b_{hi} be the proportion of households in the selected segment compared to the total number of households in the EA i in stratum h if the EA is segmented, otherwise $b_{hi} = 1$. Then the probability of selecting cluster i in the sample is:

$$P_{1hi} = \frac{n_h\ M_{hi}}{\sum M_{hi}} \times b_{hi}$$

Let L_{hi} be the number of households listed in the household listing operation in cluster i in stratum h, let t_{hi} be the number of households selected in the cluster. The second stage selection probability for each household in the cluster is calculated as follows:

$$P_{2hi} = \frac{t_{hi}}{L_{hi}}$$

The overall selection probability of each household in cluster i of stratum h is therefore the production of the two selection probabilities:

$$P_{hi} = P_{1hi} \times P_{2hi}$$

The design weight for each household in cluster i of stratum h is the inverse of its overall selection probability:

$$W_{hi} = 1 / P_{hi}$$

A spreadsheet containing all sampling parameters and selection probabilities is prepared to facilitate the calculation of sampling weights. Sampling weights will be adjusted for household non-response as well as for individual non-response, for the women’s and men’s surveys respectively. The differences between the household weights and the individual weights are introduced by individual non-response. The final weights are normalized so that the total number of unweighted cases will equal the total number of weighted cases at the national level, for both household weights and individual weights.

5.3 Sample file

A sample file including all sampling parameters is very important for survey management and for sampling weight calculation. Once the sample points are selected, an Excel file should be prepared which should include the cluster number and cluster ID information, and all sampling parameters such as the domain, stratum and EA selection probability. The cluster number is a unique serial number from 1 to the total number of clusters selected. It is important for communication and for field work supervision. The cluster number is the official cluster ID once assigned. It is also useful to include in the sample file the EA size, the total size of the stratum, the number of EAs in the stratum and the number of EAs selected in the stratum. These pieces of information allow for reconstruction of the selection probability, if needed, for example, for checking purposes and for replacement clusters.

If a selected cluster is not accessible due to security problems and a replacement cluster is selected, then from the sampling parameters it is easy to calculate the selection probability for the replacement cluster. Table 5.5 below shows a part of an example sample file. The columns with the lighter colored headings represent the sampling information provided by the sampling statistician. The columns with the darker colored headings represent the EA identification information from the sampling frame. This file should be updated after the household listing operation by adding the number of households listed, the segmentation information, and the number of households selected. These 3 pieces of information are necessary for developing the design weight for each cluster.

Table 5.5 An example sample file

Cluster number	Province	Code	Commune	Code	EA	HH	Urban=1 /Rural 2	Selection Proba	Stratum size	Stratum sam size	Measure size strat	Stratum number	# of times Select
1	Province 1	1	Commune 1	1	B007	219	2	0.059931	200	10	36542	2	1
2	Province 1	1	Commune 1	1	F026	136	2	0.037217	200	10	36542	2	1
3	Province 1	1	Commune 2	2	B007	301	2	0.082371	200	10	36542	2	1
4	Province 1	1	Commune 3	3	B006a	155	1	0.160069	15	3	2905	1	1
5	Province 1	1	Commune 3	3	D009	240	1	0.247849	15	3	2905	1	1
6	Province 1	1	Commune 3	3	C013	173	1	0.178657	15	3	2905	1	1
7	Province 1	1	Commune 4	4	A001	143	2	0.039133	200	10	36542	2	1
8	Province 1	1	Commune 4	4	F023	193	2	0.052816	200	10	36542	2	1
9	Province 1	1	Commune 5	5	D009	146	2	0.039954	200	10	36542	2	1
10	Province 1	1	Commune 6	5	A001	213	2	0.058289	200	10	36542	2	1
11	Province 1	1	Commune 6	5	D017	150	2	0.041049	200	10	36542	2	1
12	Province 1	1	Commune 8	8	C011	186	2	0.050900	200	10	36542	2	1
13	Province 1	1	Commune 10	10	A004	230	2	0.062941	200	10	36542	2	1
14	Province 2	2	Commune 11	11	A002	109	2	0.044718	233	17	41437	4	1
15	Province 2	2	Commune 11	11	D017	209	2	0.085745	233	17	41437	4	1
16	Province 2	2	Commune 12	12	B010	205	2	0.084104	233	17	41437	4	1
17	Province 2	2	Commune 12	12	F027	156	2	0.064001	233	17	41437	4	1
18	Province 2	2	Commune 12	12	I043	117	2	0.048001	233	17	41437	4	1
19	Province 2	2	Commune 12	12	K056	184	2	0.075488	233	17	41437	4	1
20	Province 2	2	Commune 14	14	D008	92	2	0.037744	233	17	41437	4	1
21	Province 2	2	Commune 14	14	L025	211	2	0.086565	233	17	41437	4	1
22	Province 2	2	Commune 15	15	A004	93	2	0.038154	233	17	41437	4	1
23	Province 2	2	Commune 15	15	D019	144	2	0.059078	233	17	41437	4	1
24	Province 2	2	Commune 15	15	G034	362	2	0.148515	233	17	41437	4	1
25	Province 2	2	Commune 15	15	J047	240	2	0.098463	233	17	41437	4	1
26	Province 2	2	Commune 15	15	M062	190	2	0.077950	233	17	41437	4	1
27	Province 2	2	Commune 15	15	P078	128	1	0.131823	15	3	2913	3	1
28	Province 2	2	Commune 15	15	Q084	136	1	0.140062	15	3	2913	3	1
29	Province 2	2	Commune 15	15	R088	274	1	0.282183	15	3	2913	3	1
30	Province 2	2	Commune 15	15	S090	226	2	0.092719	233	17	41437	4	1
31	Province 2	2	Commune 15	15	U104	187	2	0.076719	233	17	41437	4	1
32	Province 2	2	Commune 16	16	A005	203	2	0.083283	233	17	41437	4	1
33	Province 2	2	Commune 16	16	D018	233	2	0.095591	233	17	41437	4	1
34	Province 3	3	Commune 17	17	C012	210	2	0.089815	279	20	46753	6	1
35	Province 3	3	Commune 17	17	E026	203	2	0.086821	279	20	46753	6	1
36	Province 3	3	Commune 17	17	G038	158	2	0.067575	279	20	46753	6	1
37	Province 3	3	Commune 18	18	A004	223	2	0.095375	279	20	46753	6	1
38	Province 3	3	Commune 19	19	A002	152	2	0.065009	279	20	46753	6	1
39	Province 3	3	Commune 20	20	A003	234	2	0.100079	279	20	46753	6	1
40	Province 3	3	Commune 20	20	D018	176	2	0.075273	279	20	46753	6	1
41	Province 3	3	Commune 20	20	F032	187	2	0.079978	279	20	46753	6	1
42	Province 3	3	Commune 20	20	I046	366	2	0.156534	279	20	46753	6	1
43	Province 3	3	Commune 20	20	K059	265	2	0.113337	279	20	46753	6	1
44	Province 3	3	Commune 21	21	C017	195	2	0.083399	279	20	46753	6	1
45	Province 3	3	Commune 21	21	E033	225	2	0.096230	279	20	46753	6	1
46	Province 3	3	Commune 22	22	D018	149	2	0.063726	279	20	46753	6	1
47	Province 3	3	Commune 22	22	F032	203	2	0.086821	279	20	46753	6	1
48	Province 3	3	Commune 24	24	A002	219	2	0.093664	279	20	46753	6	1
49	Province 3	3	Commune 25	25	D009	234	2	0.100079	279	20	46753	6	1
50	Province 3	3	Commune 25	25	D021	217	2	0.092808	279	20	46753	6	1
51	Province 3	3	Commune 25	25	H038	205	2	0.087676	279	20	46753	6	1
52	Province 3	3	Commune 25	25	K052	237	2	0.101362	279	20	46753	6	1
53	Province 3	3	Commune 25	25	M061	212	1	0.176716	19	3	3599	5	1
54	Province 3	3	Commune 25	25	N068	159	1	0.132537	19	3	3599	5	1
55	Province 3	3	Commune 25	25	O074	187	1	0.155877	19	3	3599	5	1
56	Province 3	3	Commune 26	26	B008	157	2	0.067147	279	20	46753	6	1

5.4 Results of Survey implementation

Once the field work for the survey has been completed, and the data entry is finished, some tables for the results of the survey implementation should be produced to evaluate the survey coverage and the departures from the survey design. These tables typically include a summary table and individual tables for the household, women's and men's surveys, respectively. A summary table is usually presented in Chapter 1 of the DHS final report, including the number of clusters selected and interviewed, the number of households selected and interviewed, the number of women selected and interviewed, and the number of men selected and interviewed. The detailed tables for the household, women's and men's surveys are usually present in Appendix A of the DHS final report along with the sample design document. These tables both reflect the survey coverage and the data quality and provide various response rates and the number of eligible individuals per household, which are useful information for the sample design for subsequent surveys. The following tables are example tables that should be included in the final report.

Table 5.6 Example table for the results of survey implementation

Table 1.1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Bangladesh 2007

	Residence					
	Urban		Rural		Total	
Result	Number	Percent	Number	Percent	Number	Percent
Households selected	3,993	100.0	6,826	100.0	10,819	100.0
Households occupied	3,849	96.4	6,612	96.9	10,461	96.7
Households absent for extended period	78	2.0	121	1.8	199	1.8
Dwelling vacant or destroyed	59	1.5	73	1.1	132	1.2
Other	7	0.2	20	0.3	27	0.2
Household interviews						
Households occupied	3,849	96.4	6,612	96.9	10,461	96.7
Households interviewed	3,821	95.7	6,579	96.4	10,400	96.1
Household response rate[1]		99.3		99.5		99.4
Interviews with women age 15-49						
Number of eligible women	4,230	100.0	6,948	100.0	11,178	100.0
Number of eligible women interviewed	4,151	98.1	6,845	98.5	10,996	98.4
Eligible women response rate[2]		98.1		98.5		98.4
Interviews with men age 15-54						
Number of eligible men	1,559	100.0	2,515	100.0	4,074	100.0
Number of eligible men interviewed	1,443	92.6	2,328	92.6	3,771	92.6
Eligible men response rate[2]		92.6		92.6		92.6

[1] Households interviewed/households occupied
[2] Respondents interviewed/eligible respondents

Table 5.7 Example appendix table for the results of the women's survey implementation

Table A.5 Sample implementation: Women

Percent distribution of households and eligible women by results of the household and individual interviews, and household, eligible women and overall response rates, according to urban-rural residence and region, Bangladesh 2007

Result	Residence		Division						Total
	Urban	Rural	Barisal	Chittagong	Dhaka	Khulna	Rajshahi	Sylhet	
Selected households									
Completed (C)	95.7	96.4	96.3	96.5	95.0	96.1	96.8	96.4	96.1
Household present but no competent respondent at home (HP)	0.5	0.4	0.7	0.4	0.6	0.5	0.1	0.4	0.5
Refused (R)	0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1
Dwelling not found (DNF)	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Household absent (HA)	2.0	1.8	1.8	1.7	2.4	1.4	1.9	1.8	1.8
Dwelling vacant/address not a dwelling (DV)	1.3	0.9	0.9	0.9	1.5	1.5	0.7	0.8	1.1
Dwelling destroy (DD)	0.2	0.2	0.2	0.3	0.0	0.2	0.1	0.2	0.2
Other (O)	0.2	0.3	0.1	0.1	0.4	0.2	0.3	0.3	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	3,993	6,826	1,470	1,860	2,340	1,680	2,070	1,399	10,819
Household response rate (HRR)[1]	99.3	99.5	99.2	99.4	99.2	99.4	99.8	99.4	99.4
Eligible women									
Completed (EWC)	98.1	98.5	98.0	98.0	97.7	99.2	99.2	98.2	98.4
Not at home (EWNH)	1.3	1.1	1.6	1.2	2.0	0.6	0.4	1.2	1.2
Postponed (EWP)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Refused (EWR)	0.2	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.1
Partly completed (EWPC)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0
Incapacitated (EWI)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.5	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	4,230	6,948	1,467	1,983	2,396	1,725	2,096	1,511	11,178
Eligible women response rate (EWRR)[2]	98.1	98.5	98.0	98.0	97.7	99.2	99.2	98.2	98.4
Overall response rate (OWRR)[3]	97.4	98.0	97.3	97.4	96.9	98.6	99.0	97.6	97.8

[1] Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\frac{100 * C}{C + HP + P + R + DNF}$$

[2] Using the number of eligible women falling into specific response categories, the eligible women response rate (EWRR) is calculated as:

$$\frac{100 * EWC}{EWC + EWNH + EWP + EWR + EWPC + EWI + EWO}$$

[3] The overall women response rate (OWRR) is calculated as:

$$OWRR = HRR * EWRR/100$$

Table 5.8 Example appendix table for the results of the men's survey implementation

Table A.6 Sample implementation: Men

Percent distribution of households and eligible men by results of the household and individual interviews, and household, eligible men and overall response rates, according to urban-rural residence and region, Bangladesh 2007

Result	Residence: Urban	Residence: Rural	Division: Barisal	Division: Chittagong	Division: Dhaka	Division: Khulna	Division: Rajshahi	Division: Sylhet	Total
Selected households									
Completed (C)	95.3	96.6	96.1	96.6	94.0	96.0	97.2	97.6	96.1
Household present but no competent respondent at home (HP)	0.5	0.4	0.5	0.5	0.7	0.7	0.0	0.3	0.5
Refused (R)	0.2	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1
Dwelling not found (DNF)	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Household absent (HA)	2.1	1.7	1.9	2.0	2.7	1.1	1.7	1.1	1.8
Dwelling vacant/address not a dwelling (DV)	1.5	0.8	1.4	0.3	1.9	1.7	0.5	0.6	1.1
Dwelling destroy (DD)	0.1	0.1	0.0	0.3	0.0	0.1	0.3	0.0	0.1
Other (O)	0.3	0.2	0.1	0.0	0.5	0.4	0.2	0.3	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	1,998	3,416	736	931	1,171	840	1,036	700	5,414
Household response rate (HRR)[1]	99.2	99.5	99.4	99.2	99.1	99.1	99.9	99.6	99.4
Eligible men									
Completed (EMC)	92.6	92.6	94.8	91.7	88.9	93.8	93.8	93.8	92.6
Not at home (EMNH)	6.8	6.9	4.6	7.2	10.9	5.7	5.5	5.6	6.8
Refused (EMR)	0.5	0.0	0.0	0.6	0.1	0.3	0.1	0.0	0.2
Incapacitated (EMI)	0.1	0.4	0.6	0.0	0.1	0.2	0.5	0.6	0.3
Other (EMO)	0.0	0.2	0.0	0.5	0.0	0.0	0.1	0.0	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of men	1,559	2,515	518	664	854	665	838	535	4,074
Eligible men response rate (EMRR)[2]	92.6	92.6	94.8	91.7	88.9	93.8	93.8	93.8	92.6
Overall response rate (OMRR)[3]	91.8	92.1	94.3	91.0	88.1	93.0	93.7	93.4	92.0

[1] Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\frac{100 * C}{C + HP + P + R + DNF}$$

[2] Using the number of eligible men falling into specific response categories, the eligible men response rate (EWRR) is calculated as:

$$\frac{100 * EMC}{EMC + EMNH + EMP + EWR + EMPC + EMI + EMO}$$

[3] The overall men response rate (OWRR) is calculated as:

$$OMRR = HRR * EMRR/100$$

5.5 Sampling errors

Sampling errors are important data quality parameters which give a measure of the precision of the survey estimates. The DHS survey final reports present sampling errors in Appendix B for selected indicators. The sampling error tables present the estimated indicator value, the standard error, the number of unweighted and weighted cases, the design effect, the relative standard error and the confidence limits. The design effect can be used in sample size calculation for subsequent survey designs. Section 4.2 deals with the details of the calculation of sampling errors; here we give an example of the national level sampling error table.

Table 5.9 Example table for sampling errors

Table B.2 Sampling errors for National sample, Bangladesh 2007

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits: R-2SE	Confidence limits: R+2SE
WOMEN								
Urban residence	0.226	0.006	10996	10996	1.539	0.027	0.213	0.238
No education	0.341	0.009	10996	10996	1.988	0.026	0.323	0.359
With secondary education or higher	0.363	0.009	10996	10996	1.972	0.025	0.344	0.381
Currently married	0.927	0.003	10996	10996	1.246	0.003	0.921	0.933
Currently pregnant	0.054	0.002	12951	13071	1.220	0.044	0.049	0.059
Children ever born	2.331	0.028	12951	13071	1.294	0.012	2.276	2.387
Children surviving	2.039	0.023	12951	13071	1.276	0.011	1.992	2.086
Children ever born to women age 40-49	4.566	0.061	2294	2254	1.349	0.013	4.444	4.689
Ever used any contraceptive method	0.830	0.007	10146	10192	1.841	0.008	0.817	0.844
Currently using any method	0.558	0.008	10146	10192	1.646	0.015	0.542	0.574
Currently using a modern method	0.475	0.008	10146	10192	1.633	0.017	0.458	0.491
Currently using pill	0.285	0.007	10146	10192	1.577	0.025	0.271	0.299
Currently using IUD	0.009	0.001	10146	10192	1.396	0.144	0.007	0.012
Currently using injectabs	0.070	0.004	10146	10192	1.670	0.060	0.062	0.079
Currently using female sterilization	0.050	0.004	10146	10192	1.681	0.073	0.043	0.057
Currently using periodic abstinence	0.049	0.003	10146	10192	1.262	0.055	0.044	0.054
Currently using withdrawal	0.029	0.002	10146	10192	1.222	0.071	0.025	0.033
Using public sector source	0.502	0.013	4751	4884	1.784	0.026	0.476	0.528
Want no more children	0.625	0.006	10146	10192	1.254	0.010	0.613	0.637
Want to delay at least 2 years	0.210	0.005	10146	10192	1.246	0.024	0.200	0.221
Ideal number of children	2.284	0.013	10756	10804	1.829	0.006	2.258	2.310
Mothers protected against tetanus for the last birth	0.902	0.008	4926	4905	1.843	0.009	0.886	0.918
Mothers received medical care at birth	0.180	0.009	6150	6058	1.685	0.050	0.162	0.198
Had diarrhea in the past 2 weeks	0.098	0.006	5789	5719	1.396	0.059	0.086	0.109
Treated with oral rehydration salts (ORS)	0.766	0.022	560	559	1.187	0.028	0.723	0.810
Sought medical treatment	0.198	0.021	560	559	1.194	0.104	0.157	0.239
Vaccination card seen	0.582	0.018	1161	1146	1.226	0.031	0.546	0.618
Received BCG vaccination	0.968	0.006	1161	1146	1.168	0.006	0.955	0.980
Received DPT vaccination (3 doses)	0.911	0.010	1161	1146	1.185	0.011	0.891	0.931
Received polio vaccination (3 doses)	0.908	0.010	1161	1146	1.213	0.011	0.888	0.929
Received measles vaccination	0.831	0.015	1161	1146	1.380	0.018	0.800	0.861
Received all vaccinations	0.819	0.016	1161	1146	1.365	0.019	0.787	0.850
Height-for-age (below -2SD)	0.432	0.010	5423	5312	1.379	0.023	0.412	0.451
Weight-for-height (below -2SD)	0.174	0.007	5423	5312	1.321	0.040	0.160	0.188
Weight-for-age (below -2SD)	0.410	0.009	5423	5312	1.291	0.022	0.392	0.428
BMI < 18.5	0.297	0.007	9997	10021	1.569	0.024	0.282	0.311
Total fertility rate (past 3 years)	2.710	0.061	na	36507	1.313	0.022	2.589	2.832
Neonatal mortality (past 0-4 years)	36.677	3.296	6203	6103	1.218	0.090	30.085	43.270
Post-neonatal mortality (past 0-4 years)	14.826	2.025	6203	6094	1.254	0.137	10.775	18.877
Infant mortality (past 0-4 years)	51.503	3.942	6209	6108	1.259	0.077	43.620	59.386
Child mortality (past 0-4 years)	14.253	1.741	6255	6144	1.135	0.122	10.770	17.736
Under-five mortality (past 0-4 years)	65.022	4.387	6249	6144	1.264	0.067	56.248	73.796
Has heard of HIV/AIDS	0.674	0.011	10996	10996	2.557	0.017	0.651	0.697
Knows about condoms to prevent HIV/AIDS	0.319	0.008	10996	10996	1.893	0.026	0.302	0.336
Knows about limiting partners to prevent HIV/AIDS	0.325	0.009	10996	10996	2.045	0.028	0.307	0.343
MEN								
Urban residence	0.227	0.007	3771	3771	1.040	0.031	0.213	0.242
No education	0.307	0.011	3771	3771	1.462	0.036	0.285	0.329
With secondary education or higher	0.365	0.012	3771	3771	1.495	0.032	0.342	0.389
Currently married	0.990	0.002	3771	3771	1.171	0.002	0.986	0.994
Ideal number of children	2.266	0.019	3624	3626	1.494	0.009	2.227	2.304
Has heard of HIV/AIDS	0.866	0.010	3231	3227	1.729	0.012	0.845	0.887
Knows condom use to prevent HIV/AIDS	0.658	0.012	3231	3227	1.453	0.018	0.634	0.683
Knows limiting partners to prevent HIV/AIDS	0.629	0.013	3231	3227	1.532	0.021	0.603	0.655

na = Not applicable

5.6 Sampling parameters in DHS data files

Some important sampling parameters should be included in the DHS final data set, such as domain, stratum, EA selection probability, and sampling weights. DHS survey final data files usually present geographic identifiers only down to domain or region level; district level identifiers are usually not presented due to confidentiality constraints. As for the sampling stratum identifier, DHS final data files should provide the true sampling stratum, which is important for many statistical analyses such as the sampling error calculation. However, in case of small strata having only a few clusters selected, confidentiality constraints do not allow DHS data files to present the true sampling stratum identifier. In these cases, a higher level stratification identifier is included instead, which should be close to the true stratification and will not introduce substantial bias.

The standard sampling parameters included in the DHS Recode data files include:

1) Cluster indicator variable
2) Stratification variable
3) Sampling weight variables
4) Survey domain variables
5) First level geographical/administrative unit variable (region or province or department, etc.)

Glossary of terms

Analysis domain	A sub-population which cannot be identified in the sampling frame, such as domains specified by individual characteristics. See also *Design domain*.
Base map	A reference map that describes the geographic location and boundaries of an EA.
Cluster	The smallest geographic survey statistical unit for DHS surveys. It consists of a number of adjacent households in a geographic area. For DHS surveys, a cluster corresponds either to an EA or a segment of a large EA.
Collective living quarters	Living quarters such as army camps, boarding schools, or prisons where persons live individually. Collective living quarters are not considered as ordinary households and are excluded from DHS samples.
Confidence interval	A range within which the true value of an estimate likely lies. Usually reported as, with 95% confidence, the true value of $\overline{Y}$ will lie within the range of $\overline{y} - 1.96 * SE(\overline{y})$ and $\overline{y} + 1.96 * SE(\overline{y})$. Typically, DHS reports use $\overline{y} \pm 2 * SE(\overline{y})$ for a conservative estimate of 95% confidence limits.
Degrees of freedom	The number of independent units of information in a sample relevant to the estimation of a parameter or calculation of a statistic.
Design domain	A sub-population which can be identified in the sampling frame and therefore can be handled independently in the sample size and sampling procedures, usually consisting of geographic areas or administrative units. See also *Analysis domain*.
Design Effect (Deft)	A measure of efficiency of a complex sampling procedure compared to simple random sampling, defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used.
Design weight	The inverse of the overall probability with which a sampling unit (household or individual) was selected in the sample. See also *Sampling weight*.
Desired precision	The level of accuracy of the results desired, often expressed as *Relative standard error* or coefficient of variation.
Dwelling unit	A room or a group of rooms normally intended as a residence for one household (for example: a single house, an apartment, a group of rooms in a house); a dwelling unit can have more than one household.

Enumeration Area (EA)	A geographic statistical unit which is created as a counting unit for a census and contains a certain number of households.
Explicit stratification	The actual division of the sampling units into specified parts known as strata. See also *Implicit stratification*.
Gross response rate	The number of households or individuals interviewed over the number selected.
Head of household	A person who is acknowledged as such by members of the household and who is usually responsible for the upkeep and maintenance of the household.
Household	A person or a group of related or unrelated persons, who live together in the same dwelling unit, who acknowledge one adult male or female 15 years old or older as the head of the household, who share the same housekeeping arrangements, and are considered as one unit.
Household listing	A complete listing of dwelling units/households in the selected EAs prepared prior to the selection of households.
Household selection	Random selection of the households from the household listing, typically by systematic selection.
Implicit stratification	The systematic sampling or probability proportional to size sampling of sampling units from an ordered list to achieve the effect of *Stratification*. See also *Explicit stratification*.
Item non-response	A sampling unit does not provide an answer for a specific question. See also *Unit non-response*.
Location map	A map produced in the household listing operation which indicates the main access to a cluster, including main roads and main landmarks in the cluster.
Master sample	A random sample of large size drawn from the census frame and prepared for use in a number of surveys, from which sub-samples can be selected for specific surveys.
Measure of size	A measurement reflecting the size of the sampling unit, typically the number of households or the total population of the sampling unit, available for each and every *primary sampling unit* in the country.
Non-sampling errors	Non-sampling errors result from problems during data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors.

Normalized standard weights	*Sampling weight* normalized by a constant factor such that the unweighted number of cases is the same as the weighted number of cases at the national level. Normalized standard weights are calculated for total households, total women and total men.
Primary Sampling Unit (PSU)	The *sampling unit* for the first stage of selection in a multi-stage sampling procedure; in DHS, typically an EA or a segment of an EA.
Probability sample	A sample in which the units are selected randomly with known and nonzero probabilities.
*Relative standard erro*r (RSE)	The amount of sampling error relative to the indicator level, independent of the scale of the indicator, calculated by dividing the standard error by the estimated value of the indicator
Sample take	The number of households or individuals to be interviewed per sample cluster.
Sampling errors	Sampling errors are the representative errors due to sampling of a small number of eligible units from the target population instead of including every eligible unit in the survey.
Sampling frame	A complete list of all sampling units that entirely covers the target population.
Sampling unit	The unit of selection at each stage of the sampling process. In a typical DHS with two-stage cluster sampling, the sampling unit at the first stage (*Primary sampling unit*) would be the EA, and the sampling unit at the second stage (*Secondary sampling unit*) would be the household.
Sampling weight	The design weight corrected for non-response or other calibrations.
Secondary Sampling Unit (SSU)	The sampling unit for the second stage of selection; in a typical DHS two-stage sample this is a household.
Self-weighting sample	A sample of individuals in which each individual has the same probability of being selected, and therefore a constant sampling weight is used. Also known as an *equal probability sample*.
Simple random sample (SRS)	A random selection of individuals or households drawn directly from the target population with each individual or household having equal probability of being selected.
Sketch map	A map produced in the household listing operation, with location of all structures found in the listing operation which helps the interviewer locate the selected households. A sketch map also contains the cluster identification information, location information, access information, and principal physical features and landmarks such as mountains, rivers, roads and electric poles.
SRSWOR	*Simple random sample* without replacement.

Standard error (SE)	The standard deviation of the sampling distribution of a statistic, or representative error due to sampling. See also *Sampling errors*.
Stratification	The process by which the survey population is divided into subgroups or strata that are as homogeneous as possible based on certain criteria. The principal objective of stratification is to reduce sampling errors.
Structure	A free-standing building or other construction that can have one or more units for residential or commercial use. Residential structures can have one or more dwelling units (for example: single house, apartment structure).
Student's t distribution	A family of continuous probability distributions that arises when estimating the mean of a normally distributed population in situations where the sample size is small and population standard deviation is unknown.
Survey domain/study domain	A sub-population for which separate estimation of the main indicators is required.
Systematic selection (SYS)	Selection of units starting from a random point and selecting every n^{th} unit.
Target population	The population of interest in the survey, typically, in DHS, women age 15-49 and children under five years of age living in residential households. Most surveys also include men age 15-59.
Two-stage cluster sampling	At the first stage, a stratified sample of EAs is selected in each stratum, typically in DHS with probability proportional to size (PPS). At the second stage, a fixed (or variable) number of households is selected typically in DHS by equal probability systematic sampling.
Uniformly distributed random number	A random number which comes from a uniform distribution, that is, all possible values in the interval within which the random number is selected have equal probability of selection.
Unit non-response	A sampling unit (cluster, household, individual) is not interviewed at all. See also *Item non-response*.
Variance	A measure of how far a set of numbers is spread out around their mean.
Weight	An inflation factor which extrapolates the sample to the target population. See also *Design weight* and *Sampling weight*.

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ANNEX B

Food insecurity experience scale

Food and Agriculture Organization





The Food Insecurity Experience Scale

Development of a Global Standard for Monitoring Hunger Worldwide

Terri J. Ballard
Anne W. Kepple
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FAO Technical Paper Version 1.1
October 2013

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Foreword

FAO has been a partner in the development, validation and use of food (in)security scales since 2006 and has had an important role in furthering the research on the Latin American and Caribbean Food Security Scale (Escala Latinoamericana y Caribeña de Seguridad Alimentaria - ELCSA) through financial support for regional conferences on food security measurement and capacity-building in developing countries regarding validation and use of these tools (Melgar-Quinonez, 2010; FAO, 2012a). Because no single instrument measures food (in)security in all its dimensions, there has been substantial research devoted to developing, refining and validating different approaches for measuring the state of food insecurity. The development of measures of whether people are experiencing food insecurity because of limited access to food, and if so at what level of severity, constitutes an important addition to the suite of commonly used food security measures.

Building on the experience of the Latin American scale, the FAO *Voices of the Hungry* project (VOH) has developed an experience-based food insecurity scale module called the Food Insecurity Experience scale (FIES), which is based on a short form of the ELCSA. The FIES will be used as a common metric for measuring food insecurity at several levels of severity, across different geographic areas and cultures.

Many efforts are going into the search for global indicators capable of measuring food insecurity in a comparable manner across different parts of the world, as seen by current discussions on indicators for the post-2015 development agenda (http://www.un.org/en/ecosoc/about/mdg.shtml). The FIES has a potentially important role for monitoring food security within this process. It is particularly well-suited to monitoring systems that meet principles recently identified by the Committee on World Food Security in the 2012 Global Strategic Framework for Food Security and Nutrition (CFS, 2012a).

Acronyms and abbreviations:

CFS	Committee on World Food Security
ELCSA	Escala Latinoamericana y Caribeña de Seguridad Alimentaria
FAO	The Food and Agriculture Organization
FIES	Food Insecurity Experience Scale
GWP	Gallup® World Poll
IRT	Item Response Theory
MDG	Millennium Development Goal
USDA	United States Department of Agriculture
US HFSSM	United States Household Food Security Survey Module
VOH	*Voices of the Hungry* project

1. Introduction

One of the most basic needs shared by all human beings is the need for enough food. Access to enough nutritionally adequate food was declared a basic human right at the World Food Summit[1] in Rome in 1996, reflecting an evolution in the discourse over a period of several decades and growing international political commitment to end hunger.

Yet despite progress in our understanding of how to guarantee this basic human right and how to conceptualize and monitor it, hunger continues to affect hundreds of millions throughout the world. FAO has estimated that one in eight people in the world (870 million) suffered from chronic undernourishment in 2010-2012 (FAO, 2012b). The social inequalities at the root of the problem – from the household to the international level - have proven resistant to change, while new factors such as climate change, demand for biofuels and food price volatility have emerged to exacerbate the problem.

Information regarding the distribution and severity of hunger and food insecurity in the population and the characteristics, circumstances, and location of those most affected can contribute to building political will, designing effective policies, and targeting allocation of resources. While information alone is clearly insufficient, it can be a powerful tool.

Efforts to measure, monitor, and eradicate hunger and food insecurity have been underway for decades, often reflecting the perspectives of different sectors: economy, agriculture, health and nutrition. Combined scientific and political efforts have converged on a growing consensus regarding definitions, terminology, conceptual frameworks, and measures of hunger that reflect a more integrated, multi-sectorial perspective (CFS 2012b). Because no single indicator can account for the many dimensions of food and nutrition security, suites of indicators are being proposed to capture this complexity within the diversity of different contexts, a useful step towards promoting multisectorial approaches for improving food security (FAO, 2012c; Coates, 2013).

The Food Insecurity Experience scale (FIES) is expected to make an important contribution to any suite of food and nutrition security indicators. It has particular potential as a cross-disciplinary indicator capable of promoting the link between different sectorial perspectives, for example, the link between nutrition and agriculture. It is an experience-based metric of severity of food insecurity that relies on people's direct responses to a series of questions regarding their access to adequate food. Accumulated evidence over the past two decades has convinced FAO of the potential for using this method of measurement to provide valid and reliable population estimates of food insecurity in the different countries of the world.

[1] http://www.fao.org/wfs/index_en.htm

The following section of this paper provides an overview of current terminology and conceptions related to food insecurity and lays the groundwork for a discussion of how the FIES contributes to the measurement of food insecurity– what it measures and how it can be used to complement other indicators. The theoretical basis underlying the scale and a summary of its evolution are also discussed. The *Voices of the Hungry* project (VOH), the FAO initiative aimed at exploring the potential of the FIES as a new global standard for measuring food insecurity, is described in Section 3. Section 4 addresses the need for careful linguistic adaptation of the FIES questionnaire module in major national languages, as a first step towards obtaining valid estimates of food insecurity. The method for linguistic and cultural adaptation applied by the VOH in four pilot countries during 2013 is described. Section 5 presents a discussion of the validity of the food insecurity construct underlying the FIES and the analytic approaches to be applied by the VOH to ensure cross-cultural comparability of severity levels of food insecurity, based on the Item Response Theory. The final section focuses on the link between information and action, summarizing potential uses of the information derived from the FIES in the global, national and sub-national policy contexts.

2. Direct Measurement of Food Insecurity Using Experience-Based Scales

It is widely acknowledged that an array of measurement instruments is needed to account for the complex nature of food and nutrition security and to monitor its multiple dimensions. This section summarizes some of the different measures commonly used, and describes the particular contribution of experience-based food insecurity scales in identifying populations at risk of hunger and food insecurity. A brief history of such scales is provided, with particular focus on a food insecurity scale developed for use in Latin America and the Caribbean, which gave origin to the Food Insecurity Experience Scale (FIES) presented in this paper.

2.1 The many terms associated with hunger

Various terms are used, often interchangeably, to talk about hunger and food insecurity. While the word “hunger” speaks the most powerfully and clearly to most people, it ranges in meaning from short-term physical discomfort to life-threatening lack of food, and often encompasses broader issues related to food access and socioeconomic deprivation (Habicht *et al.,* 2004). These physiological as well as socioeconomic dimensions of hunger pose a conceptual challenge for measurement.

The FAO Prevalence of Undernourishment is one of the indicators selected to monitor progress toward achievement of the Millennium Development Goal (MDG) to halve the proportion of people who suffer from hunger by 2015. It is an estimate of the number of people who are likely not ingesting enough food to meet dietary energy needs, based on national estimates of: 1) total food energy available for human consumption, and 2) distributions of energy requirements and consumption in the population, (FAO 2012b - SOFI Annex 2). This measure has served well to monitor national and regional trends in undernutrition estimates through an analysis of food availability in relation to estimates of needs, at the level of national populations, but does not identify who the food insecure are or where they live within countries.

The other indicator selected to monitor the MDG regarding hunger is weight-for-age of children under five years of age, which measures another condition closely associated with hunger: malnutrition. The term "malnutrition" refers to both undernutrition (nutritional deficiencies) and overnutrition (consumption of too much energy in relation to energy requirements). This term was, until recently, associated primarily with poor child growth and nutritional deficiencies, in particular stunting and wasting, conditions resulting from insufficient dietary energy and nutrient intake and/or poor utilization of nutrients due to infections or other illnesses. As the nutrition transition became increasingly evident in countries throughout the world, characterized by decreasing prevalence of undernutrition and increasing rates of overweight among the less privileged classes, previous assumptions regarding the association between poverty, hunger, and undernutrition were challenged (Ruel, Haddad and Garrett, 2001; Monteiro, Conde and Popkin , 2004).

It was in this context that experience-based food insecurity scales emerged. Other measures were needed to account for a broader concept of hunger and its association with both undernutrition and overnutrition. Ethnographic research carried out in the USA to understand the lived experience of hunger revealed it to be a process characterized initially by worry about having enough food, followed by dietary changes to make limited food resources last, and finally, decreased consumption of food in the household (Radimer, Olson and Campbell, 1990; Radimer *et al.,* 1992). Although the original ethnographic study was based on a small number of households in a wealthy country, a review conducted years later of studies derived from many countries in different regions of the world concluded that these dimensions of the experience of hunger appear to be common across cultures (Coates *et al.,* 2006a).

The approach to conceptualizing the experience of hunger developed by Radimer and colleagues coincided with an increasing focus on unequal access to food and socio-cultural aspects of the experience of hunger (Sen, 1981). In the 2009 Declaration of the World Summit on Food Security, food security was defined in the following way*: Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life* (FAO, 2009[2]). Access to food was recognized as one of the pillars of food security. It is this dimension of food security – food access – that experience-based food insecurity scales are designed to measure in populations, based on data collected at the household and individual level.

[2] This definition of the Committee on Food Security (http://www.fao.org/cfs/en/) is slightly different from the 1996 World Food Summit definition: "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (http://www.fao.org/docrep/003/w3613e/w3613e00.htm). The words "physical, social and economic" were added to characterize "access". See also CFS (2012b) for a discussion of the evolution of terminology.

2.2 Complementary uses of different food and nutrition security measures

It is easy to see from the breadth of the definition of food security why an array of measurement instruments is needed to account for its complex nature and to monitor its multiple dimensions. While each method generates a different type of indicator with different challenges for application, analysis and interpretation, the consensus is that the various indicators complement one another. For excellent comprehensive reviews and conceptual discussions of the state of the art of food security measurement, see Coates (2013) and Jones *et al.* (2013).

The FAO Prevalence of Undernourishment is an indicator of the relative adequacy of food availability across the population and can serve as a useful proxy for food security at the national level. However, it is statistically complex to calculate, is largely dependent on national capacity to generate reliable data on a regular basis and is not a direct indicator of access to food at the household or individual level. The same is true of composite measures of hunger like the Global Hunger Index, composed of indicators of undernourishment, child underweight and child mortality (Grebmer *et al.,* 2012). The time lag between data collection and availability of the results for these two indicators tends to be significant, which compromises the ability to take timely action.

Anthropometric measures, such as child weight-for-age (measure of underweight) and height-for-age (measure of stunting), provide invaluable information regarding the nutritional status of individuals, but are costly and require a relatively sophisticated level of expertise to collect and analyze the data. Given the complex relationship between food security and underweight *as well as overweight*, the utility of anthropometric measures as proxy indicators of household food security is questionable (Kac *et al.,* 2012; Finney *et al.,* 2010; Adams, Grummer-Strawn and Chavez, 2003; Alaimo, Olsen and Frongillo, 2001; Frongillo, 2003). One advantage of a direct measure of the experience of food insecurity, like the FIES, is that it can be used to complement anthropometric data and potentially identify vulnerable populations before malnutrition becomes manifest.

Other time-tested methods for assessing food security, which come closer to being direct measures of food access, include indicators of the quantity and quality of food consumed, such as food consumption scores, dietary diversity indicators, and food acquisition data obtained from household expenditure surveys (FAO, 2002a; Jones *et al.*, 2013). While food consumption and dietary diversity are a more direct measure of the adequacy of the diet, methods based on household expenditure surveys employ indirect methods to estimate food intake. Acquisition of food products during a reference period is not equivalent to actual consumption of the purchased products, and there is no guarantee that the food was consumed during the reference period. Results also do not reflect food purchased outside the home. As a general rule, similar to the FAO undernourishment measure and anthropometric measures, methods for measuring food insecurity based on expenditures and food consumption require significant technological expertise, time and resources to collect and analyze the data.

Experience-based food insecurity scales like the FIES represent a simple, timely and less costly method for measuring the access dimension of food insecurity based on data collected at the household or individual level. They do not provide specific information on actual food consumption, diet quality and food expenditures like household expenditure surveys and individual food intake surveys might do, but rather focus more broadly on reported food-related behaviors associated with the experience of food insecurity due to limited access to food. They should therefore not be seen as substitutes for but rather as complements to these other important measures.

Unlike aggregate measures, such as the FAO Prevalence of Undernourishment or the Global Hunger Index, the FIES measure of the severity of food insecurity can be used in surveys that allow disaggregation at sub-national levels and across different population groups, making it possible to identify more specifically who the food insecure are and their geographic distribution. Finally, the ease of application, analysis, and interpretation facilitates better communication of results to decision makers, leaders of civil society, and the general public.

2.3 Evolution of experience-based measures of household food insecurity: direct measures of the access component

The ethnographic research mentioned above, conducted by Radimer, Olsen and Campbell (1990) and Radimer *et al.* (1992) in the USA revealed that the experience of food insecurity is characterized initially by uncertainty and anxiety regarding food access, followed by changes in the quality of the diet as the situation worsens, such as a less balanced, more monotonous diet. With increasing severity, the quantity of food consumed decreases as portion sizes are reduced or meals are skipped (Radimer, Olson and Campbell, 1990; Radimer *et al.,* 1992; Radimer, 2002). Additional ethnographic studies aimed at understanding the experience of hunger from the perspective of the elderly in the U.S. and low-income families in Quebec, Canada, revealed similar patterns (Wolfe *et al.,* 1998; Wolfe, Frongillo and Valois, 2003; Hamelin, Beaudry, and Habicht, 2002).

This underlying theoretical construct of food insecurity formed the basis for the U.S. Household Food Security Survey Module (US HFSSM), which has been applied annually in the United States since 1995 to monitor the food security situation (Hamilton *et al.,* 1997). The US HFSSM, in turn, has served as a model for many other experience-based food insecurity scales in diverse countries around the world, including the FIES. It represented a significant change in approach to food insecurity measurement compared to traditional ways of assessing it indirectly, either through the determinants (such as food availability) or the consequences (such as anthropometric failures and other signs of malnutrition).

The items that compose the US HFSSM, as well as the FIES module, ask people directly about having to compromise the quality and quantity of the food they eat due to limited money or other resources to obtain food. Each item refers to a different situation and is associated with a level of severity according to the theoretical construct of food insecurity underlying the scale.

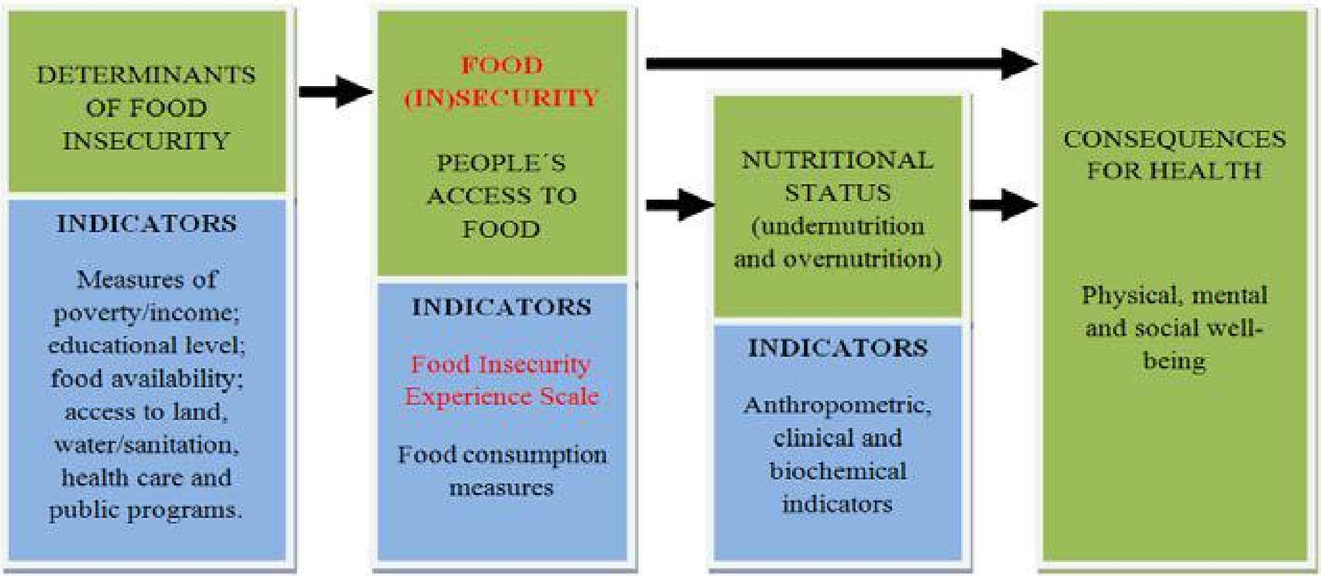
By asking the series of related questions that compose the FIES, it is possible to classify respondents at different levels of severity: “food secure” (those who answer “no” to all the questions about food insecurity-related experiences) or “food insecure” along a continuum of food insecurity severity, as shown in Figure 1.

Figure 1: Food insecurity severity along a continuous scale

Mild food insecurity			**Severe food insecurity**
Worrying about how to procure food	Compromising on quality and variety	Reducing quantities, skipping meals	Experiencing hunger

Figure 1 points to one of the unique contributions of experienced-based food insecurity scales: in addition to contemplating aspects related to deprivations in diet quality and quantity, they also capture an aspect of the experience of hunger and food insecurity that others do not, i.e. psychosocial aspects associated with anxiety or uncertainty regarding the ability to procure enough food. Food insecurity can affect health and well-being in many ways, with potentially negative consequences for mental and social in addition to physical well-being, even *in the absence of measurable negative effects on nutritional status* (Figure 2). Innumerable studies using experience-based food insecurity scales have documented negative psychosocial effects of food insecurity in women and children, as recently reviewed by Pérez-Escamilla and Vianna (2012).

Figure 2: Determinants and consequences of food insecurity at the individual level[3]



[3] Adapted from Campbell (1990).

With respect to the indicators cited in Figure 2, it should be kept in mind that determinants of household and individual food insecurity, as measured by experience-based food insecurity scales, and the consequences for individual health and well-being, are determined by local, regional, national and international factors.

While there is considerable evidence pointing to the validity and reliability of experienced-based food insecurity scales in diverse contexts, research to refine and improve them is ongoing. Most of the scales used in research and monitoring to date measure food insecurity at the household level, such as the previously described US HFSSM, the Latin American and Caribbean Food Security Scale (described in the next section), the FANTA Household Food Insecurity Access Scale (Coates, Swindale and Bilinsky, 2007) and the FANTA Household Hunger Scale (Ballard *et al.,* 2011). However, their applicability for measuring food insecurity of individual adults and children has also been investigated (Wolfe *et al.,* 1996; Nord and Hopwood, 2007; Fram *et al*., 2011; Bernal *et al.,* 2012).

Experts participating in the International Scientific Symposium on the Measurement and Assessment of Food Deprivation and Undernutrition, held at FAO Headquarters in 2002, emphasized the usefulness of experience-based measures of household food security for decision makers at various levels, as expressed by Eileen Kennedy in her keynote speech:

> *At the policy level, they are relatively uncomplicated to interpret and understand, which can be critical in policy analysis and presenting resonant messages to policy makers. At the programme or project level, they can be effective in targeting interventions (specifically for identifying populations or geographic areas, but not for identifying households or individuals) and in monitoring changes in food insecurity and hunger* (FAO, 2002b).

While the lack of internationally validated instruments that capture the experience of food insecurity was cited as a shortcoming in food security measurement at the 2002 Symposium (FAO, 2002a), participants in the follow-up Symposium ten years later acknowledged that substantial progress has been made in the use and refinement of experience-based scales (FAO, 2012c).

In 2006, the Journal of Nutrition released a supplement that brought together many of the foremost researchers with experience on developing and applying food insecurity scales in widely different parts of the world (http://www.fantaproject.org/publications/hfias.shtml). This seminal publication, which set the stage for a new way of measuring food insecurity internationally, cited three main conceptual developments in food security measurement: "*1*) a shift from using measures of food availability and utilization to measuring "inadequate access"; *2*) a shift from a focus on objective to subjective measures; and *3*) a growing emphasis on fundamental measurement as opposed to reliance on distal, proxy measures" (Webb *et al.,* 2006). The Journal of Nutrition supplement for the first time defined food insecurity scales as "experiential" or "experience-based" measures that directly ask people about their experiences or behaviors in relation to food when money or other means to obtain food are limited, reflecting “not only increased severity in food stresses but also the actual experience of becoming hungry” (Webb *et al.,* 2006).

The development of food insecurity scales over the past two decades has also included an evolution regarding how this type of instrument is labeled. In the proceedings of the 2002 FAO symposium, they were referred to as “qualitative measures”. Webb *et al.* (2006) described a dichotomy between “objective/quantitative” compared to “subjective/qualitative” schools of thought. Food insecurity scales may be considered subjective measures in the sense that they are based on self-reporting, as is the case for much health, social and economic data obtained through survey work. A commonly cited misconception is that the scales measure the perception of food security; however, measurement is based on reported behaviours and experiences associated with compromised food access due to limited resources. They are sometimes referred to as qualitative because the experience of food security is not directly quantifiable, in the sense of directly observing and counting something. However, food insecurity scales are quantitative measurement tools that produce numerical scores with statistical properties, as will be discussed further in Section 5.

The evolution of food insecurity scales and efforts to validate this type of measurement tool in the United States, Canada and Latin America have been instrumental in demonstrating their validity and reliability as measures of what is essentially an unobservable phenomenon through the application of statistical models based on Item Response Theory (Frongillo, 1999; NAS, 2006; Nord, 2012; Faye *et al.,* 2011), described further in Section 5.

2.4 The Latin American and Caribbean Food Security Scale: A regional experience paves the way for a global measure

The FIES is the global version of an experience-based food insecurity scale that originated from a regional initiative in Latin America and the Caribbean. During the 2000s, several countries in Latin America independently began to adapt experience-based food insecurity scales for their own contexts. Recognizing the potential for a regional food insecurity measure, researchers combined their experiences to create a Latin American and Caribbean Food Security Scale (*Escala Latinoamericana y Caribeña de Seguridad Alimentaria*, or ELCSA) (Pérez-Escamilla *et al.,* 2007; FAO, 2012a), with roots in the US HFSSM, the Brazilian Food Insecurity Scale, a similar scale adapted for Colombia, as well as the Household Food Insecurity Access Scale (HFIAS) developed by the U.S. Agency for International Development (Coates, Swindale and Bilinsky, 2007). While the Brazilian scale is an adapted version of the US HFSSM (Pérez-Escamilla *et al.,* 2004), the instrument adapted for use in Colombia was derived from a slightly different scale that was a precursor to the US HFSSM (Wehler, Scott and Anderson, 1992; Lorenzana and Sanjur, 1999; Álvarez *et al.,* 2006; Hackett, Melgar-Quinonez and Álvarez, 2008). The experiences in Brazil and Colombia were the first national efforts to validate such scales in Latin America.

The ELCSA was thus conceived out of the combined experiences with food insecurity scales in various countries as well as the growing demand for tools to diagnose and monitor hunger and food insecurity in the region. A formal, interactive process of consultation was initiated in 2007 to promote the development of a single instrument capable of measuring household food insecurity in diverse national and sub-national contexts (Pérez-Escamilla *et al.,* 2007).

A 2010 report commissioned to the Ohio State University by FAO, with funding from the European Commission, gave a detailed historical review of the development and use of the different experience-based food insecurity scales in Latin American and the Caribbean that fall under the ELCSA umbrella. The report described the need for developing a harmonized scale that would enable cross-country comparison (Melgar-Quinonez, 2010). Based on findings of this report, FAO sponsored a workshop in Cuernavaca, Mexico, in 2010 with the participation of representatives from Mexico, Guatemala, Nicaragua, Honduras, and El Salvador, which resulted in a final, harmonized version of the ELCSA[4]. The harmonized ELCSA has since been applied in national population surveys in Guatemala and Mexico and in pilot studies in several other countries in the Latin American region, including Bolivia and Peru, and a manual has been produced in Spanish (FAO, 2012a). A linguistically adapted version of the ELCSA has also been tested in Albania (Albanian Centre for Economic Research, 2012).

Various experience-based food insecurity scales have been proposed, tested, and written about in the literature; however care must be taken when comparing results of studies using different versions of food insecurity scales. The ELCSA, as well as the Brazilian Food Insecurity Scale, and consequently, the FIES, are all closely based on the US HFSSM, and despite differences in their application[5,6], they measure food insecurity in essentially the same way.

Much of the success of the regional ELCSA experience can be attributed to the inclusive and intersectorial process that characterized its development, validation and dissemination. The ELCSA has been successfully applied from the local to the national level in government surveys, academic studies and public opinion polls. Application of the instrument has contributed significantly to a better understanding of the distribution, causes and consequences of food insecurity in Latin American and Caribbean. In countries where the ELCSA has been applied, the positive response from national-level decision makers and accumulated scientific evidence that experience-based food insecurity scales can measure food insecurity accurately and precisely have set the stage for proposing the use of a similar tool at the global level.

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[4] http://www.foodsec.org/fileadmin/user_upload/eufao-fsi4dm/docs/ELCSA-exec-summary-english.pdf. http://www.foodsec.org/web/publications/pubshome/pubsdetail/ar/c/80691/

[5] While the items of the US HSFSSM remain the same, the manner of scoring responses and names of the food insecurity categories were changed several years ago, so comparisons must take that into consideration. See: http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx

[6] It should be noted that the reference period differs for each scale: 12 months for the US HFSSM, 3 months for the ELCSA, and 30 days for the Brazilian Food Insecurity Scale. Response categories vary somewhat as well; the US HFSSM has three additional affirmative response categories to characterize the frequency of occurrence, whereas the response categories for the ELCSA and the Brazilian scale are dichotomous (yes/no).

The US HFSSM has withstood intense scrutiny since it was first applied nationally in the USA in 1995, and has proven capable of reliably measuring food insecurity among various sub-populations. Extensive testing of the ELCSA in various countries in the Latin American and Caribbean region as well as sporadic use in other continents over the past ten years strongly supports the potential validity and reliability of this type of measurement instrument in diverse socio-cultural contexts.

It is on this solid basis of evidence that FAO is undertaking the initiative to develop, test and refine the FIES for application globally through the *Voices of the Hungry* project (VOH).

3. *Voices of the Hungry project (VOH)*

Accurate global measurement of food insecurity on an annual basis will contribute to monitoring of the development agenda objectives and identifying global, regional and national trends, as well as informing country-level decision making. The *Voices of Hungry* project (VOH) aims to explore the feasibility of using the FIES to provide timely and valid information regarding the degree of severity of food insecurity in populations world-wide. FAO has identified the FIES as the tool with the greatest potential for becoming a global standard capable of providing comparable information on food insecurity experience across countries and population groups to track progress on reducing food insecurity and hunger.

The version of the FIES currently being adapted and piloted in the VOH is presented in Table 1.

Table 1: Food Insecurity Experience Scale

FOOD INSECURITY EXPERIENCE SCALE **Included in the 2013 pilot study delivered through the Gallup World Poll in Angola, Ethiopia, Malawi and Niger.**		
Now I would like to ask you some questions about your food consumption in the last 12 months. During the last 12 MONTHS, was there a time when:		
Q1. You were worried you would run out of food because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused
Q2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused
Q3. You ate only a few kinds of foods because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused
Q4. You had to skip a meal because there was not enough money or other resources to get food?	0 No 1 Yes	98 DK 99 Refused
Q5. You ate less than you thought you should because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused
Q6. Your household ran out of food because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused

Q7. You were hungry but did not eat because there was not enough money or other resources for food?	0 No 1 Yes	98 DK 99 Refused
Q8. You went without eating for a whole day because of a lack of money or other resources?	0 No 1 Yes	98 DK 99 Refused

FAO will be leveraging on the Gallup® World Poll (GWP)[7], a branch of Gallup Inc. that has conducted nationally representative surveys in more than 140 countries annually since 2005, as a vehicle for data collection. Starting in 2014, the FIES will be incorporated into the World Poll questionnaire and the data will be used to derive estimates of the prevalence of food insecurity at different levels of severity. Through this measurement approach and the data collection service provided by the Gallup® World Poll, FAO will obtain cross-culturally comparable, real time information at a relatively limited cost, gathered from a nationally representative sample of adults in a large number of countries. The focus on food insecurity of individuals rather than households will enable the study of gender disparities in food access in the population. Data from the scale responses as well as a detailed food security analysis will be available to Governments and the public through an open-access platform.

The FIES is being pilot-tested in Angola, Ethiopia, Malawi and Niger during the 2013 round of the GWP. The characteristics of the pilot study include the following:

1. Surveys are being conducted based on nationally representative samples of 1000 adult individuals, using a three-stage sampling framework, in each of the four pilot countries;
2. The linguistically and culturally adapted FIES questions are directed to adult individuals randomly selected at the 3rd stage who reside in sample households randomly selected in the 2nd stage from primary sampling units, which are in turn either randomly selected or selected based on probabilities proportional to population size (1st stage).
3. In households where children under 5 years of age reside, two additional questions are asked of the respondent about food insecurity experiences of these children (if they were not able to eat healthy or nutritious foods or if they were not given enough food to eat because of a lack of money or other resources). The information will be used to describe the context of food insecurity of children, but will not be included in analysis of the 8 adult items to determine food security status, including severity of experienced food insecurity.

As part of the 2013 VOH pilot study, FAO carried out linguistic adaptations in national languages of Angola, Ethiopia, Malawi and Niger [8] following a common methodology (presented in Section 4). The goal of these activities was to produce translations of the FIES that were linguistically and culturally appropriate and faithful to the intention of the FIES questions. The adapted versions have been pre-tested by Gallup, Inc. in preparation for their 2013 World Poll surveys in each country, which in several cases led to minor refinements to the wording of several items. The experiences of the 2013 pilot study

[7] http://www.gallup.com/strategicconsulting/en-us/worldpoll.aspx
[8] http://www.fao.org/economic/ess/ess-fs/voices/linguistic/es/

will provide invaluable information on linguistic challenges and inform subsequent approaches for accurate, albeit less intense adaptation of the scale for global use.

The FAO initiative, starting with the pilot study limited to the four sub-Saharan countries in 2013 and extended to global data collection in 2014, will provide a unique opportunity to explore the cross-cultural equivalency of the FIES. The project plans to carry out extensive validation studies with the country datasets from the pilot study and over the first two years of global operation in order to understand the potential biases in its performance across different countries and cultures. In collaboration with the Economic Research Service of the U.S. Department of Agriculture (USDA), FAO is developing innovative analytic methods to define the standard against which to score and classify cases (see Section 5). The goal of the validation work will be to identify a scale that is simple to use, yet measures the phenomenon of food insecurity experience across countries in a comparable way.

The VOH contributes to strengthening the ability of FAO to fulfill its mandate of monitoring food insecurity at the global level in a timely and consistent manner. Results of the application of the FIES through the World Poll will be available every year within a few months of data collection in more than 140 countries.

To ensure sustainability of the methodology for direct measurement of food insecurity, the VOH aims to promote use of the FIES in national surveys designed to allow disaggregation at sub national levels, thus enabling governments to produce their own statistics as part of national food security information systems. FAO will review the country-level FIES results with Governments and begin a parallel capacity development programme with national statistics agencies. The consistency of the method used by FAO globally and by national governments in more detailed, periodic population surveys will promote comparability of results.

The expectation is that these efforts will contribute to advances in food insecurity measurement on a global basis and play a significant role in the monitoring of the Zero Hunger Challenge set forth by the Secretary General of the United Nations in 2012 as well as any food security target that may be considered for the post 2015 Development Agenda.

4. Linguistic Adaptation of the Food Insecurity Experience Scale

An important pre-requisite towards developing a tool that measures the severity of food insecurity in a comparable way world-wide is careful linguistic adaptation. In this section, we discuss the methodology used by the VOH during the 2013 pilot study to adapt the FIES to different cultural and linguistic contexts.

4.1 Trade-offs between context-specific measures and a global measure of food insecurity

An important debate regarding experience-based food insecurity scales during the history of their development addressed the feasibility of creating an internationally valid instrument using a single scale for the many diverse cultural and socioeconomic contexts in the world. Originally grounded in ethnographic research in the USA, the applicability of the US HFSSM in other contexts, even after linguistic adaptation, was an open question. Many believed that a similar process of developing household food insecurity scales “from the ground up”, based on ethnographic research, would be necessary in different contexts in order to adequately reflect the theoretical constructs of the food insecurity experience in each cultural context (Wolfe and Frongillo, 2001; Frongillo and Nanama, 2006). In a few countries, ethnographic research resulted in measures based on slightly different theoretical constructs (Coates *et al.,* 2006b; Frongillo and Nanama, 2006).

Aiming to address this question and motivated by the recognized value that a common instrument would provide for international comparisons, Coates *et al.* (2006a) compared 22 food insecurity scales and ethnographic studies derived from 15 countries in different regions of the world, ranging from “ground up” research to application of existing scales following linguistic adaptation. Their exploration of “cross-cultural commonalities” to the food insecurity experience confirmed that the theoretical constructs reflected in the FIES – “uncertainty and worry about food, inadequate food quality, and insufficient food quantity” – were common to all the cultures sampled, pointing to the feasibility of a universally applicable measure.

The VOH is based on the premise that the evidence of universal dimensions of the food insecurity experience (Coates, *et al*, 2006b; Swindale and Bilinsky, 2006), and accumulated research pointing to the cross-cultural validity and applicability of measures very similar to the FIES have paved the way for a standardized measure that enables international comparisons (Derrickson, Fisher and Anderson, 2000; Álvarez *et al*., 2008; Hromi-Fiedler *et al.,* 2009; Melgar-Quiñonez, 2010; Segall-Corrêa *et al.,* 2008; Segall-Corrêa, Marín-León and Pérez-Escamilla, 2010).

4.2 Linguistic adaptation of the FIES for the 2013 VOH pilot study

The FIES consists of a set of questions asked directly to respondents. Applying it on a global level requires linguistic adaptation in the many different contexts and languages to ensure that the questions are understood in the way they were meant to be understood and to modify the wording appropriately within the specific language and culture while maintaining their original meaning. The linguistic adaptation process undertaken for the VOH was aimed at producing culturally and linguistically appropriate versions of a standardized set of questions, not a “ground-up”, ethnographic approach.

As part of the 2013 VOH pilot study, FAO carried out linguistic adaptations in national languages of Angola, Ethiopia, Malawi and Niger using a methodology similar to ones used successfully in a number of different settings (Derrickson and Anderson, 2000; Melgar-Quiñonez *et al.*, 2003; Segall-Corrêa *et* *al.*, 2008; Segall-Corrêa, Marín-León and Pérez-Escamilla, 2010). The process included consultations with country-level specialists and officials as well as focus group discussions with people representative of different population groups or regions in the pilot countries.

While the FIES questions used in the VOH are worded to be as universally relevant as possible (See Table 1, Section 3), cultural and language differences are likely to influence how the questions are understood and answered. Linguistic adaptation must go beyond literal translation of the questions, making sure that the original concepts captured by the questions are maintained in translation while using culturally appropriate terms and phrases. Careful linguistic adaptation reduces the risk of obtaining inconsistent information due to misunderstanding of the questions, improves ease of administration and helps guarantee comparability across different cultures as well as within countries.

The starting point for the linguistic adaptation work in Angola, Ethiopia, Malawi and Niger was to have a solid understanding on the intended meaning of each of the items, using the explanations presented in Table 2 as a guide. Based on these explanations, preliminary translations of the FIES questionnaire were first produced by independent translators or in collaboration with a group of knowledgeable professionals.

Table 2: Questions that compose FIES and explanations of the intended meanings

“*Now I would like to ask you some questions about your food consumption in the last 12 months.* *During the last 12 MONTHS, was there a time when:*	
Q1. You were worried you would run out of food because of a lack of money or other resources?	The question refers to a state of being **worried, anxious, apprehensive, afraid or concerned** that there might not be enough food or that the respondent would run out of food (because there was not enough money or other resources to get food.) The worry or anxiety is due to circumstances affecting their ability to procure food, such as: loss of employment or other source of income, or other reasons for not having enough money; insufficient food production for own consumption; disrupted social relationships; loss of customary benefits or food assistance; environmental or political crises. It is not necessary for the respondent or the household to have actually run out of food in order to answer affirmatively to this question, the rationale being that even just the concern and the consequent possible coping strategies are manifestations of food insecurity, even in cases when the actual food consumption is not compromised
Q2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?	This question asks the respondent whether s/he was not able to get foods they considered **healthy** or those that make a **nutritious or balanced diet** (because there was not enough money or other resources to get food.) The answer depends on the <u>respondent's own opinion</u> of what *they* consider to be healthy and nutritious foods. This question refers to the <u>quality</u> of the diet and not the quantity of foods eaten.
Q3. You ate only a few kinds of foods because of a lack of money	The question asks if the respondent or any other adult in the household had to eat a

or other resources?	diet with a limited variety of foods or whether they had to eat the same foods or just a few kinds of foods every day because there was not enough money or other resources to get food. The implication is that the diversity of foods consumed would likely increase if the household had better access to food. This question refers to quality of the diet and not the quantity of foods eaten. It is important to stress the link to lack of money, to identify conditions of food insecurity, rather than customary habits to limit the variety of food for other circumstances (i.e., health or religion)
Q4. You had to skip a meal because there was not enough money or other resources to get food?	This question inquires about the experience of having to **miss** or **skip** a major meal (for example, breakfast, lunch or dinner depending on the norm for number and times of meals in the culture) that would normally have been eaten (because there was not enough money or other resources to get food.) This question refers to insufficient quantity of food.
Q5. You ate less than you thought you should because of a lack of money or other resources?	This question enquires about eating less than what the respondent considered they should, **even if they did not skip a meal** (because the household did not have money or other resources to get food). The answer depends on the respondent's own opinion or perception of how much *they* think they should be eating. This question refers to quantity of foods eaten and not the quality of the diet. This question does *not* refer to special diets to lose weight or for health or religious reasons.
Q6 Your household ran out of food because of a lack of money or other resources?	Referring to any experiences when there was actually no food in the household because they did not have money or other resources (for example, the household's own production or bartering) to get food.
Q7 You were hungry but did not eat because there was not enough money or other resources for food?	This question asks about the **physical experience of feeling hungry**, and specifically, feeling hungry and not being able to eat enough (because of a lack of money or resources to get enough food). It does not refer to dieting to lose weight or fasting for health or religious reasons
Q8. You went without eating for a whole day because of a lack of money or other resources?	This question asks about a specific behaviour—not eating anything all day (because of a lack of money and other resources to get food). It does not mean dieting to lose weight or fasting for health or religious reasons.

4.3 Expert panels

For the linguistic adaptation work in Angola, Malawi and Niger, panels of experts were formed composed of people from relevant government ministries, national statistics institutes, research institutions, or non-governmental organizations with experience in issues related to food insecurity, such as agriculture, social development, health and nutrition.

These panels discussed the preliminary version of the translated questions, suggested modifications to each question based on their experiences, and identified different ways to express key concepts which were later explored in the focus group discussions. Potential problems related to comprehension of the questions in the module, as well as its application in the field, were discussed. They also provided assistance in determining criteria for planning of focus group participants (e.g. whether to separate by age and/or gender) and identifying key socio-demographic differences, such as urban, peri-urban, rural, different ethnic groups and livelihood strategies. Since limited time and resources imposed limits on the number and geographical distribution of the focus groups conducted the four countries, the expert panels helped to identify priorities with respect to the key criteria.

The version of the translated questions reflecting modifications recommended by the panel of experts, including possible alternatives that needed to be explored further, served as the basis for the focus group discussions and key informant interviews.

4.4 Focus group discussions

To ensure that the translated FIES module was understood by respondents as intended, the questions were explored in semi-structured discussions with groups of individuals from the target population, using a qualitative research technique known as **focus group discussions**. Focus group discussions are designed to elicit the perceptions, opinions, beliefs, and attitudes of participants through a guided, interactive discussion. This step helped to identify potential sources of misunderstanding and enabled further refinement of the questions based on insights into how the questions were understood by potential survey respondents.

In all four countries of the pilot study, focus groups were planned so that each group was composed of people of similar socio-cultural backgrounds, generally from the same community. In general, participants were people who were at risk of hunger or food insecurity at the time or who had been in the past. The total number of focus groups in each country was planned to take into consideration the key socio-demographic differences likely to lead to different perspectives or understandings regarding the themes and questions in the FIES. When deemed culturally appropriate, focus groups were conducted separately for men and women, and younger and older adults, to ensure that everyone would feel comfortable speaking.

A summary of the number and composition of focus groups conducted in each country is presented in Table 3.

Table 3: Focus groups conducted in Angola, Malawi, Niger and Ethiopia

Type of community	Number of focus groups			Language	
ANGOLA	*Men*	*Women*			
Urban (Luanda)	1	1		Portuguese	
Peri-urban (Luanda)	2	2		Portuguese	
Rural farming community near Luanda	1	1		Portuguese	
Rural farming community – Kwanza Sul Province	1	1		Umbundu	
Rural fishing village - Kwanza Sul Province	1	1		Umbundu	
MALAWI	*Men*	*Women*	*Mixed youth*		*Key Informants*
Lilongwe (Rural)	1	1	1	Chichewa	1 (m)
Lilongwe (peri-urban)	1	1	1	Chichewa	
Rumphi (rural)	1	1	1	Chitumbuka	1(m)
Rumphi (peri-urban)	1	1	1	Chitumbuka	1(m)
Zomba (rural)	1	1	1	Chichewa	1 (f)
Zomba (peri-urban)	1	1	1	Chichewa	1(m)
NIGER					
Niamey – peri-urban	1 + 1	1 + 1		Haoussa and Djerma	
Dosso region (rural)	2 + 2	2 + 2		Haoussa and Djerma	
Maradi region region	2	2		Haoussa	
Tahoua region (peri-urban and rural)	2	2		Haoussa	
Tillabéri region (rural)	4	4		Djerma	
ETHIOPIA					
Urban Addis	1			Amharic	
Rural Addis	1	1		Amharic	
Rural Adama		2		Oromo	

The focus group discussions began with more general questions about obtaining food and eating habits followed by some open questions about the experience of not having enough food. Participants were asked to describe situations they had personally experienced or experienced by people they know, and to describe the distinguishing characteristics between households where people always have enough to eat and those that often do not.

Each question on the FIES questionnaire was then reviewed with the discussants to verify comprehension and identify potential discrepancies in relation to the intended meaning. Possible alternative phrases suggested by the expert panels were explored. The objective was not to elicit answers to the questions that compose the FIES, but rather to explore how respondents understood the questions, to listen to how they talked about the experiences to which the questions refer and to note possible alternative phrasing.

De-briefing sessions were held as soon as possible following each focus group to discuss methodological issues and to identify emerging themes to be explored in greater depth in subsequent focus groups as well as phrases used by participants to express key concepts. In Malawi and Niger, Key Informant Interviews were also conducted with local leaders in the respective areas to further verify certain terms and phrases proposed by the team. After all the focus group discussions were completed, final de-briefing sessions were held with focus group moderators and assistants, supervisors and expert panel members to reach consensus on final versions of the scale based on focus group findings.

The final linguistically adapted versions of the FIES were pre-tested by Gallup in preparation for their World Poll surveys to be conducted in each country during 2013, leading to minor refinements in wording of a few items.

The experiences from the linguistic adaptation work in Angola, Ethiopia, Malawi and Niger highlighted some of the more difficult challenges inherent in adapting the FIES in diverse contexts, some of which are summarized in Table 4.

Table 4: Linguistic challenges addressed during the 2013 pilot study

PHRASE	EXAMPLES FROM THE FOCUS GROUPS: FINDING THE RIGHT PHRASE AND EXAMPLES
Past [year /12 months]	In Malawi, many people thought that the past 12 months referred to the calendar year 2012, so the phrase way modified to reflect the period between 12 months ago and present (e.g. if interviewed in August, the period would be “from last September until present...”.
Lack of money and other resources	In Angola, “lack of means” was understood better than “lack of money and other resources”. In Niger, in both Djerma and Haoussa languages, lack of money and other resources was understood as the lack of any mean to cope with a certain situation, to find a solution to a problem. Participants to the focus group discussions stressed the need of having money to procure food, especially during the lean season, as well as the importance of relying on other resources, such as livestock or other informal social safety net systems (e.g. barter, called *troc*, or regular collection of money to be distributed to the vulnerable families called *tontine*) as a way to escape extreme poverty.
Household	In Malawi, the communities in central region were traditional Chichewa is spoken, referred to household as “*pakhomo”* meaning people living together and sharing food and other resources. The communities referred to “*pabanja”,* another term that was suggested, meaning someone’s blood line or clan, and therefore not appropriate. However, this was different in the southern region; there was no distinguishing between

	the two words. The team decided that both words be used when administering the questions.
Food	In Malawi, **food** was generally referred to as the staple maize in all the regions. Some respondents indicated that even if they ate rice but not maize that day they had not eaten (Rumphi and Lilongwe), while in the Southern region (Zomba) they acknowledged that rice and cassava were food. In the Central region, food was also defined as the main staple (maize) and was tied to manual labor (farming) and that nsima (maize meal) is the food that provides energy to work in agricultural production. Similarly as in Malawi, in Niger food was generally associated with the main staples (those which provide the majority of required energy) which are millet, sorghum and the residual bran of these cereals. In some communities of herders milk is also considered as a basic, important food. As an example, picking and eating wild leaves is also a source of food supply but it is considered more as a feeding strategy which compensates for the scarcity of food during the lean season.
Healthy and nutritious food	In Angola, "healthy food" to some people referred to food that is hygienic and safe, while "nutritious food" is associated with having a varied diet. In all districts in Malawi, question 2 (not eating healthy and nutrition foods), and question 3 (having to eat only a few kinds of food) yielded a considerable amount of debate. There seemed to be a thin line between "different kinds of foods" and "healthy and nutritious foods". In all the 3 districts the phrase "healthy and nutritious foods" was interpreted as "food that gives energy" and even after probing the respondents indicated that if food is healthy and nutritious it should be the one that will "give you energy to do your farming activities". Most respondents indicated that different kinds of foods are part of healthy and nutritious diets. In Niger healthy and nutritious food was associated with 'food that is not harmful to the health of the person (healthy) and builds the body (nutritious)". It contains everything the body needs and it helps to have strong, healthy and shiny skin. Healthy and nutritious diets are diets including different kinds of food.
Eating only a few kinds of foods	During focus group discussions in Niger, respondents had no problem understanding and giving examples of what it means for them to eat different kinds of food. Eating few kinds of foods means having very limited variety of foods during the same meal. On the contrary, to have a diversified diet means being able to eat all the food (quantity) that the person wants (quality) such as rice, meat, fish, salad, cabbage, mangoes.
Skipping a meal	In some languages, such as Djerma in Niger and Chichewa in Malawi, there is no single term for meal or way to express skipping a meal. In both languages, the question was modified to ask if food was skipped in the morning, afternoon or evening, depending on the interval that those communities take their meals.
Ran out of food	In Niger, participants associated this expression with the worry, the doubt, the fear of not having enough food left in their stocks and the difficulty of buying more due to lack of resources. However, discussions revealed that men and women might not have the same

	perception of this concept. For women, "being out of food" is synonymous with having a monotonous diet while among men, it means being unable to feed their family, not having food in their stocks.
Eating less than you thought you should	In Malawi, some respondents indicated that they maintained the same frequency of meals but cut down on the portions, hence eating less than expected. Some respondents indicated that they had to skip meals, hence eating less than what they thought they should have eaten. For the two above phrases, the Chichewa and Chitumbuka versions were adjusted to the different contexts correctly without changing the meaning. In Niger, virtually all respondents in all the visited villages reported that the number of meals is strongly associated with the cropping season. In the different regions visited, participants of both groups (men and women) indicated that during "normal" periods, when there is good food availability, following the harvest season, they take three meals a day. During the lean season, the frequency decreases and varies between 1-2 meals per day. However, when crops fail the number of meals can be drastically reduced to 1.
Hungry but did not eat	The communities in the northern region of Malawi referred to the initial translation as long-term hunger, famine, or implied drought. The "*mukaziya*" depicts feeling hungry.
Go a whole day without eating	In Niger, this question was adapted with the expression of "not being possible to eat from sunrise to sunset" which corresponds to "not taking any of the three meals of the day: breakfast, lunch and dinner".
Enough food	In Djerma, respondents understood the expression eating enough food as eating until "they have a full stomach" (quantity) while in Haoussa it was possible to almost make a literal translation with the expression "eating enough food".

The linguistic adaptation experiences in Angola, Ethiopia, Malawi and Niger provided invaluable information on the challenges involved, corroborating experiences in other countries regarding phrases and concepts which require more careful adaptation. While it will not be logistically possible to conduct such in-depth adaption work in every country and language, these experiences will be used to inform approaches for accurate, albeit less intense adaptation and translation of the scale for global use.

5. *Towards a Valid Global Standard for Food Insecurity Measurement*

In science and statistics, validity is the extent to which a concept, conclusion or measurement is well founded and corresponds accurately to the real world. [...]

The validity of a measurement tool [...] is considered to be the degree to which the tool measures what it claims to measure.[9]

This section is concerned with establishment of the validity of the FIES as a food-insecurity measurement tool for global monitoring.

Validity is a quite general term, related to adherence of a concept, the result of a scientific inquiry or a measure to reality. In the physical sciences there is usually no significant ambiguity regarding what the reality is, and therefore validation of a measurement tool reduces to comparison of the measures obtained from the tool with some available objective reference or benchmark, sometimes referred to as the "gold standard". In recognition of the fact that measures are always possibly affected by errors, the quality of a measurement tool is assessed with reference to two different aspects, referred to as "reliability" and "accuracy" respectively, which could also be described as the attributes of "being right" and "being precise". By comparing the results of repeated applications of the measurement tool to the benchmark object, the measure of which is known, one can assess both reliability and accuracy of the measures, thus establishing validity in its broader meaning. Obviously, a valid measurement tool produces measures that are both right (that is, it produces, on average over repeated applications, the correct measure) and precise (each of the produced measures is quite close to the true magnitude of the "thing" that one aims at measuring).[10]

When applied to many concepts in social sciences, however, this process is not so simple. Assessing the quality of a measurement tool poses the immediate problem that the object of interest may be an *immaterial*, *unobservable thing* (commonly referred to as a *construct* or a *latent trait*) for which no *objective* benchmark or reference exists. Lack of an objective benchmark has the consequence that it may become particularly difficult to disentangle the two components that contribute to validity: that of the underlying conceptualization of the construct (i.e., "reliability") and that of the measure (i.e., "precision"), which can only be assessed if the construct has been conceptualized correctly. In fact, in debates over food security measurement, the two processes of defining the object to be measured and evaluating the various proposed tools to measure it have been so inextricably linked that judgments on the appropriateness of an indicator have sometimes been confused with value judgments on the underlying concept.

In addressing the question of the validity of experience-based food insecurity scales in general, and of the FIES in particular, we consider the two issues in turn. We discuss first the *propriety of the tool as a food security monitoring instrument*, which concerns the validity of the food insecurity construct that the

[9] (http://en.wikipedia.org/wiki/Validity_(statistics), accessed on August 4, 2013)

[10] Judgment of the overall validity of a tool must thus balance the two properties. While it is desirable that measures be as precise as possible, excessive focus on precision may sometimes lead to the risk of preferring instruments that are … "precisely wrong" over those that are "approximately right," a risk that we propose should be adamantly avoided.

tool is intended to measure. We then tackle the question of the *accuracy of the produced measures*, that is, *how well* the proposed tool is able to measure the specific concept of food insecurity.

The above distinction is important, as in some cases, the term “validity” is used to simply imply precision without also considering the adequacy of the underlying concept of food insecurity. Ignoring this important aspect of the validation process may rightfully lead to some skepticism. Statistical tests and modeling may confirm the “validity” of experience-based food insecurity scales because the response patterns conform to certain criteria. Without an understanding of the underlying construct of the food insecurity scale that the tool is intended to measure, some erroneous conclusions may be drawn. Experiential food insecurity scales are sometimes perceived as being unrelated to nutrition, for example. However, as discussed in Section 3, nutritional aspects associated with changes in food intake resulting from restricted access to food are indeed an important part of the underlying construct of food insecurity. On the other hand, food insecurity scales are not intended to quantify changes in food or nutrient intake.

For the first part of this discussion, we refer back to the summary in Section 2 of the history of the debate regarding the use of the food security definition for practical purposes such as monitoring progress towards the MDGs or evaluating projects and programmes. For the second part of the discussion, as no specific evidence on the application of the FIES in its current form is available yet, we provide a review of the significant amount of research, undertaken by numerous investigators in different settings aimed at establishing the validity of other experience-based scales. We critically review those efforts through the lens of the proposed two-layer analytic framework highlighting if, and to what extent, the results obtained for the US HFSSM, the HFIAS or the ELCSA also apply to the FIES and its potential applications.

We conclude that the collective evidence from existing validation work is sufficient to suggest that the FIES is indeed founded on a valid concept of food insecurity. It covers domains that are common across cultures and socio-economic conditions and thus has *the potential* to form the basis for a valid measure worldwide. It is also clear, however, that a conclusion regarding whether or not such a measure can be established *in practice,* in each and every country in the world is premature if based only on the existing evidence so far. Successful practical implementation of a global measurement standard requires additional research, to verify, for example, whether or not the FIES in its current form is able to measure the prevalence of different levels of severity of food insecurity comparably across populations that differ in their linguistic, cultural and socio-economic aspects. It is safe to say, however, that this is indeed a worthy endeavor, and that the development of such a global standard will generate enormous benefits for the entire community of researchers, analysts and policy makers interested in eradicating food insecurity and hunger. This is precisely what the projected work to be carried out by the FAO VOH focuses on. The objective is to promote the FIES as a global standard through extensive validation of the results obtained in the initial phases, accompanied by the development of the necessary analytic procedures to compute severity of food insecurity indicators based on the responses to properly adapted questionnaires.

5.1 What is meant to be measured? Defining the "severity of food insecurity"

The FIES is being proposed as a metric for the **severity of food insecurity** (access dimension) in population groups, based on data collected at the household or individual level. Establishing its validity implies finding agreement on a definition of this food insecurity construct that can be measured along a scale of severity. In other words, it requires being able to speak legitimately of subjects not only in terms of being food insecure or not, but also as being *more* or *less* food insecure than others.[11] Food insecurity experiences may occur at either the household (economic unit) level or the individual level. While the experiences of reduced food intake, disrupted eating patterns, poor diet, and hunger are essentially individual, food provisioning and the adequacy of food stores in terms of quantity and quality inherently apply to the household-level.

To investigate the validity of the FIES as a measure of food **in**security, we recall the definition of food security in the 2009 Declaration of the World Summit on Food Security presented in Section 2: *Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.*

Arguably, this has been a useful definition for advocacy and to inform discussions at the higher political level, but it is also leaves, as put very recently, "sizeable gaps between the food security definition and its measurement in practice" (Coates, 2013, p. 190). One of the major effects of the World Food Summit definition is that such an encompassing definition of the concept of food security suggests multiple possible definitions of the inverse concept, that of "food insecurity", which is what we really want to measure at its different levels of severity. The construct of food insecurity that the FIES aims to measure is a more restricted concept within the broader, more encompassing definition. The advantage of the FIES is that it enables measurement of the food insecurity which can then be analyzed together with indicators of its determinants and consequences to contribute to a more comprehensive understanding and inform more effective policies and interventions.

Measuring food insecurity using experienced-based scales like the FIES puts peoples' experiences and behavioral responses at the core of the definition of what food insecurity *means*. According to a number of authoritative commentators, this was a long due and welcome change in perspective that would fill the gap in existing methods (Barrett, 2002; FAO, 2002b). This line of thinking has been described, by Coates *et al.* (2006a), as one way to promote a shift towards "third generational indicators" [the first two generations being those characterized by attention to determinants and to outcomes of food insecurity,

[11] This is not obvious, and the problem is particularly relevant if we consider that the two official indicators used to monitor the hunger target within the Millennium Development Goal (MDG) framework only provide measures of prevalence in the population, leaving the question of the *severity* of food insecurity largely unaddressed.

respectively proposed by Barrett (2002)]. The substantial innovation is represented by the possibility of capturing food insecurity directly and analyzing it from a behavioral perspective.

The essential arguments in favor of directly measuring food insecurity are that (a) food insecurity is a condition that may affect overall welfare in different ways, depending on the type and strength of the constraints faced by people affected; (b) it is characterized by behavioral responses, and (c) both the responses and the welfare impact can be located along a scale of severity. As described in Section 2, Radimer's work identified a consistent pattern: the lived experience of food insecurity was characterized initially by anxiety, associated with worry about being able to get enough food; then, as conditions worsened, it resulted in decreased amount of stored food in the home, followed by worsening quality and diversity of the diet, decreased quantity of food eaten per meal, and, finally, in being forced to skip meals and feel hungry for an extended period (Radimer *et al.,* 1992). We are thus presented with a construct that involves three domains - uncertainty and worry about food, inadequate food quality, and insufficient food quantity and a hypothesis on the relative position of the domains on an underlying scale of severity as shown in Figure 1 (Section 2).

The meta-analysis of food insecurity scales and ethnographic studies in different regions of the world described in Section 4 revealed that the same basic dimensions of the theoretical construct identified by Radimer were common to all the cultures sampled (Coates *et al.*, 2006a). While the analysis does not confirm that a universally applicable questionnaire may be developed, it does suggest that these common domains are robust across cultures in their broad definition and ranking of severity (Swindale and Bilinsky, 2006). These are precisely the domains covered by the items included in the FIES, as shown in Table 5, where each item of the FIES is presented with the domains of the underlying construct and level of severity of food insecurity to which it is assumed to correspond.

Table 5: The 8 FIES items by domain of the theoretical construct of food insecurity and assumed level of severity

Scale items		Domains of the food insecurity construct	Assumed severity of food insecurity
Q1	Felt anxiety about having enough food at any time during the previous 12 months (this time period applies to all 8 scale items)	uncertainty and worry about food	**Mild**
Q2	Not able to eat healthy and nutritious food because of lack of money or other resources to get food	inadequate food quality	**Mild**
Q3	Consumed a diet based on only few kinds of foods because of lack of money or other resources to get food	inadequate food quality	**Mild**

Q4	Did not eat breakfast, lunch or dinner [or skipped a meal] because there was not enough money or other resources to get food	insufficient food quantity	**Moderate**
Q5	Ate less than they thought they should because of lack of money or other resources to get food	insufficient food quantity	**Moderate**
Q6	Household ran out of food because of lack of money or other resources to get food	insufficient food quantity	**Moderate**
Q7	Felt hungry but didn't eat because there was not enough money or other resources for food	insufficient food quantity	**Severe** (hunger)
Q8	Went without eating for a whole day	insufficient food quantity	**Severe** (hunger)

5.2 Lacking a proper reference, how can we determine accuracy of the measures?

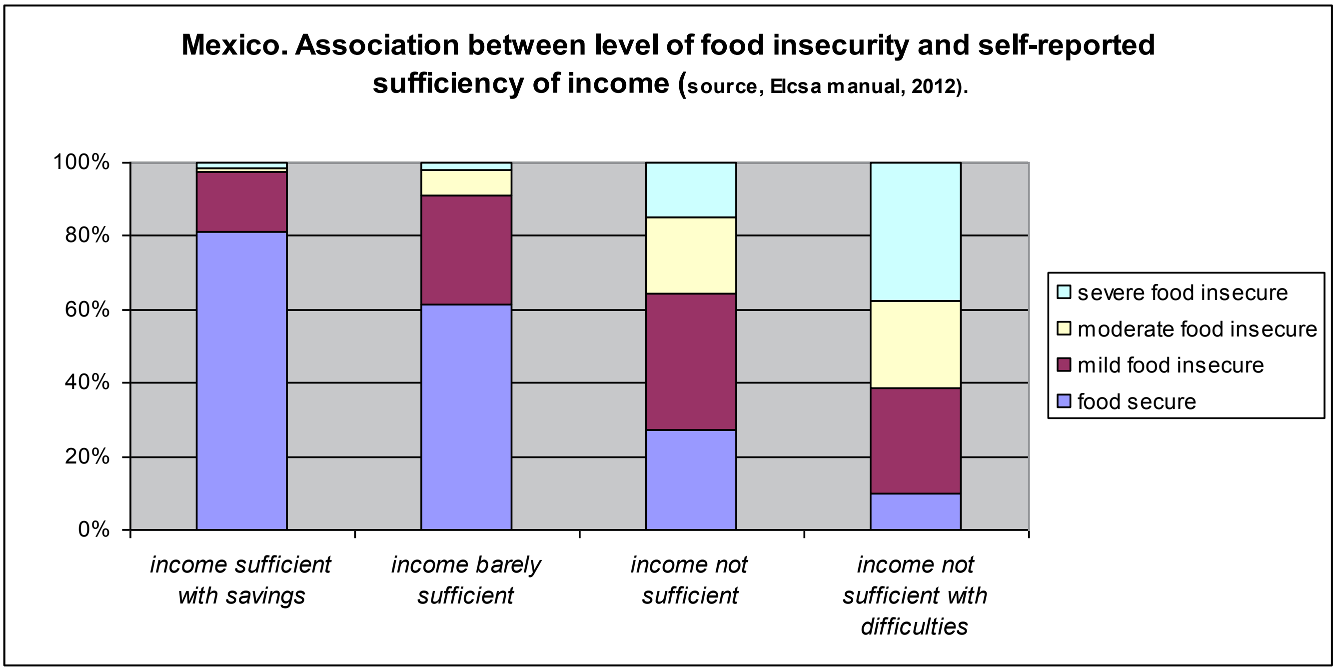
Experience-based scales were developed to fill a recognized gap in the ability to measure food insecurity, but this creates a conundrum when one tries to empirically validate the accuracy of the measures that they produce. According to Frongillo, "Accuracy [of a food insecurity measure] is assessed by in-depth analysis, and by relating the measure to a criterion measure, which may be a more definitive measure, determinant or consequence" (Frongillo, 1999, p. 508S). The ideal approach would be to assess the accuracy of a scale by using a definitive measure of the underlying theoretical construct against which the measurement tool can be compared (validated). However, there is no definitive measure. Food insecurity is a social as well as biological, nutritional, and economic phenomenon (Frongillo, 1999), and experience-based food insecurity scales capture social aspects that other measures do not. These types of scales are direct measures of the access component of food security: the experience of not having enough money or adequate resources to get food in sufficient quantity and/or quality, for which no alternative direct measure exists.

Frongillo *et al.* (1997) and Frongillo (1999) used an approach for developing and applying a criterion measure that involved consensus among independent researchers who classified households using a very rich data set, composed of food security status as well as demographics, factors contributing to food insecurity, coping strategies, fruit and vegetable consumption, disordered eating behaviors, dietary recall, and an inventory of household food stores. A similar approach to developing a criterion measure was also used in other settings (Wolfe *et al.*, 1998, 2003; Hamelin, Beaudry and Habicht, 2002; Frongillo and Nanama, 2006).

However, developing criterion measures for validating the FIES in new settings would require a lengthy and thorough process to obtain detailed databases. A more feasible approach involves relating measures produced by the scale to existing measures of determinants and/or consequences of food insecurity. It has been standard practice to test accuracy of the scale by studying associations between the scale and variables that are theoretically part of the same construct as food insecurity, and/or that would vary in an expected way across different levels of food insecurity, when these variables are measured concurrently in the same subjects.

Showing that the FIES or similar scales correlate with other variables in the expected direction (such as observing an increase of food insecurity severity across quintiles of increasing poverty) supports the conclusion that whatever is being captured by the scale is consistent with the intended underlying construct of food insecurity (Cook and Beckman, 2006). Consistent relationships have been found across countries, as is illustrated in the following graph of data from a study in Mexico that looked at food security levels calculated from the ELCSA across levels of self-reported sufficiency of income (Figure 3). There is a clear trend of a worsening food security situation as income becomes insufficient.

Figure 3: Association between level of food insecurity and self-reported sufficiency of income

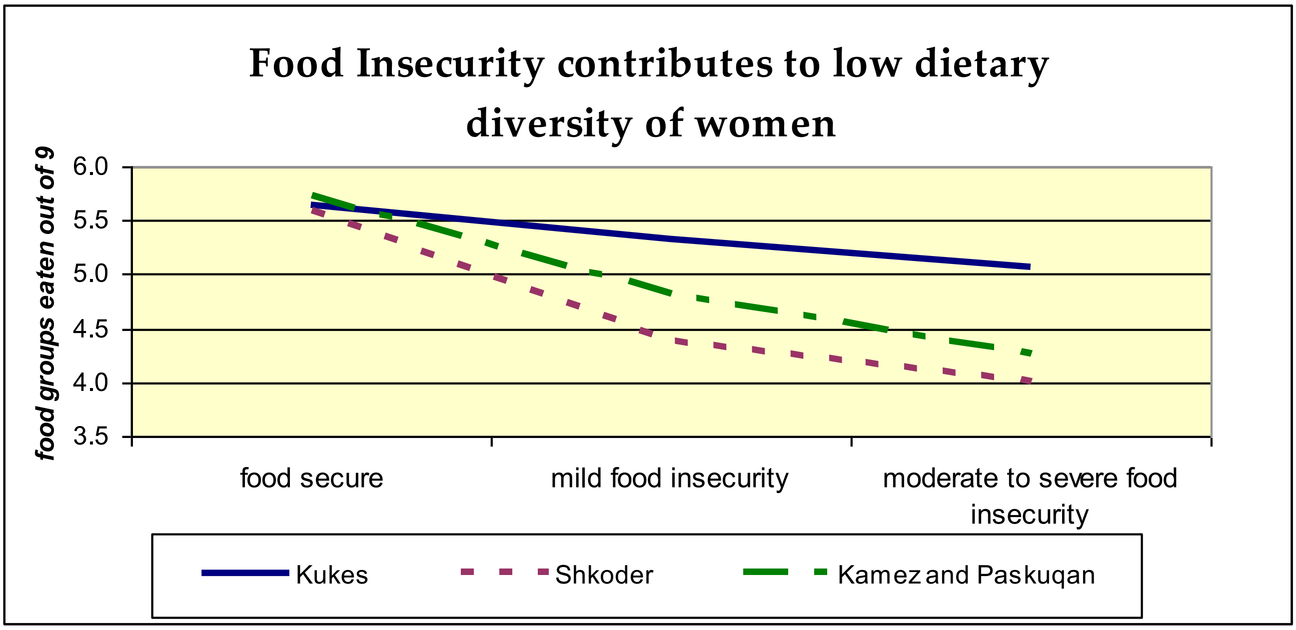


Source: Adapted from Figure 4, ELCSA manual (pg. 55), FAO 2012a.

Examining associations between food insecurity and indicators of dietary intake is also useful to verify the accuracy of experience-based food insecurity scales, since changes to dietary quantity and quality are part of the underlying construct of food insecurity. National studies conducted in Brazil (Segall-Corrêa *et al*., 2008) and Mexico (Pérez-Escamilla, Parás and Vianna, 2012) showed an inverse relationship between severity of household food insecurity and consumption of high nutritional quality foods such as fruits, vegetables, meat, and dairy products. Another study in Brazil using a food frequency questionnaire found that 85% of food secure households had consumed meat and 75% had consumed fruits, while among the most food insecure households, consumption of these foods was 12% and 8%, respectively (Panigassi *et al.*, 2008).

In Albania, the diversity of women's diets was associated with food security status. A study showed that dietary diversity (number of food groups consumed in a 24 hour period) in three vulnerable areas declined with increasing severity of household food insecurity, consistent with the underlying theoretical construct of food insecurity. (see Figure 4 below).

Figure 4: Food insecurity and dietary diversity of women - Albania



Source: United Nations Albania. Baseline nutrition and food security survey. 2012. Tirana. Chapter 4, figure 4.12, page 59. http://www.unicef.org/albania/Baseline_Nutrition_and_Food_Security_Survey.pdf

It is often of interest to policy makers to know how food insecurity relates to child malnutrition. While this relationship can be explored using the FIES and similar scales, anthropometric measures and other biological indicators of malnutrition would be inappropriate for validation studies of experience-based food insecurity scales for a number of reasons. Results of such comparisons are likely to be misleading and difficult to interpret, particularly in the case of the FIES, which provides prevalence estimates of adult food insecurity. Stunting and wasting, especially in the case of young children, are influenced by many other factors besides access to food, including sanitation, maternal care and access to health and social services. Equally important are temporal aspects, as stunting, in particular, reflects nutritional and environmental conditions in the past, thus complicating further the analysis of the relationship between stunting and severity of food insecurity (which in the case of the FIES, has a 12-month reference period). Thus, while it is valid to explore the relationship between biological indicators of nutritional status and experience-based measures of food insecurity, it would not be an appropriate to use the former to explore the validity of the latter. It should also be kept in mind that the experience of food insecurity, even in the absence of observable negative effects on nutritional status, is a serious problem in itself, indicating a violation of the Human Right to Adequate Food.

In conclusion, we can say that there are strong empirical bases to claim that the fundamental construct, best described as *resource-constraint food insecurity* (Ohls, Radbill and Schirm, 2001, p.6), is indeed a meaningful and useful concept. The findings by Coates *et al*. (2006a) and the scrutiny to which experience-based food insecurity scales have been submitted suggest that the items included in the FIES questionnaire can serve as a valid starting point to create a globally valid measurement tool. However, most of the discussion thus far has proceeded under the assumption that the food insecurity measures produced by the scales are indeed reliable measures of the underlying concept. By being fully aware of the potential risk of circularity of the arguments, we must recognize that meaningfulness of the concept is not synonymous with meaningfulness of the measures. In other words, establishing the validity of the concept is not sufficient to claim validity of the measures. This is a crucial aspect in the analysis of validation, to which we now turn.

5.3 From a concept to a measure: application of the Item Response Theory (IRT).

The next step in the development and validation of an actual measurement tool based on the concept of food insecurity experiences is the identification of methods to obtain and process the information that will lead to food insecurity *scores,* along the continuum defined by the arrow in Figure 1 (Section 2, page 6). In bridging the gap between defining the concept and developing a measure, the lead was taken by a USDA-led team of collaborating researchers while developing the US HFSSM.[12] Based on the results of the qualitative research done at Cornell and elsewhere in the U.S., it was evident that probably the best way to obtain the necessary evidence on peoples' experience was through *self-reported data* on perceptions, behaviors and experiences associated with different levels of food insecurity. It was then proposed that the analytics for processing the data and computing the scores could be successfully borrowed from the toolkit of *Item Response Theory* (IRT) models, commonly used in the educational and psychological testing fields.

The foundation of modern IRT is the assumption that a quantitative measure of an underlying, unobservable construct (i.e., a *latent trait*) can be inferred from a set of dichotomous variables (1/0, for positive/negative, correct/incorrect, affirmed/denied) obtained as the result of a test.[13]

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[12] See Bickel *et al.*, 2000 for a description of how this has been accomplished.

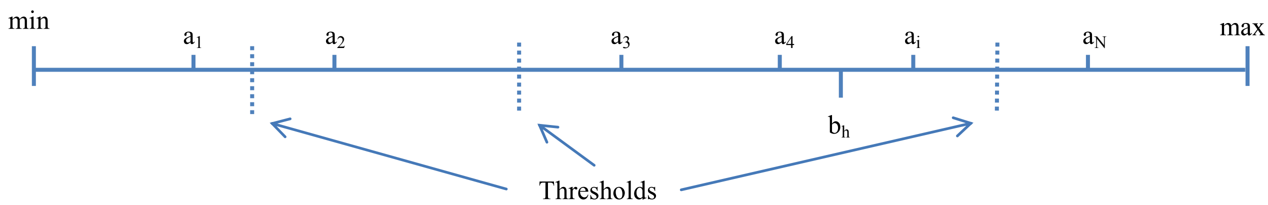
[13] In educational testing, the underlying construct is the "proficiency" or "ability" level of the subjects, and a test is composed of a collection of items clearly linked to the underlying construct and characterized by different levels of difficulty. In psychological testing, the underlying construct is an "attitude" or a "character", and test items are represented by "symptoms" or "manifestations" typically associated with that attitude or trait. In experience based food insecurity measurement, the underlying trait is the severity of resource-constrained food insecurity, and the items are typical experiences associated with increasingly binding constraints.

The fundamental assumption of this theory of measurement is that the probability of testing positively, responding correctly, or affirming an item associated with a certain level of difficulty or severity depends on the unobservable true ability, attitude or condition of the subject. Formally, by using a_i for the item parameter and b_h for the respondent's, the dependency can be represented by a function, *F(·),* termed the *item characteristic curve* (ICC) or *item response function* (IRF):

$$\text{Prob}\left(x_{h,i} = 1 \middle| b_h, a_i \right) = F(b_h, a_i) \qquad (1)$$

Once the function *F(·)* is specified, the likelihood of obtaining a certain set of responses to different items - each characterized by a different difficulty level - from a subject with a certain degree of proficiency can be ascertained. This provides the statistical basis for estimating both the items' difficulty parameters and the respondents' ability scores. The estimated parameters will correspond to locations along the underlying scale of abilities. When necessary, thresholds can also be defined on the same scale to identify groups of classes of severity. (See Figure 5)

Figure 5: Thresholds



By comparing Figures 1 and 5, the parallel with the problem of measuring the severity of food insecurity should be evident: the model in (1) can be interpreted as describing the probability that a respondent whose unobservable food insecurity level is b_h would report having gone through the experience or behavior corresponding to the severity a_i. When a set of data is available on the responses from a number, say *T*, of respondents to the same set of, say *N*, questions, both the *N* different *item parameters,* a_i, and the *T* different *respondents' parameters*, b_h, can be estimated, most commonly through maximum likelihood procedures.

The idea is rather simple, yet powerful: by looking at the way in which the many respondents report on one of the experiences, one can establish a measure of the severity associated with that experience, i.e., where that experience is located on the scale (intuitively, experiences reported by a larger number of subjects are deemed less severe, and vice versa). Then, once the severity level characteristic of each question has been established, each respondent can be located on the same scale by looking at the answers provided to the whole set of questions, that is, how many and which experiences have been reported. Based on their position along the continuum of the food insecurity severity scale represented in Figure 1, they can be classified in different classes of severity levels.

The Rasch model

Modern IRT provides a battery of models that can be used to address various issues common in any attempt at measuring latent traits, which explains why IRT is becoming the dominant framework for measurement in many social sciences, in particular in psychology and educational testing.[14] Among them, one of the simplest formulations is the **One Parameter Logistic Model**, also known as the classical **Rasch model** (Rasch, 1960).

In a Rasch model, the probability that a subject with ability b_h responds correctly to a test item characterized by difficulty level a_i is modeled as a logistic function of the distance between b_h and a_i:[15]

$$\text{Prob}\left(x_{h,i} = 1 \middle| b_h, a_i \right) = F(b_h - a_i) = \frac{e^{b_h - a_i}}{1+e^{b_h - a_i}} \qquad (2)$$

Application of the model to the measurement of food insecurity severity entails interpretation of the *a* parameters as reflecting the severity associated with the experience captured by the different questions, and of the *b* parameters as the measure of the level of food insecurity experienced by the respondents. Assuming that the probability of affirming any item by each respondent is (locally stochastically) independent from the probability of affirming any other item by the same respondent, or from the probability of affirming the same item by any other respondent, the likelihood function of any sample of 0/1 responses, $\mathbf{X} = \{x_{h,i}\}$ (where $x_{h,i}$= 1 if the h-th respondent reported having experienced item *i*, and 0 otherwise) can be determined by the product of the probabilities of each $x_{h,i}$.[16] The likelihood function can then be maximized with respect to the vectors of parameters, ***a*** and ***b***, yielding the required measures.[17]

The major attractiveness of the simplest formulation of the traditional Rasch model as in (2) resides in the fact that the measures of individual severity (i.e., the estimated *b* parameters) are linked monotonically (albeit not linearly) to the *raw score*, that is the number of affirmed items. This means that raw scores are a sufficient basis to represent the severity of food security of the respondents on an

[14] Also in economics, since the pioneering work of McFadden (1974), methods for latent variable measurement are becoming standard with application of Random Utility Models in the analysis of both stated and observed choices (Louviere, Hensher and Swait, 2000). The analytics of discrete choice models parallels very closely that inspiring IRT.

[15] Notice that, because the model is specified in terms of the difference between *a* and *b*, only the distance between two parameters is meaningful. This means that in practice one is free to choose any reference point as the “zero” of the measurement scale and to express the “units” as it is most convenient. This is certainly not a problem for any stand-alone assessment, i.e. one conducted with one dataset only and when results are interpreted with reference to that particular sample of subjects. When different assessments made with the same or similar set of items are to be meaningfully compared, however, some conventions need to be followed to set both the zero of the scale and the units. When applied to food insecurity measurement, the *b* parameter is interpreted as the food insecurity severity to which a respondent is exposed and corresponds to the severity associated with the condition that the respondent has a 50% chance of having experienced over the reference period.

[16] Local stochastic independence means that the probability of responding yes to one of the questions, conditional on having a certain level of food insecurity, is independent from having responded yes to any other of the questions, or from the fact that others have responded yes to the same question. In other words, it means that the food insecurity level of the respondent is the only variable that establishes the observed pattern of responses.

[17] For a detailed discussion of the assumptions needed to obtain consistent estimates of the unknown parameters, see any of the excellent references available on the Rasch model, e.g., Fischer and Moleenar (1995).

ordinal scale. Classes of food insecurity severity can be defined simply in terms of raw score, irrespective of the actual pattern of responses, with a degree of precision that is comparable to the one produced by more sophisticated models, but with obvious returns in terms of communication and simplicity of use (Nord, 2012).

This possibility of using the raw score as a measure of respondent's severity is the result of essentially two restrictions that are imposed on the model: one is the *conditional independence of the responses*; the other is the *equal discriminatory power of the questions* included in the questionnaire. To evaluate the validity of measures obtained via applications of a Rasch model, the question is whether or not these restrictions are rejected empirically: if the evidence supports the hypotheses, the measures produced are defensible also on empirical grounds if not, one has to look for more flexible models that relax some of the assumptions embedded in the simple Rasch formulation.

The empirical evidence so far seems to support application of the Rasch model to food insecurity measurement in various countries and conditions, which is one of the reasons why we believe that the OPLM may well be well-suited to constitute the basis for measuring the severity of food insecurity. The conviction is reinforced by the additional consideration that some of the problems highlighted in the literature on educational and psychological testing that have suggested the need for less restrictive, more sophisticated models will not arise in the case of food insecurity measurement.

The rapid evolution of IRT and the proliferation of existing models (including 2 parameter models, 3 parameter models, partial credit, mixture models, etc.), in fact, have been developed mainly in the educational testing field to address issues that are rather common in that area of measurement, such as for example the fact that an answer to a test may be only partially correct or the possibility of "guessing" the right answer. Analogous issues are much less relevant in food insecurity measurements. Here respondents are not expected to provide the "correct" answer, but only to report on whether or not they have experienced a well-described situation. Even though the possibility exists that somebody could make an honest mistake in self-reporting an experience, this may be more likely due to misunderstanding of the question, rather than to the different status of the respondent in terms of food insecurity (which would invalidate the measure). Significant empirical departures from the assumptions underlying the Rasch model are therefore much more likely due to insufficient care in formulating and asking the questions, than to problems with the theory of measurement that underpins it. [18] All of this

[18] The rapid evolution of IRT and the proliferation of existing models (including 2 parameter models, 3 parameter models, partial credit, mixture models, etc.) might well lead a casual reader to develop the wrong impression that the Rasch model is insufficiently sophisticated to capture the essential elements of the needed measurement in practice. To see things in the proper perspective, it should be considered that IRT models have been developed mainly in the educational testing field, where more sophisticated models than the one originally proposed by Rasch may be needed to address issues that are rather common in that area of measurement (such as the possibility of "guessing" the answer on a test). Analogous issues are much less relevant in food insecurity measurements, when respondents are not expected to provide the "correct" answer to a quiz, but only to report on whether or not they have experienced a well-described situation. Even though a probability exists that somebody could make a mistake in self-reporting an experience, this could be linked more to misunderstanding the question, rather than to a differential ability of the respondent.

points to the importance of careful linguistic and cultural adaptation of the questionnaire and to proper implementation of the survey.

Testing the assumptions required for proper measurement

One of the benefits of developing a measurement tool strongly rooted in a probabilistic theory is that the restrictions imposed on the model can be tested against the data. In this section we shall first review the meaning of the fundamental restrictions imposed by the OPLM formulation, and then outline the procedures for empirical testing.

Conditional independence is the assumption that allows forming the likelihood function used to estimate the model's parameters as the product of the conditional probabilities of affirming each item. It can be stated by saying that the probability of affirming one experience by a respondent, conditional on his or her food insecurity level, does not depend on whether or not he or she has affirmed other experiences, or on whether or not other respondents have affirmed the same experience. In other words, it amounts to saying that the respondents' food insecurity severity levels are sufficient to explain the structure of correlation that exists in the matrix of responses.

In educational testing, failures of conditional independence may arise because of problems in the actual test design that induce patterns of correlation in the responses which are not explained solely by the ability levels of the respondents (for example, because some test takers have "cheated" by peeking at the responses given by others, and therefore their probability of responding correctly depends also on the ability of neighboring test takers). In the context of food insecurity experience scales, conditional independence may fail to be reflected in the data because of, for example, inadvertently prompted responses by the interviewer, or of confusion between questions that are perceived by the respondent as being equivalent (so that the answer given to one of them conditions the answer given to the second).
While failures of conditional independence can be detected in the data (see below), there is little scope for treating them once the data has been collected. Given that they most likely derive from problems in design and implementation of the test, such failures, if detected, will point to the importance that due attention is paid to preparation and implementation of the survey. In the context of the FIES questionnaire, these include careful linguistic and cultural adaptation of the questions and administration by properly trained enumerators, to avoid problems due to anchoring of the responses, inducing bias, etc.

Uni-dimensionality requires that the items included in the scale used for measurement capture one clearly identified dimension: the one that corresponds to the latent trait of interest, and not others. In the context of food insecurity measurement, this dimension is the *severity* of the food insecurity situation as related to the resource constraints that prevents people from achieving satisfactory levels of food consumption. Defining a scale to measure this dimension does not imply neglecting the existence or the importance of other dimensions, but only to stress that efficient measurement requires focusing on the object of interest, avoiding confounding elements.

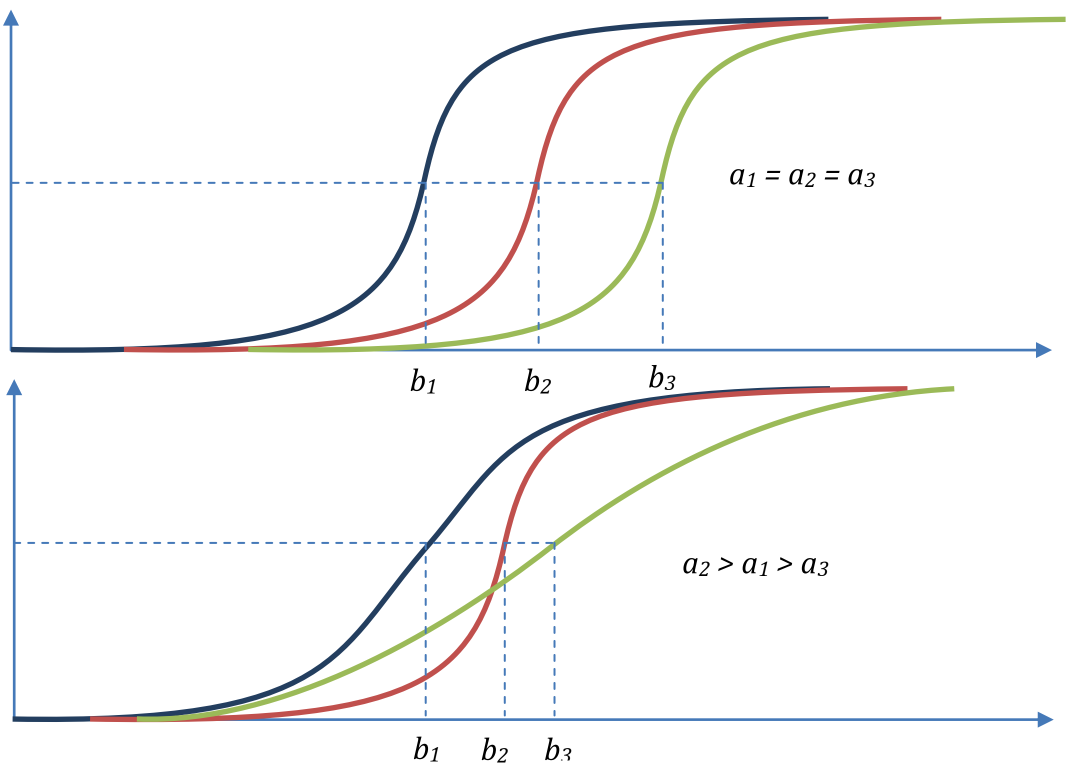
We have already discussed at some length the fact that the severity of resource-constrained food insecurity is a valid construct and that it is amenable to measurement, clarifying also that it should not be taken as an all-encompassing synthetic index of food and nutrition security. If two or more dimensions of a problem or of a latent trait are deemed relevant, effort should be made to define *different uni-dimensional* scales to be used for classification along a multi-dimensional lattice, rather than forcing the two dimensions on a single scale.

The discussion is relevant here because some of the existing food insecurity experience modules (such as the US HFSSM or the HFIAS) intended to capture the severity of food insecurity also contain follow-up questions on the related (but conceptually distinct) dimension of the *frequency* of the experienced food insecurity condition. While, in general, asking questions on both severity and frequency should not create problems, validity and efficiency of the food insecurity measure depend on the choice of the appropriate scoring and classification methods. Rather than trying to combine considerations of severity and frequency of food insecurity on a single scale[19], a more appropriate methodology seems to be identifying which items provide information on each of the dimension, and to use only those to score that particular dimension, as is currently done by the Economic Research Service of the USDA in their analysis of Household Food Insecurity in the United States (Nord, 2012).

Equal discrimination of the items means that the items in the scale have similar power in discriminating among respondents, which is seen, by proponents of the Rasch model, as a necessary prerequisite for a scale to reflect construct validity. The best way to describe this assumption is by reference to a diagram with Item Characteristic Curves of different items. The discriminatory power is reflected in the "steepness" of the ICC at the midpoint (reflected in the "*a*" parameters). In the top panel, the ICCs of three items with different severity (as reflected in the "*b*" parameters) are simple horizontal displacements of the same graph (corresponding to a logistic cumulative distribution function) which implies that the three items will be ranked in the same order of severity by any respondent independently from the location of the respondent on the food insecurity scale: the probability of affirming the most severe item is always lower than the probability of affirming a least severe one (the order in the vertical position of the three ICC, or the ranking in terms of severity of the three items, is always the same).

[19] This is suggested in the proposed methods to determine food insecurity scores from the data collected through the HFIAS (HFIAS manual), or in Recommendation 5-1 in National Research Council, 2006 to improve the US assessment. Confusion arises from the suggestion to use polytomous IRT models based on data collected on the *frequency* of experiences to derive a scale of *severity*, essentially treating frequency as a sub-dimension of severity. The problem with this approach is that it would be imposing an unwarranted *quantitative* comparison between severity and frequency (as if being exposed twice to a certain experience is equivalent to being exposed once to an experience that is twice as severe).

Figure 6: Item Characteristic Curves for three items with equal discriminatory power (panel (a)) or with different discriminatory power (panel (b))



Violation of equal discrimination (as revealed in the data by estimating significantly different slopes of the ICCs, and that would appear as in the second panel of Figure 6) implies the possibility that ranking of the items in terms of severity may change depending on the position of the respondent. According to the prevailing interpretation within the Rasch measurement school of thought, this would seriously question construct validity. In fact, violation of equal discrimination implies that, when confronted with the same set of experiences, people differing in their condition will rank them in different order of severity, which makes the "severity" construct somehow ambiguous. This is why proponents of the Rasch model insist that equal discrimination is something that should not be easily given up, and attention should be focused instead on using a set of items that discriminate equally, even if that means sacrificing some of the data by not using it for scoring some of the items whose discrimination parameter is mostly different from average. Low discriminating items may result, for example, from difficult interpretation and possible misunderstanding of the meaning of the experience being presented in a question, stressing once again the need for proper design and careful adaptation of the questionnaire to local languages and cultures.[20] Even in cases where some of the items reveal degrees of discrimination different from average, this does not mean that Rasch theory has to be abandoned, as there is always the possibility to identify a subset of questions that could form a proper basis for scoring in a way that is theoretically consistent with Rasch theory. This will entail a loss of efficiency (as some of the question asked will not contribute to the measurement) but can still allow for meaningful assessments, especially if there is convincing evidence that problems with the items that are discarded may be the result of the way in which the questions have been asked, and identifying them can provide useful information on how to possibly improve on the set of items in subsequent applications.

The conclusion of this brief discussion on the restrictions imposed by the OPLM (the Rasch model) is that several potentially problematic features of the data could be the result of faulty implementation of the measurement tool, rather than signs of the fact that the model is inadequate as a basis for providing valid measures of food insecurity severity. Nevertheless, whether or not the restrictions imposed by the OPLM formulation are relevant remains an empirical matter that can be addressed once the data has been collected. If the evidence is such that the restrictions must be rejected, proper consideration must be given to implementation issues. If no problems are identified in the survey implementation, it may be necessary to resort to more sophisticated versions of IRT models that relax some of the assumptions.[21]

How to test, in practice

All indications thus far point to the fact that the OPLM is indeed an appropriate formalization for meaningful measurement of the severity of food insecurity. In practice, adequacy is assessed through three kinds of tests to verify the suitability of the model: two to assess whether the data adequately fit the Rasch assumptions or not, and the third one to assess the overall reliability or "performance" of the measure.

All these tests are based on the analysis of the "residuals", that is the differences between the observed responses and those that would be expected under the truth of the estimated model. Given estimated values for item ($\hat{a}$) and person ($\hat{b}$) parameters, the probability of affirming the i-th item by the h-th respondent can be predicted as:

$$E_{h,i} = \frac{e^{\hat{b}_h - \hat{a}_i}}{1 + e^{\hat{b}_h - \hat{a}_i}}$$

A residual $r_{h,i}$ can then be calculated as the difference between the actual response, $x_{h,i}$, and the expected value $E_{h,i}$ for each item/person combination, and a matrix of residuals $R = \{r_{h.i}\}$ can be formed. As the responses are coded as zero/one and the predicted probabilities are strictly included within the {0 ,1}

[20] For example, in the FIES, if insufficient emphasis is given to the qualifier "for lack of money or other resources" to the experience of skipping meals, the item can be affirmed with high probability also by relatively food secure people, who skip meals for religious, health related or other reasons. The result will be a flatter ICC, located at very low levels of food insecurity, thus completely missing the point.

[21] The slightly more sophisticated 2 parameter logistic model (2PLM), for example, relaxes the assumption of equal discrimination of the items and could be estimated with relatively minimal added complexity, even though it will require a different approach to scoring cases.

interval, the residuals will always be values between -1 and +1, and will be positive when the item has been affirmed, and negative when it has been denied. Moreover, a residual will be larger, in absolute value, either when an individual with a low estimated parameter (i.e., found to be relatively food 'secure') affirms severe items, or when individuals with high parameters (i.e., relatively more food 'insecure') deny the less severe parameters. High values of fit statistics are thus evidence of response patterns that are difficult to reconcile with the estimated severity of the items and characteristics of the respondent.

As with the matrix of actual responses, also the matrix of residuals (organized with each row representing one respondent and each column representing one item) can be used for a differential analysis of the items and of the respondents. First, by looking at how the residuals are distributed across the sample of respondents, one can derive indications on the relative "performance" of each of the items; then, analyzing the way in which residuals are distributed across items, one can identify potential problems with one or a group of respondents.

In practice, the row and column averages of the squared residuals can be taken as measures of the extent of misfit of respondents and of items, respectively.[22] Under the truth of the model, these statistics have an expected value of one. Ideally, a scale for meaningful measurement of a uni-dimensional underlying trait ought to be formed by items whose fit statistics are between 0.8 and 1.2. In practice, once the data has been collected, values in the range of 0.5 to 1.5 are considered acceptable, identifying items that are "productive for measurement" (Wright and Linacre, 1994). Detected differences between the in-fit and out-fit values for a given item are a sign that responses to that item may be idiosyncratic for a small group of respondents, perhaps revealing problems with the way the question has been differently understood by that group of people.

The available empirical evidence on application of the Rasch modeling to food insecurity measurement, based on both published and unpublished results of the analysis of various scales derived from the US HFSSM (both for the US and for other countries) points clearly towards the possibility to identify a limited set of items that ensures equal discrimination. A cursory review of the results from those applications in various countries and in different settings reveals in-fit values between 0.7 and 1.3 for most of the items (Nord, personal communication).[23]

The analysis of fit statistics provide a sufficiently solid basis to assess the appropriateness of the model and of the data for measurement purposes, especially if measurement is aimed at obtaining estimates of the populations' prevalence of a limited number of classes of food insecurity. If more reliable measures

[22] Two types of statistics are traditionally reported in IRT analyses and labeled as *in-fit* and *out-fit* respectively, the difference being that, in the first case, the sums of row (respectively, column) squared residuals are weighted by the variance of responses in the corresponding columns (rows) of the original data matrix. Both are measures of the contribution of each item/respondent to overall misfit, but in-fit statistics are more robust to the presence of a few "outliers," a reason why they are preferred to assess the performance of the items.

[23] The results of these analyses have, for the most part, not been included in the published reports because they did not fit the type of publication, focusing more on the results than in the technical aspects of the measure.

of *individual* food insecurity measures are necessary, then more extensive tests are available that can be useful in deciding whether more sophisticated models may be needed.

Conditional independence across items, for example, is typically assessed by examining the pattern of correlations of residuals across items, based on the implication that, under the truth of the Rasch model, residuals should not show any discernible pattern of correlations. Once again, if some residual correlation is detected in the residuals, this may be used as a guide to select only a subset of items used for scoring, and to guide on the possible improvement of the items.

In the context of experience based food insecurity measurement, all the testing and resulting refinement of the questions will be greatly favored by the availability of datasets coming from different countries and contexts, one of the outputs expected from the Voices of the Hungry project.

5.4 Equalization of the scale and methods for classification

When proposing the FIES as the basis for a global standard to monitor food insecurity, establishing the appropriateness of the measurement theory is not enough. Another challenge is to use the information provided by the answers to the FIES questionnaires to classify cases into food insecurity classes in a way that is meaningful and comparable over time and across countries and socioeconomic contexts. Doing so requires: (a) establishing the metric equivalence of the scale, and (b) classifying cases into different food security levels taking into account possible differences in the severity of some items in some of the countries.

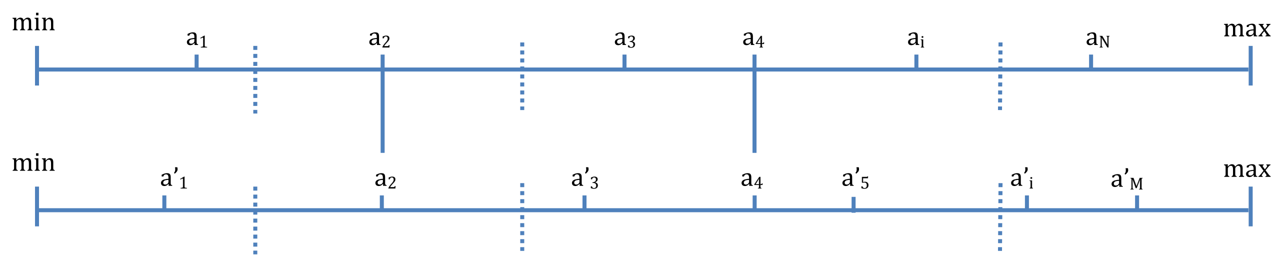
The need to ensure the *metric equivalence of the scale* derives from a fundamental indeterminacy of the IRT models (and of the Rasch model in particular): as the probability of affirming an item is a function only of the *difference* between the person and the item parameter, one is free to arbitrarily set the “zero” of the absolute scale. Also, as the model is defined only in terms of *relative* probabilities, only N-1 item parameters can be estimated. This means that, in a sense, each dataset of responses from a food insecurity experience set of questions can be used to measure the *relative* position of respondents on a scale that is strictly valid for *that* dataset in *that* instance, and this relative position would not change if the scale is transformed through an affine function. When comparing estimates from different applications (for example when analyzing data from different countries) metric equivalence must be ensured. In the contexts of unidimensional IRT models such as the Rasch model, this requires appropriate *anchoring* and *scaling* of the person parameters estimates obtained in different contexts to make sure that they are all expressed on a scale with the same zero and the same unit of measure. This is most commonly achieved by rescaling severity estimates of a group of *anchoring* items so that the group of items will have the same mean and standard deviation of severity. While only items that show the same severity in different countries can be used as anchoring, it is not necessary to require that *all* items in the scale are anchoring items in order to obtain proper comparisons of the severity measures.
This is important as one of the reservations raised against the possibility of defining a globally valid food insecurity scale, when analyzing the experience with the HFIAS, has been based on the fact that

only three items proved robust to cross country comparisons (Deitchler *et al.,* 2010). That analysis, however, is conducted on the presumption that there are no alternatives to discrete assignment of cases to food security classes based on raw scores, which may be an inappropriate limitation. In reality, differences in item severity across countries do not necessarily imply rejection of the underlying concept of an experience-based scale or of the capacity to compare prevalence rates based on such measures across countries.

This will require, unfortunately, abandoning the simplest classification based on discrete assignment of food security status using raw scores, as it may produce biased results. Discrete classification by raw score is only one of several possible methods for comparing measures on the same latent trait across countries and language groups. Two more flexible methods are available that retain the simplicity of the Rasch model. These require probabilistic assignment of food security status based on the severity parameter and measurement error for each raw score, which may differ from country to country.

A third method abandons the simplest Rasch model in favor of a two-parameter IRT model, relaxing the assumption of equal item discrimination and may provide even more precise comparability of the actual individual level measure, and could be explored for research purposes, when the objective of the analysis goes beyond estimation of prevalence rates.

Figure 7: Two test forms yielding comparable measure on a scale



Full commonality of the items actually included in a measurement test is not a mandatory requirement. Modern theory of measurement in educational testing recognizes this, for example, since in this case, there is often the opposite need to ensure that no two instances of the same test are identical, but that the various instances produce fully comparable measures. This is accomplished by developing different test forms, and by considering the specific set of items included in one form as being selected from a larger set of available items, all of which relate to the same underlying latent trait. Results are then processed in a way that allows equalization of the measures obtained. The figure represents two forms of an equivalent test, one made of N items, and the second made of M items. The presence of (at least) two common items (anchoring) in the two forms allows equalization of the two scales.

As evidenced by this discussion of the statistical methods that may be required for classification of severity of food insecurity, further research is needed to confirm the validity of a global experience-based food insecurity scale and ensure cross-cultural comparability of results. The VOH aims to undertake the challenge of exploring the issues raised here based on global data made available for the first time to enable such analyses. It is the next step in the already impressive evolution of experience-based food insecurity scales.

6. Uses of the FIES: Linking Information and Action

The above discussion presents the evidence that the FIES is based on a well-grounded theoretical construct, and that reliable and accurate measures of the experience of food insecurity are possible when based on careful application of the principles of Item Response Theory. However, information is but one element that contributes to effective decision making. The real challenge is to link the information to action.

The FIES can be used to provide information for purposes ranging from advocacy and policy formulation to basic research. Some of the potential uses of the FIES, and possible modifications for different purposes, are discussed below.

6.1 Estimation of food insecurity prevalence

The VOH aims to use the FIES to estimate the prevalence of food insecurity of individuals at different levels of severity across countries and regions of the world. However, it can also be used to estimate prevalence at the sub-national level, for example regions of a country, states or provinces, cities and even neighborhoods. When included in a survey that allows disaggregation beyond the national level, the prevalence of food insecurity can also be estimated for sub-groups of these populations, such as rural or urban residence, age groups, and different racial or ethnic groups.

Prevalence is typically reported as a percentage of respondents surveyed who have the characteristic being studied. The different levels of severity of food insecurity (i.e. mild, moderate and severe) are sometimes combined for analysis and reporting, often to increase the power of the statistical inferences. However, they should be reported separately whenever possible to provide more complete information, as the differences between them are meaningful, theoretically as well as empirically.

6.2 Targeting and defining priorities for programmes and resources

Results from surveys that include the FIES can also be used to inform decisions regarding priorities for targeting programmes and resources. While it is not appropriate to use the FIES to identify individual beneficiaries for programmes, the information provided by population surveys that include the FIES can serve to identify vulnerable sub-populations or geographic areas that are more affected by food insecurity.

National survey data in Brazil in 2004, for example, clearly illustrated marked differences in household food insecurity levels among the five geographical regions of the country (BRASIL-IBGE, 2006; Segall-Corrêa, *et al*., 2007). Evidence of these stark regional inequalities convinced the Brazilian government to direct resources and public policies toward the more vulnerable regions.

6.3 Monitoring trends in food insecurity

With repeated application of the FIES in the same population, it is possible to monitor changes in food insecurity levels over a period of time. Several countries have already incorporated experience-based food insecurity scales into their national monitoring systems, including the U.S.A., Canada, Mexico, and Brazil.

When using trend data, it is important to report the different levels of food insecurity as mentioned above because this reveals subtle but meaningful changes in people's food insecurity experience from one time period to the next. For example, in Brazil, a decrease in prevalence of severe food insecurity was accompanied by an increase in moderate food insecurity, suggesting that households had moved out of a more serious food access problem into a slightly improved situation. In the same way, families previously classified as moderately food insecure appeared to have moved into the mild food insecurity category (FAO, 2012a). Such changes have real significance for the lives of those at risk of food insecurity. Simply reporting "food secure" and "food insecure" can mask the shift in the magnitude of food insecurity over time, which may be a positive outcome of programmes and services.

Looking at food insecurity experience across a range of severity, and how this changes over time, provides valuable information for accurately reporting the wellbeing of citizens and for adjusting programmes and services to better reduce vulnerability and food insecurity. Likewise, timely monitoring of food insecurity, with special attention to the different levels of severity, could possibly serve as an early warning indicator. A sudden surge in mild and moderate food insecurity without a simultaneous drop in severe food insecurity may be an alert that levels of hunger may rise, as well, calling for timely action.

6.4 Identifying risk factors and consequences of food insecurity

The underlying causes of food insecurity and hunger are social injustice, inequalities and the lack of guarantees of the economic, social, cultural, and environmental rights of the population, including the human right to adequate food. This context gives rise to more immediate risk factors such as poverty and lack of access to education and good jobs with living wages.

It is thus important to keep in mind that the phenomenon of food insecurity encompasses much more than what the FIES captures; it includes aspects ranging from social, economic and agriculture policies at the international and national levels to livelihood strategies, basic sanitation, food habits and nutritional status at the household level. Indicators associated with these additional aspects should be considered in broad-based studies to complement the information derived from the FIES, aiming to build a better understanding of the relationships among various factors, including the risk factors and the consequences of food insecurity.

Consequences may range from negative psychosocial effects or going without other essential items in order to get food, to nutritional problems related to consuming a diet of poor quality, such as micronutrient deficiencies or obesity, to frank undernutrition, such as underweight, stunting and wasting, and in extreme cases to prolonged hunger or starvation.

The advantage of having a direct experiential measure of food insecurity like the FIES is that it can be used in combination with other indicators to build a better understanding of this complex phenomenon.

6.5 Modifications to the FIES in other survey contexts

There are several modifications that can be made to the FIES questionnaire to meet the specific needs of the users, including altering the reference period and using households rather than individuals as the unit of data collection.

The FIES being used in the VOH is a measure of food insecurity collected at the individual level, which provides population prevalence estimates of people's experiences with food insecurity. This approach makes it possible to frame the experience of hunger from the perspective of individuals whose human right to adequate food may be violated. However, many national population surveys collect data at the level of the household, such as Household Income and Expenditure Surveys, Household Budget Surveys and Living Standard Measurement Studies. When used in household-level surveys, the FIES items can easily be adapted to capture experiences at that level (by changing the wording to the questions slightly as follows: Was there was a time when "you or any other member of your household"….).

The choice of the reference period depends on the objectives for collecting the data. Where seasonal changes are of interest, a three-month period might be the best choice to investigate how food insecurity varies in different seasons. However, this would limit comparability if data are collected across different areas that do not have the same climatic or agricultural calendar. In the case of national surveys with the objective of estimating overall prevalence of food insecurity in different parts of the country, or multi-national surveys that include countries with different environmental and climatic zones, a 12-month period is recommended to avoid the influence of seasonal effects and to improve comparability of the measure across different areas. The FIES makes use of a 12 month reference period for this reason. However, if the survey is being carried out in settings undergoing a humanitarian crisis, the investigators may be interested in capturing the most recent time period, in which case a one-month recall would be appropriate.

The information resulting from the uses of the FIES described above could be relevant for a variety of audiences at many levels, including advocates, community leaders and activists, researchers, programme managers and government officials at all levels. FAO is committed to making this link between information and action more effectively. Prevailing models of policy-making concede a potentially influential role for survey-based information. However, there is also consensus that policy-making is a messy process characterized by negotiation among competing interests and diffuse decision making processes (Jones, 2009; Weiss, 1983). Those responsible for producing the information are therefore called upon to strive to improve their political savvy and reflect on the uses and appropriations of the resulting information.

7. Conclusion

While it cannot be said that the FIES gives voice to the hungry per se, it does represent a step closer to framing the experience of hunger from the perspective of those whose human right to adequate food is being violated. It is a measurement tool with great potential for contributing to monitoring systems that meet the five principles recently identified by the Committee on World Food Security in the 2012 Global Strategic Framework for Food Security and Nutrition (CFS, 2012a):

a) Food Security and Monitoring Systems should be human-rights based, with particular reference to the progressive realization of the right to adequate food;

b) They should make it possible for decision-makers to be accountable;

c) They should be participatory and include assessments that involve all stakeholders and beneficiaries, including the most vulnerable;

d) They should be simple, yet comprehensive, accurate, timely and understandable to all, with indicators disaggregated by sex, age, region, etc., that capture impact, process and expected outcomes;

e) They should not duplicate existing systems, but rather build upon and strengthen national statistical and analytical capacities.

Research being undertaken by the VOH over the next several years will contribute more evidence regarding whether or not the FIES represents the best basis for a valid experience-based measure of food insecurity *worldwide*. However, despite the particular challenges of using it as a global measure, experience in many countries leaves little doubt regarding its potential to be adopted by national governments and used successfully to guide policy at the national and sub-national levels. Its ease of application and analysis makes it accessible to people at many levels and from diverse fields. Local governments, non-governmental organizations and advocacy groups can also appropriate this relatively simple instrument to monitor food insecurity locally or regionally, engaging diverse stakeholders in the process, and building bridges between people of different backgrounds. This may in fact be where their greatest potential lies to effect change and contribute to guaranteeing the human right to adequate food.

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ANNEX C

Cultural and events calendar

National Nutrition Survey 2018

National Nutrition Survey 2018: Cultural and Event Calendar (Punjab)

Month	2013	2014	2015	2016	2017
January	Eid Milad-un-Nabi Chehlum Wheat sowing Season Annual festival of Hazrat Baha-ud-Din Zakariya Daata Ganj Bakhsh, Basant is a seasonal festival	Eid Milad-un-Nabi Wheat sowing Season Annual festival of Hazrat Baha-ud-Din Zakariya Daata Ganj Bakhsh, Basant is a seasonal festival	Wheat sowing Season Annual festival of Hazrat Baha-ud-Din Zakariya Daata Ganj Bakhsh, Basant is a seasonal festival	Wheat sowing Season Annual festival of Hazrat Baha-ud-Din Zakariya Daata Ganj Bakhsh, Basant is a seasonal festival	Wheat sowing Season Annual festival of Hazrat Baha-ud-Din Zakariya Daata Ganj Bakhsh, Basant is a seasonal festival
February	Kashmir Day Basant is a seasonal festival Sugar cane sowing Jowar Sowing	Kashmir Day Basant is a seasonal festival Sugar cane sowing Jowar Sowin	Kashmir Day Basant is a seasonal festival Sugar cane sowing Jowar Sowing	Kashmir Day Basant is a seasonal festival Sugar cane sowing Jowar Sowing	Kashmir Day Basant is a seasonal festival Blast on shrine of Qalandar Shahbaz Sugar cane sowing Jowar Sowing
March	Pakistan Day Holli Easter day National Horse and Cattle Show Sugar cane sowing	Pakistan Day Holli National Horse and Cattle Show Sugar cane sowing	Pakistan Day Holli National Horse and Cattle Show Sugar cane sowing	Pakistan Day Holli Easter day National Horse and Cattle Show Gulshan-e-Iqbal Park blast Sugar cane sowing	Pakistan Day Holli National Horse and Cattle Show Sugar cane sowing
April	Cotton Sowing Annual urs Hazrat Syed Ahmad Sultan (Sakhi Sarwar)	Easter day Cotton Sowing Annual urs Hazrat Syed Ahmad Sultan	Easter day Cotton Sowing Annual urs Hazrat Syed Ahmad Sultan	Cotton Sowing Annual urs Hazrat Syed Ahmad Sultan (Sakhi Sarwar)	Shab – e – Meraj Easter day Cotton Sowing

	Baisakhi (It is a harvest festival)	(Sakhi Sarwar) Baisakhi (It is a harvest festival)	(Sakhi Sarwar) Baisakhi (It is a harvest festival)	Baisakhi (It is a harvest festival)	Annual urs Hazrat Syed Ahmad Sultan (Sakhi Sarwar) Baisakhi (It is a harvest festival)
May	Labor Day Cotton Sowing Rice Sowing	Labor Day Shab – e – Meraj Cotton Sowing Rice Sowing	Labor Day Shab – e – Meraj Shab – e – Barat Cotton Sowing Rice Sowing	Labor Day Shab – e – Meraj Shab – e – Barat Cotton Sowing Rice Sowing	Labor Day Shab – e – Barat Cotton Sowing Rice Sowing Start of Ramzan
June	Shab – e – Meraj Shab – e – Barat Cotton Sowing Rice Sowing	Shab – e – Barat Rice Sowing	Start of Ramzan Rice Sowing	Start of Ramzan Rice Sowing	Eid Ul Fitar Rice Sowing Heavy Rains
July		Eid-ul-Fitr	Eid ul Fitar Heavy Rain & Flood	Eid Ul Fitar	
August	Independence Day Eid-ul-Fitr Mango picking	Independence Day Mango picking	Independence Day Mango picking	Independence Day Mango picking	Independence Day Mango picking
September	Defense day Saint Waris Shah (Urs) Mango picking	Defense day Saint Waris Shah (Urs) Mango picking	Eid ul Uzha Saint Waris Shah (Urs) Defense day Mango picking	Eid ul Uzha Saint Waris Shah (Urs) Defense day Mango picking	Eid ul Uzha Saint Waris Shah (Urs) Defense day Mango picking
October	Eid-ul-Azha	Eid-ul-Azha Diwalli	Ashura (Shahdat Imam A.S)	Ashura (Shahdat Imam A.S) Diwalli	Ashura (Shahdat Imam A.S) Diwalli
November	Iqbal Day Ashura (Shahdat Imam A.S) Baba Farid (urs) Diwalli	Ashura (Shahdat Imam A.S) Baba Farid (urs) Iqbal Day	Iqbal Day Ashura (Shahdat Imam A.S) Baba Farid (urs) Diwalli	Iqbal Day Ashura (Shahdat Imam A.S) Baba Farid (urs)	Iqbal Day Ashura (Shahdat Imam A.S) Baba Farid (urs)

December	Quaid Azam Day/Chirsmirs Wheat sowing Season (Dec-Jan) Starwberry (Dec-March)	Quaid Azam Day/Chirsmirs Chehlum Wheat sowing Season (Dec-Jan) Starwberry (Dec-March)	Eid Milad Nabi Quaid Azam Day/Chirsmirs Chehlum Wheat sowing Season (Dec-Jan) Starwberry (Dec-March)	Quaid Azam Day/Chirsmirs Chehlum Wheat sowing Season (Dec-Jan) Starwberry (Dec-March)	Eid Milad Nabi Quaid Azam Day/Chirsmirs Chehlum Wheat sowing Season (Dec-Jan) Starwberry (Dec-March)

National Nutrition Survey 2018: Cultural and Event Calendar (Sindh)

Month	2013	2014	2015	2016	2017
January	Sun flower sowing Sugar Cane cutting Eid Milad Nabi	Sun flower sowing Sugar Cane cutting Aitzaz Hassan killed (Sucide attack KPK) Earth Quak in Sindh Eid Milad Nabi	Sun flower sowing Sugar Cane cutting Karachi Bus & Oil tanker accident 57 killed Eid-Milad Nabi Shikarpur Imam Bargah attack	Sun flower sowing Sugar Cane cutting	Sun flower sowing Cutting of Sugar cane
February	Pir Hajan Shah Huzoori Shikarpur attack Attack Syed Hussain Shah of Qambar Sugar cane sowing Sun flower cutting Kashmir Day Sindh Horse & Cattle Show Jacobabad	Death of Justice Rana Bhagwandas 2 weeks Sindh Festival start from Moen jo Daro Sugar cane sowing Sun flower cutting Kashmir Day Sindh Horse & Cattle Show Jacobabad	Sindh Horse & Cattle Show Jacobabad Sugar cane sowing Sun flower cutting Kashmir Day	Sugar cane sowing Sun flower cutting Kashmir Day Sindh Horse & Cattle Show Jacobabad	Sun flower sowing Sugar cane Sowing Attack on Dargah Qalandar Shahbaz Sindh Horse & Cattle Show Jashan-e-Larkana The second season of the Pakistan Super League began. Kashmir Day
March	Mir Hazar Khan Khoso Care taker PM Jowar/Bajra Sowing season 23 March Pakistan Day Holy Festival	23 March Pakistan Day Holi Festival	23 March Pakistan Day Holy Festival	23 March Pakistan Day Holi Festival	Sugar cane Sowing Pakistan Day PSL final in Lahore Pakistan's sixth census began. 23 March Pakistan Day Holy festival
	Jowar/Bajra Sowing season Z.A Bhutto death Anniversary	Z.A Bhutto death Anniversary Wheat Harvesting	Wheat Harvesting Chilli Sowing season Z.A Bhutto death Anniversary	ZA Bhutto death Anniversary Holi Cotton Sowing	Wheat Harvesting Chilli Sowing Shab e Miraj

April	Wheat Harvesting		Wheat Harvesting	Chilli Sowing season Wheat harvesting Shab-e-Miraj Wheat Harvesting	Z.A Bhutto death Anniversary Wheat Harvesting
May	Wheat harvesting General Elections Qaim Ali Shah became CM Sindh Shab e Miraj Labour Day Cotton/Rice cultivation	Shab e Miraj Wheat Harvesting Labour Day Cotton/Rice cultivation	Wheat harvesting Rice Sowing Cotton Sowing Season Shab e Miraj Labour Day Cotton/Rice cultivation	Shab e Miraj 05 Labour Day Urs Qalandar Shahbaz Rice/Cotton sowing Shab e Brat Wheat Harvesting Labour Day Cotton cultivation	Wheat Harvesting Cotton/Rice cultivation Chilli Sowing Shab e Brat Wheat Harvesting Labour Day
June	Nawaz Sharif became Prime Minster Wheat Harvesting Cotton/Rice cultivation Mango Season Uris Sachal Sarmast Chilli picking Heavy Rains Shab e Brat	Harvesting Cotton/Rice cultivation Mango Season Chilli picking Jinnah International Airport attack Shabe Brat Starting of Ramzan	Harvesting Cotton/Rice cultivation Mango Season Chilli picking Shab e Brat Rice sowing Heat Weave Start of Ramzan	Start of Ramzan Urs Sachal Sarmast Rice Sowing	Wheat Harvesting Cotton/Rice cultivation Mango Season Uris Sachal Sarmast Chilli picking Pakistan won the 2017 ICC Champions Trophy 2017 defeating India.
July	Mamnoon Hussain New President Sachal Sarmast Urs	Eid ul Fitar Sachal Sarmast Urs	Rice Sowing Eid ul Fitar Sachal Sarmast Urs	Eid-ul-Fitar Mango picking Rice Sowing	Mango Season Chilli picking
August	Independence Day Rakhi/Raksha Bandhan	PTI – PAT container March Heavy Rains Independence Day Rakhi/Raksha Bandhan	Independence Day Rakhi/Raksha Bandhan	14 Independence Day Cotton picking Mango picking season Rakhi/Raksha Bandhan	Rakhi/Raksha Bandhan Independence Day Shahid Khakan Abbasi incumbent

September	Onion cultivation Chilli cultivation Defense Day	PTV goes air off PTI protest Heavy Monsoon rains Defense Day	Eid ul Uzha Defense Day	Eid ul Uzha Cotton picking Defense Day	Rice Harvesting/Cotton picking Ashura (Shahdat Hazrat Imam Hussain A.S) Defense Day
October	Wheat sowing Chilli sowinig	Nobel Peace Prize won by Malala Yousafzai Dewali festival	Ashura (Shahdat Hazrat Imam Hussain A.S) Local Body Elections Phase 1 Dewali festival	Ashura (Shahdat Hazrat Imam Hussain A.S) Dewali festival	Rice Harvesting/Cotton picking Dewali festival
November	Parviz Mushraf retired & Rahil Sharif ne COAS Ashura (Shahdat Hazrat Imam Hussain A.S) Dewali festival Wheat sowing Iqbal Day	Ashura (Shahdat Hazrat Imam Hussain A.S) Wheat sowing Iqbal Day	Sugar cane harvesting Urs of Shah Abdul latif Bhattai Local Body Elections Phase 2 Wheat sowing Iqbal Day	9 Iqba Day Urs Shah Abdul Latif Bhattai Wheat sowing Sugar cane harvesting Train accident near Juma Goth station Iqbal Day	Wheat Sowing Uris Shah Abdual Latif Bhittai Sugar Cane Cutting Iqbal Day
December	Iftkhar Choudhary retired & Tasduk jillani new Chief Justice of SC Death Anniversary of Banzir Bhutto Urs Shah Abdual Latif Bhattai Annual Sindh Culture Day	Peshawar Army Public School attack Death Anniversary of Banzir Bhutto Urs Shah Abdual Latif Bhattai Annual Sindh Culture Day	Sugar cane harvesting Quaid Azam Day Chirsmis Local Body Elections Phase 3 Death Anniversary of Banzir Bhutto Annual Sindh Culture Day	Eid Milad Nabi Birthday Quaid Azam Anniversary of Banzir Bhutto Wheat Sowing Sugar cane harvesting Junid jamshid killed in PIA plane crash Death Anniversary of Banzir Bhutto Annual Sindh Culture Day	Wheat Sowing Sugar Cane Cutting Annual Sindh Culture Day Eid Milad Nabi Quaid day/Chrisms Death Anniversary of Banzir Bhutto

National Nutrition Survey 2018: Cultural and Event Calendar (KPK)

Month	2013	2014	2015	2016	2017
January	Wheat cultivation Gram & rape seed cultivation Eid Milad Nabi	Wheat cultivation Gram & rape seed cultivation Aitzaz Hassan killed (Sucide attack KPK) Earth Quak in Sindh Eid Milad Nabi	Wheat cultivation Gram & rape seed cultivation Karachi Bus & Oil tanker accident 57 killed Eid-Milad Nabi	Wheat cultivation Gram & rape seed cultivation	Wheat cultivation Gram & rape seed cultivation
February	Sugar cane sowing Kashmir Day	Sugar cane sowing Death of Justice Rana Bhagwandas Kashmir Day	Sugar cane sowing Kashmir Day	Sugar cane sowing Kashmir Day	Sugar cane sowing Attack on Dargah Qalandar Shahbaz The second season of the Pakistan Super League began. Kashmir Day
March	Lobia, groundnut sowing Mir Hazar Khan Khoso Care taker PM 23 March Pakistan Day	Lobia, , groundnut sowing 23 March Pakistan Day	Lobia, , groundnut sowing 23 March Pakistan Day	Lobia, , groundnut sowing 23 March Pakistan Day	Lobia, , groundnut sowing Pakistan Day PSL final in Lahore Pakistan's sixth census began. 23 March Pakistan Da
April	Gram Harvesting Barley harvesting, Lobia, , groundnut sowing Cotton sowing	Gram Harvesting Barley harvesting, Lobia, , groundnut sowing Cotton sowing	Gram Harvesting Barley harvesting, Lobia, , groundnut sowing Cotton sowing Mini-Cyclone on, Glacial Lake Outburst Floods (GLOF)	Gram Harvesting Barley harvesting, Lobia, , groundnut sowing Cotton sowing Holi Shab-e-Miraj Torrential rains and flash floods	Gram Harvesting Barley harvesting, Lobia, , groundnut, Cotton sowing Shab e Miraj

May	Barley, lentil harvesting, lobia sowing Cotton sowing General Elections Shab e Miraj Labour Day	Barley, lentil harvesting, lobia sowing Cotton sowing Shab e Miraj Labour Day	Barley, lentil harvesting, lobia sowing Cotton sowing Shab e Miraj Labour Day	Barley, lentil harvesting, lobia sowing Cotton sowing Shab e Miraj 05 Labour Day Shab e Brat	Barley,lentil harvesting, lobia sowing Cotton sowing Shab e Brat Labour Day
June	Lobia sowing& harvesting Nawaz Sharif became Prime Minster Shab e Brat	Lobia sowing & Harvesting Jinnah International Airport attack Shabe Brat Starting of Ramzan	Lobia sowing & Harvesting Shab e Brat Heat Weave Start of Ramzan	Lobia sowing & Harvesting Start of Ramzan	Lobia sowing & Harvesting Pakistan won the 2017 ICC Champions Trophy 2017 defeating India.
July	Lobia sowing & Harvesting Mamnoon Hussain New President	Lobia sowing & Harvesting Eid ul Fitar	Lobia sowing & Harvesting Eid ul Fitar flash floods in July-August,	Lobia sowing & Harvesting Eid-ul-Fitar	Lobia sowing & Harvesting
August	Lobia Harvesting Independence Day Rakhi/Raksha Bandhan	Lobia Harvesting PTI – PAT container March Independence Day Rakhi/Raksha Bandhan	Lobia Harvesting Independence Day Rakhi/Raksha Bandhan flash floods in July-August,	Lobia Harvesting 14 Independence Day Rakhi/Raksha Bandhan	Lobia Harvesting Rakhi/Raksha Bandhan Independence Day
September	Barely sowing , bajra, lobia harvesting Defense Day	Barely sowing ,lobia, bajra harvesting PTV goes air off PTI protest Defense Day	Barely sowing ,bajra ,lobia harvesting Eid ul Uzha Defense Day	Barely sowing ,lobia, bajra harvesting Eid ul Uzha Defense Day	Barely sowing ,lobia, bajra harvesting Ashura (Shahdat Hazrat Imam A.S) Defense Day
October	Barley, gram, alsi sowing Cotton, , groundnut Harvesting	Barley, gram, Alsi sowing Cotton, groundnut, Harvesting	Barley, gram,Alsi sowing Cotton, , groundnut Harvesting	Barley, gram,Alsi sowing Cotton , groundnut Harvesting	Barley, gram,Alsi sowing

		Nobel Peace Prize won by Malala Yousafzai Dewali festival	Ashura (Shahdat Hazrat Imam A.S) Local Body Elections Phase 1 Dewali festival 26th October followed by earthquakes in November and December, caused 232 deaths	Ashura (Shahdat Hazrat Imam Dewali festival	Cotton, , groundnut Harvesting Dewali festival
November	gram sowing Cotton Harvesting Parviz Mushraf retired & Rahil Sharif ne COAS Ashura (Shahdat Hazrat Imam A.S Dewali festival Iqbal Day	gram sowing Cotton Harvesting Ashura (Shahdat Hazrat Imam A.S Iqbal Day	gram sowing Cotton Harvesting Local Body Elections Phase 2 Iqbal Day	gram sowing Cotton Harvesting Iqba Day	gram sowing Cotton Harvesting Iqbal Day
December	Sugar cane Harvesting Quaid Azam Day Christmas Iftkhar Choudhary retired & Tasduk jillani new Chief Justice of SC	Sugar cane Harvesting Quaid Azam Day Christmas Peshawar Army Public School attack	Sugar cane Harvesting Quaid Azam Day Christmas Local Body Elections Phase 3	Sugar cane Harvesting Eid Milad Nabi Quaid Azam Day Christmas Junaid jamsheed killed in PIA plane crash	Sugar cane Harvesting Eid Milad Nabi Quaid day/Christmas Death

National Nutrition Survey 2018: Cultural and Event Calendar (Baluchistan)

Month	2013	2014	2015	2016	2017
January	EidMilad-un-Nabi Wheat sowing Season Gram (Chana crop) Rane Seed Chehlum	EidMilad-un-Nabi Wheat sowing Season(Dec-Jan) Gram (Chana crop) Rane Seed	Wheat sowing Season(Dec-Jan) Gram (Chana crop) Rane Seed	Wheat sowing Season(Dec-Jan) Gram (Chana crop) Rane Seed	Wheat sowing Season (Dec-Jan) Gram (Chana crop) Rane Seed
February	Kashmir Day Rane Seed Lady Finger (Jan-Mar) Water Melon (Feb-July) Apple (Feb-July) SibiMela (Last week Feb)	Kashmir Day Rane Seed Lady Finger (Jan-Mar) Water Melon (Feb-July) Apple (Feb-July) SibiMela (Last week Feb)	Kashmir Day Rane Seed Lady Finger (Jan-Mar) Water Melon (Feb-July) Apple (Feb-July) SibiMela (Last week Feb)	Kashmir Day Rane Seed Lady Finger (Jan-Mar) Water Melon (Feb-July) Apple (Feb-July) SibiMela (Last week Feb)	Kashmir Day Rane Seed Lady Finger (Jan-Mar) Water Melon (Feb-July) Apple (Feb-July) SibiMela (Last week Feb)
March	Pakistan Day Sunflower Sorgham (Jowar) (Mar-May) Chillies (Mar-July) Grapes (Mar-June) Peach (Mar-May) Pomegranates (Mar-Oct)	Pakistan Day Sunflower Sorgham (Jowar) (Mar-May) Chillies (Mar-July) Grapes (Mar-June) Peach (Mar-May) Pomegranates (Mar-Oct)	Pakistan Day Sunflower Sorgham (Jowar) (Mar-May) Chillies (Mar-July) Grapes (Mar-June) Peach (Mar-May) Pomegranates (Mar-Oct)	Pakistan Day Sunflower Sorgham (Jowar) (Mar-May) Chillies (Mar-July) Grapes (Mar-June) Peach (Mar-May) Pomegranates (Mar-Oct) Sports Festivals	Pakistan Day Sunflower Sorgham (Jowar) (Mar-May) Chillies (Mar-July) Grapes (Mar-June) Peach (Mar-May) Pomegranates (Mar-Oct)
April	Cotton Sowing	Cotton Sowing	Cotton Sowing	Cotton Sowing	Cotton Sowing Shab – e – Meraj
May	Labor Day Cotton Sowing Rice sowing	Labor Day Shab – e – Meraj Cotton Sowing Rice sowing	Labor Day Cotton Sowing Rice sowing Shab – e – Meraj Shab – e - Barat	Labor Day Cotton Sowing Rice sowing Shab – e – Meraj Shab – e - Barat	Labor Day Cotton Sowing Rice sowing Shab – e - Barat

June	Cotton Sowing Rice sowing Shab – e – Meraj Shab – e - Barat	Cotton Sowing Rice sowing Shab – e - Barat	Start of Ramzan Cotton Sowing Rice sowing	Start of Ramzan Cotton Sowing Rice sowing	EidUlFitar Cotton Sowing Rice sowing
July		Eid-ul-Fitr Heavy rainfall &windstrom	EidulFitar	EidUlFitar	
August	Independence Day Eid-ul-Fitr Heavy monsoon rain	Independence Day	Independence Day	Independence Day	Independence Day
September	Cotton picking Defense day	Cotton picking Defense day	EidulUzha Cotton picking Defense day	EidulUzha Cotton picking Defense day	EidulUzha Cotton picking Defense day
October	Eid-ul-Azha Cotton picking	Eid-ul-Azha Cotton picking Diwalli	Ashura (Shahdat Imam A.S) Cotton picking	Ashura (Shahdat Imam A.S) Cotton picking Diwalli	Ashura (Shahdat Imam A.S) Cotton picking Diwalli
November	Iqbal Day Ashura (Shahdat Imam A.S) Diwalli	Ashura (Shahdat Imam A.S) Iqbal Day	Iqbal Day Ashura (Shahdat Imam A.S) Ashura (Shahdat Imam A.S) Diwalli	Iqbal Day Ashura (Shahdat Imam A.S) Ashura (Shahdat Imam A.S)	Iqbal Day Ashura (Shahdat Imam A.S) Ashura (Shahdat Imam A.S)
December	Quaid Azam Day/Chirsmirs	Quaid Azam Day/Chirsmirs Chehlum	EidMiladNabi Quaid Azam Day/Chirsmirs Chehlum	Quaid Azam Day/Chirsmirs Chehlum	EidMiladNabi Quaid Azam Day/Chirsmirs Chehlum

ANNEX D

Standard operating procedures for water quality

National Nutrition Survey 2018

Standard Operating Procedures for Water Quality National Nutrition Survey 2018

Introduction

Water quality and safety are fundamental to human development and well-being. Provision and access to safe water is one of the most effective instruments in promoting health. WHO defines safe drinking water as water that "does not represent any significant risk to health over the lifetime of consumption, including different sensitivities that may occur between life stages. According to WHO and national water quality standards as described by PCRWR (Pakistan council of research for water resources), there should be no *E-Coli* or Coliforms present in drinking water. So in order to test the quality of drinking water, it has been made one of the most important components of NNS survey. Drinking water will be tested for microbiology and certain chemicals and PH. The parameters that will be tested in water under NNS project include the following:

Microbiological parameters	Chemical parameters
• Total Coliforms	• Total Dissolved Solids (TDS)
• E-coli	• pH
	• Hardness
	• Nitrate
	• Fluoride
	• Iron
	• Arsenic

Importance of Water Sample Collection

Water quality sampling is very important for mitigation of policies; in addition to evaluate the presence of safe drinking water for our population. It is a critical step of water quality monitoring as92% error comes from wrong sampling**,** 7 % from wrong sample transportation while only 1% from laboratory practices.

Prerequisites:

The materials required for water sampling are as follows:

- Sampling Bottles
- Preservatives
- Gloves/Masks
- Methylated Spirit
- Cotton swabs
- Paper Tap
- Permanent ink Marker
- Sampling Performa's

- Field Incubator
- Sample Transportation Box

Type of Water Samples and Preservatives:

According to the PCRWR sample type Classification, water sampling will be done using four different bottles for different testing different parameters.

- Water samples for physico-chemical analysis are collected in polystyrene bottles of 250-500 ml capacities.
- Nitric Acid (HNO_3) and Boric Acid (1M) are added as preservatives in the sampling bottles for trace elements and nitrate, respectively before going to field.
- The material of the sampling bottles normally used is pre-sterilized disposable/auto-clavable plastic, or good quality soda / borosilicate glass.
- A total of 30,000 samples(5/PSU) will be collected for microbiological testing for *E-Coli* and total Coliforms (Bottle type A) while 12,000 samples (2/PSU) will be collected for chemical analysis i.e. Bottle type B, C and D. The details are given in the below figure:

Bottle A	• This bottle will contain water sample for microbiological testing. • The bottle will be sterilized.
Bottle B	• Bottle B will be used for testing trace elements including Iron and Arsenic. • It will have 1 ml Nitric acid /500 ml of water samples as preservative.
Bottle C	• Bottle C will be used for testing Nitrates. • 1ml Boric acid/100 ml water sample will be added as preservative.
Bottle D	• In this bottle, water will be collected for testing pH, Hardness, Flouride and TDs. • No preservatives will be added.

Figure 1: Bottles to be used for water sampling

WATER SAMPLE COLLECTION

Before collecting the samples, the bottles are washed properly and rinsed thoroughly with deionized water and then preservative will be added where required. They should be checked thoroughly for proper labeling and bar code.

Collecting Tap Water

i. ***Cleaning the Tap:***

- ✓ Attachments from the faucet, including aerators, screens, washers, hoses, and water filters are removed.
- ✓ Un-rusted taps will be selected for collection of water samples.
- ✓ Spray spirit on hands up to arms for disinfection purpose.
- ✓ Using a clean cloth, the outlet of the tap is wiped to remove any dirt.
- ✓ Taps should properly disinfect with alcohol swab.

ii. ***Opening the Tap:***

- ✓ Taps should be allowed to flow for 4-5 minutes before collecting the sample to flush out the standing water.

iii. ***Filling the sampling bottle***

- ✓ While holding the cap face downwards, immediately held bottle under the water jet and fill. Taken sample carefully not let the bottle to touch the sample tap.

- ✓ Bottle should be filled to the neck not allowing it to overflow. A small air space should left for shaking before analysis
- ✓ Stopper should be placed on the bottle or screw on the cap and tightly closed.
- ✓ Sample bottles should be placed in icebox until transported to laboratory

Tube well Water

- The water samples from tube wells should be collected after allowing them to flow for at least 5-10 minutes to get representative sample of the groundwater.
- The depth of groundwater level should also be recorded and the location of the tube well properly marked/mentioned on the topographic survey sheet.

Distribution Network Water

- The water samples from the distribution network should be collected from the source of supply (as closely as possible) to minimize the effects of pollution in the distribution system
- From consumers end to evaluate the actual quality of water being used. All water sample containers are filled slowly to avoid turbulence and air bubbles after flushing the system for sufficient time.

Hand Pump

- Water samples should be collected from hand pumps after purging of the hand pump or well. The purging should be carried out by making one stroke for every foot of depth (a hand pump or dug well having 30 feet of depth, needs 30 strokes for its purging).

Dug Well Water

- With a piece of string, a clean weight should be attached to the sampling bottle.
- A 20 meter length of clean string rolled around a stick and tied it to the bottle. Bottle should be opened as described in previous step five.
- Bottle should be lowered down by the weight, into the well, unwinding the string slowly. Bottle should not be allowed to touch the sides of the well.
- Bottle should be immersed completely in the water and lowered it well below the surface without hitting the bottom or disturbing any sediment.
- Sampling bottle is filled, taken back and then immediately capped tightly.

Stream Water

- Water samples should be collected from the centre by standing in the middle of the stream. Care should be taken to keep the bottle well above the bed of the stream to avoid unwanted bed material going into the sample. Do not dip the bottles B and C directly into reservoir or stream as they contain preservatives.

Spring Water

- Water samples should be collected directly from the spring in sterilized sampling bottles for microbiology and bottles used with or without preservatives for other water quality parameters; however Bottle B and C should not be directly dipped into any water source for collecting water as these contain preservatives and by direct dipping the preservative may get mixed with the water in the stream or any reservoir.

TRANSPORTATION OF WATER SAMPLES

- Microbiological samples to be tested in field should be inoculated on petri films using 1ml of collected water within 4 to 6 hours of water collection.
- After sampling collection the samples should be transported to the PCRWR laboratory within 2-4 days through sample transportation box or wooden boxes to avoid any damage during the transportation.
- The 10% sample collected for the microbiological analysis to be sent to PCRWR must be kept in iceboxes after collection. The iceboxes must have enough coolant which can maintain the temperature of the samples at about 4 ^{o}C (2-8^{o}C) up to 6-12 hours until the samples reaches regional collection point of PCRWR.
- The bottles for chemical analysis (Bottle B, C and D) will be transported to PCRWR within 24-48 hours of collection on room temperature but not in sunlight.
- QC samples and field blanks must be sent to PCRWR on Monday, Tuesday or Wednesday.

QUALITY CONTROL OF WATER SAMPLING

Duplicate samples:

From the total 30,000 samples for microbiological testing, 10% i.e. 3000 samples; selected after every 10 samples will be send to PCRWR on 2-8^{o}C for validation of the field testing.

Field Blank:

From the sample B, C and D, 5% i.e. 600 samples; after every 20 samples will be checked for environmental contamination and quality control which is termed as field blank. In this, de-ionized water will be provided by lab which will be transferred in an empty bottle under the similar circumstances as for other water sample collection to check for contamination within the environment. These samples will also be sent to PCRWR on 2-8^{o}C for retesting.

MICROBIOLOGICAL SAMPLE INOCULATION AND ANALYSIS

Microbiological sample inoculation will be done after 4 to 6 hours of water collection in respective field areas/base offices. Until then the sample must be kept in 2-8ºC as bacteria start growing in warmer temperature which can affect our analysis. The process of Inoculation of requires the following steps:

1. Pre-inoculation preparation
2. Inoculation
3. Spreading
4. Incubation
5. Interpretation

The details of each process are given below:

Pre-inoculation preparation

Before inoculating the sample, it should be made sure that the area and surroundings are clean and not too busy; to avoid the risk of spillage. Inoculation will be done using a petri films. These are small round media films which reflect the growth of E-coli and coliforms within 24-48 hours. These films are present in a sealed cover containing 25 petri films with a shelf life of 1 month when opened; ideally on room temperature. Unopened pouches can be stored for 18 months if refrigerated on <8ºC.

Inoculation

The phase of inoculation is critical as it requires complete sterilized environment. For this reason, a stepwise approach should be followed.

1. The person who is inoculating the sample should be in an environment which is clean and not too busy. Try to carry out the process in isolation so there is no risk of skipping any step or doing it in a wrong way.
2. Wear Mask and gloves to avoid contamination from aerosols when you talk.
3. Weak gloves to ensure that the process is under sterilized conditions.
4. The work area on which the inoculation will be conducted should be clean and flat. It should be disinfected by wiping it with alcohol swab before and after the procedure.
5. After disinfecting the area, take out one petri film from the pouch, when refrigerated (2-8 ºC), keep it on room temperature (20-25ºC) for half an hour to one hour before starting inoculation.
6. Care should be taken while handling petri films, not to touch the media.
7. Take out one petri film and seal the pouch again in a zip log bag to avoid its interaction with the environment. The petri film should be labeled with bar code date and time
8. Shake the water bottle gently 7-10 times keeping it away from the petri film. Avoid vigorous shaking as this may dislodge the bacteria and create bubbles in water sample.

9. Using a syringe (without a needle), 1 ml water sample should be taken and then close the cap of the bottle to avoid spillage.
10. With the help of your left hand, hold the flap of the petri film slowly and pour 1ml of water in the center of the pink colored media. Syringe should not touch the media and should be kept perpendicular i.e. at 90^{O}while shifting the sample on the media.
11. Throw the syringe in trash box while holding the flap of the petri film.
12. Slowly with the help of your hand, roll back the flap of the petri film; taking care not to rush because this may introduce bubbles in the media and the sample will lose its productivity.

Spreading

Spreading of the sample will be done with the help of a plastic spreader. Its flat surface should be kept on the media and should be pressed from both sides gently and removed immediately. This step will ensure equal distribution of sample within the media.

Incubation

When the petri film has been inoculated with water sample, it should be kept in an incubator at 35^{o}C for at least 36-48 hours to allow E-coli and coliforms to grow. The incubator should be charged sufficiently so that it is not affected by power failure as interruption in the process of inoculation and frequent temperature changes will alter the results and hence the interpretation. The petri film should be kept in the incubator with gridded side down; can be put in a stack of 20 films in a horizontal fashion.

Interpretation

This is one of the most critical steps. After at least 36 hours of incubation, the petri film will be taken out slowly. Gloves should be worn and care should be taken not to touch the pink medium and not to roll up the flap as this will disturb the medium. Interpretation should be done as follows:

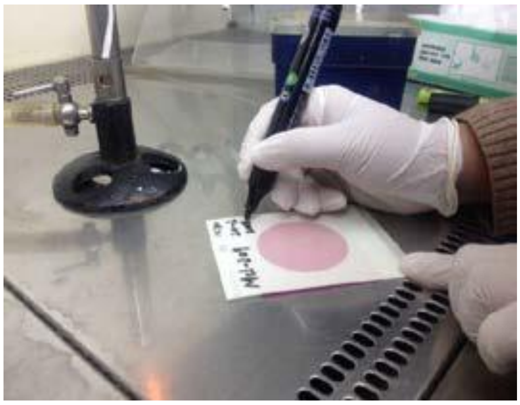
1. Observe the petri film keeping it high in sunlight.
2. You will see a circle made of 20 grids. These grids have an area of 20 cm in total while 1 grid occupies 1cm scale.
3. Start counting from the first grid at the top and move horizontally and then start from the next row.
4. E-coli will be blue in color while the colonies of coliforms will appear pink.

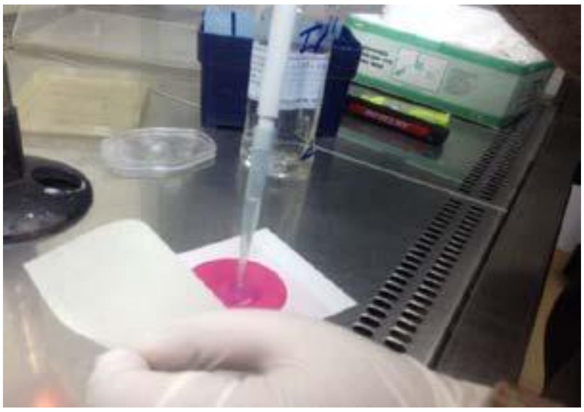
5. If both the colonies appear countable, then note the following in CFU/ml:
    a. Total E-coli (blue in color)
    b. Total coliforms including E-coli (both pink and blue colonies)
6. If apparently the colonies of coliforms appear countable but too much to count individually then apply the following formula; Take any three grids, count the number of coliform colonies in those three grids, divide by three to get an average and then multiply by 20. The number you will get will be recorded as coliform colonies. However, E-coli will be read separately on individual basis.
7. If the number of coliforms is more than 1000 after applying the formula or are too much to count even in three grids, then label it as TNTC i.e. Too Numerous to Count. While E-coli should be read separately.

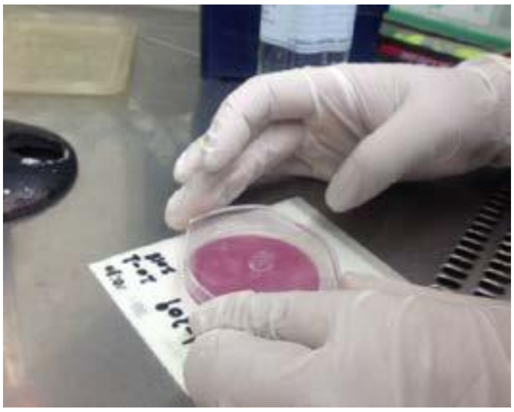
Disposal of petri films

These petri films should never be thrown in an ordinary dust bin or kept anywhere as they contain pathogenic growth. Therefore should be soaked in bleach for 1 hour at least and then placed in trash.

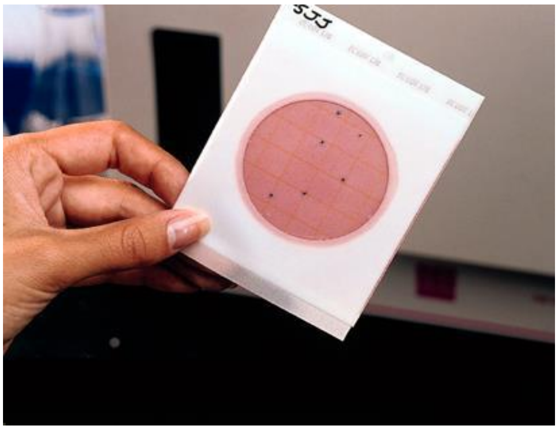
Picture Gallery: Inoculation and Incubation of water sample for microbiology

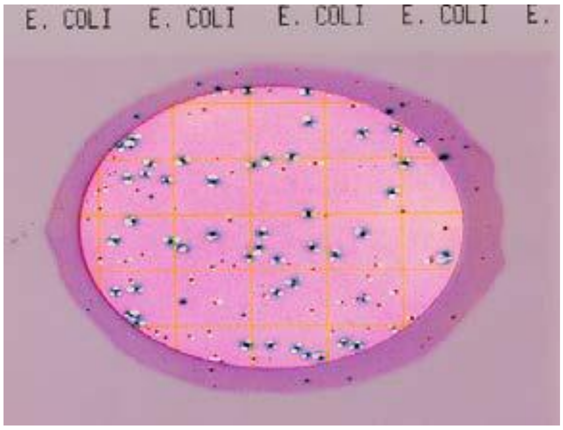


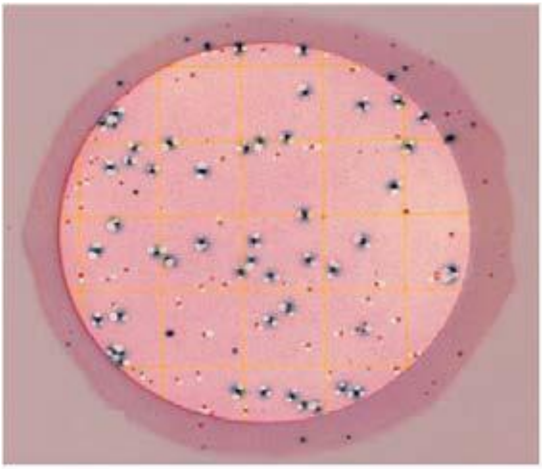




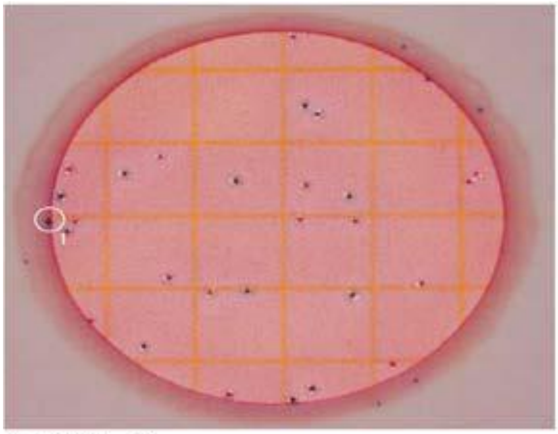
Pictures for Interpretation of Results:



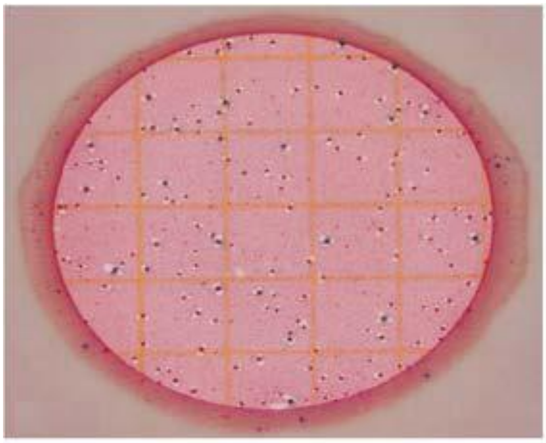




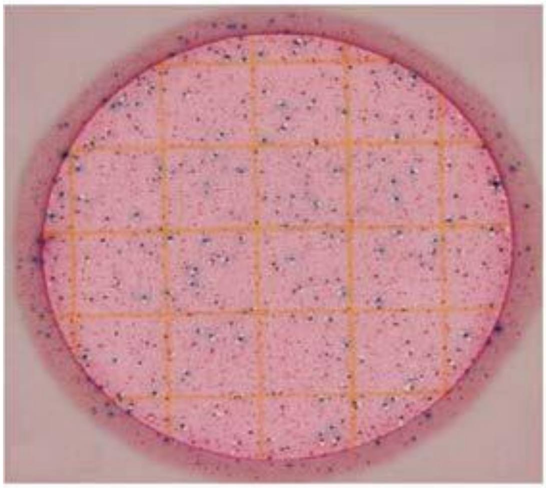
E. coli count = 49 (blue colonies with gas)
Total coliform count = 87 (red and blue colonies with gas)



E. coli count = 13
Total coliform count = 28
The recommended counting limit on a 3M Petrifilm EC Plate is 150 colonies. Do not count colonies that appear on the foam barrier because they are removed from the selective influence of the medium. See Circle 1.

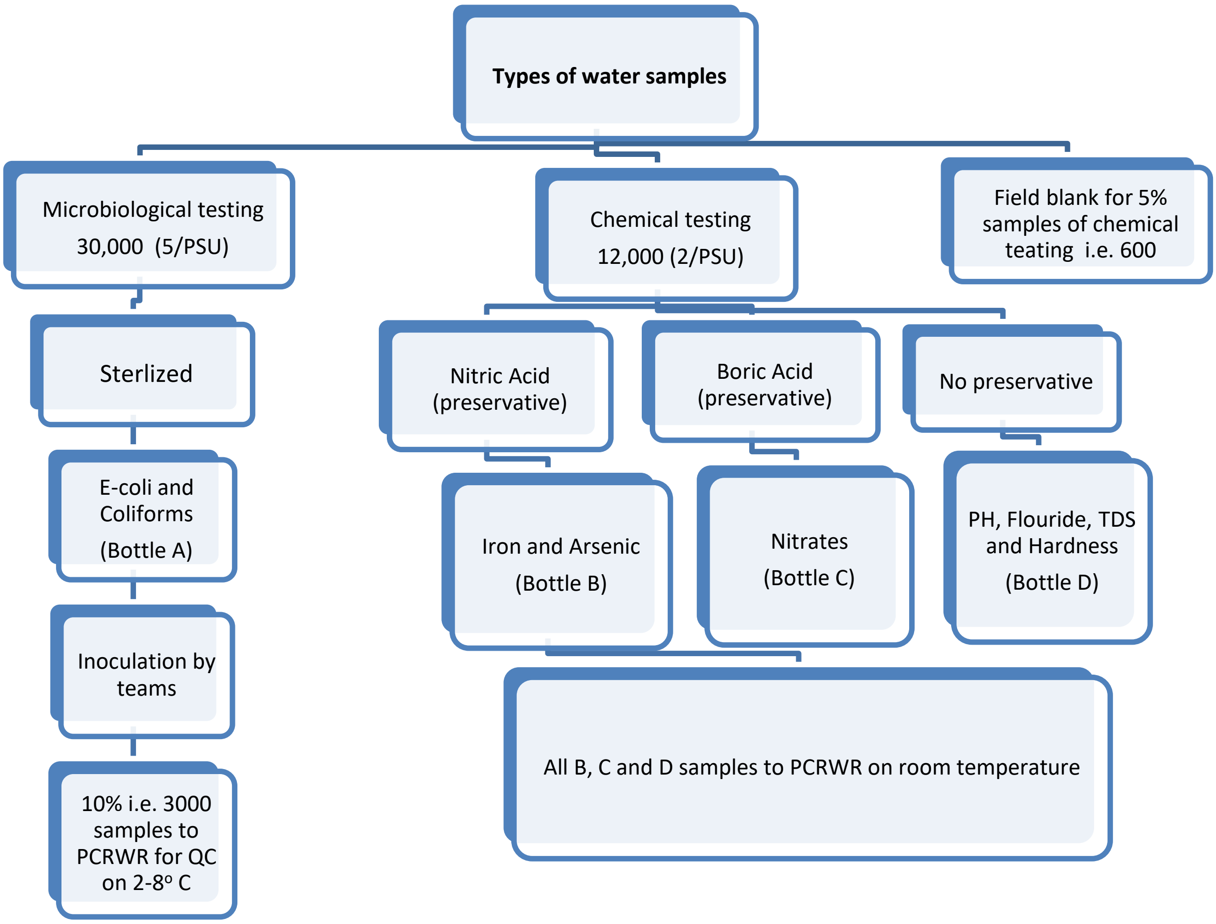


E. coli count = 17
Estimated total coliform count = ~150
The circular growth area is approximately 20cm^2. Estimates can be made on plates containing greater than 150 colonies by counting the number of colonies in one or more representative squares and determining the average number per square. Multiply the average number by 20 to determine the estimated count per plate.



Actual count = ~10^6
3M Petrifilm EC Plates with colonies that are TNTC have one or more of the following characteristics: many small colonies, many gas bubbles and a deepening of the gel color from red to purple-blue.

SUMMARY OF WATER COLLECTION PROCEDURE



ANNEX E

Training manual

National Nutrition Survey 2018

TRAINING MANUAL FOR NATIONAL NUTRITION SURVEY (NNS) 2018

GOVERNMENT OF PAKISTAN

FUNDING SUPPORT
DEPARTMENT FOR INTERNATIONAL DEVELOPMENT

Acknowledgement

The training manual for Pakistan's National Nutrition Survey 2018 is developed by the department of Pediatrics and Child Health at Aga Khan University in accordance with the United Nations International Children's Fund (UNICEF), World Health Organization (WHO) and Food and Agriculture Organization (FAO) guidelines for nutrition specific and nutrition sensitive approach. The survey questionnaire is primarily an adaption of National Nutrition Survey 2011 (NNS 2011), WHO, FANTA and FAO's Guidelines, and Multiple Indicator Cluster Survey

Ministry of National Health Services, Regulation and Coordination (MoNHSR&C) and Aga Khan University acknowledges the technical input of Technical Advisory Group (TAG), assistance from Pakistan Council of Research in Water Resources (PCRWR), Pakistan Bureau of Statistics (PBS) and respective provincial technical committees for the joint contribution and finalization of the manual and tools.

List of Acronyms / Abbreviations

AJK	Azad Jammu and Kashmir
AKU	Aga Khan University
ANC	Antenatal Care
BISP	Benazir Income Support Program
BMI	Body Mass Index
CBN	Cost of Basic Needs
CRP	C-Reactive Protein
DFID	Department of International Development
DHS	Demographic and Health Survey
EB	Enumeration Blocks
FATA	Federally Administrative Tribal Areas
FGD	Focus Group Discussions
FIES	Food Insecurity Experience Scale
GB	Gilgit Baltistan
IDI	In-depth interviews
IYCF	Infant and Young Child Feeding
KII	Key Informant Interviews
KPK	Khyber Pakhtunkhwa
LBW	Low Birth-Weight
MICS	Multiple Indicator Cluster Survey
MNP	Micronutrient Package
MUAC	Mid Upper Arm Circumference
NGO	Non-Governmental Organization
NNS	National Nutrition Survey
NSC	Nutrition Stabilization Centers
ORS	Oral rehydration Solution
OTP	Outpatient Therapeutic Program
PBS	Pakistan Bureau of Statistics
PCRWR	Pakistan Council of Research in Water Resources
PDHS	Pakistan Demographic and Health Survey
PINS	Pakistan Integrated Nutrition Strategy
PSU	Primary Sampling Units
RUSF	Ready to Use Supplementary Food
RUTF	Ready to Use Therapeutic Food
SC	Steering Committee
SoP	Standard Operating Procedures
SSU	Secondary Sampling Units
SUN	Scaling up Nutrition
TAG	Technical Advisory Group
TBD	To be decided
TEM	Technical Error of Measurement
TFU	Therapeutic Feeding Unit
ToT	Training of Trainers
TSFP	Targeted Supplementary Feeding Program
UNICEF	United Nations Children's Fund
VAD	Vitamin A deficiency
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WRA	Women of Reproductive Age
WHZ	Weight for Height Z-score

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1 Introduction to National Nutrition Survey 2018

1.1 Introduction

Nutrition lacks priority in the national health agenda of Pakistan, despite some progress at provincial level it has not yet been systematically included as a concerted national program. Without any nutritional policy at national level, it has remained a silent but serious development issue with relatively low visibility to the political leadership in the country. Malnutrition prevention requires multi-sectorial actions with robust coordination across various ministries, community engagement and close linkages with social safety nets and poverty alleviation programs. Given the aforementioned situation and lack of alternative methods of determining change, cross-sectional surveys remain the most logical strategy for determining change or lack thereof. Almost seven years have passed since the last NNS survey (2011), during which devolution has taken place and a number of provincial nutrition initiatives have been carried out. Thus in order to evaluate the impact of these interventions and to fully understand the post devolution situation there is a need to acquire latest data. While the NNS 2011 focused on a smaller household sample size at provincial level, the information in the current survey will be collected at district level using a much larger sample size. This is likely to result in more robust estimates of nutrition indicators and will offer a clear picture of nutrition status of the country. The findings will help all concerned gain a fresh insight into the current burden of malnutrition and its determinants among children and mothers and in turn be helpful for the prioritization of nutrition interventions and implementation in the country.

1.2 Aim & Objectives

The aim of the NNS 2017-18 is to undertake field survey and generate district specific nutrition information related to malnutrition (both under and over nutrition) and micronutrient deficiencies among women, Adolescent girls and children under five in Pakistan.

1.2.1 Nutritional status

- To determine the prevalence of severe, mild and moderate stunting among children aged 0 - 59 months
- To determine the prevalence of severe, mild and moderate underweight among children aged 0 - 59 months
- To determine the prevalence of mild, moderate and severe wasting and edematous malnutrition among children aged 0 - 59 months of age
- To determine BMI and prevalence of low mid-upper arm circumference measurements among women of reproductive age (15-49 years of age)
- To determine BMI and prevalence of low mid-upper arm circumference among Adolescent girls/boys (10-19 years)

1.2.2 Micronutrient status

- To assess the magnitude of micronutrient deficiencies including anemia, iron deficiency anemia, low concentrations of Vitamin A, zinc, Vitamin D, Vitamin B 12 and calcium among the women of reproductive age (15-49 years of age).
- To assess the magnitude of micronutrient deficiencies including anemia, iron deficiency anemia, low concentrations of Vitamin A, zinc, Vitamin D and calcium Vitamin B12 (subject to approval of cost) among children 0-59 months of age.
- To assess the magnitude of anemia among Adolescent girls (10-19) (subject to approval of cost)
- To estimate the serum AGP, CRP, and Albumin concentrations for the adjustment of serum Ferritin and Calcium values respectively.

- To assess the excretion of Iodine in urine samples of women of reproductive age group
- To assess the coverage and adherence to key interventions such as Iron and folic acid, Vitamin A supplementation and use of iodized salt.

1.2.3 Infant and Young Child Feeding

- To assess the infant and young child feeding (IYCF) practices among children 0-23 months of age including breast feeding and complementary feeding
- To assess the appropriate food preparation and storage (food hygiene) among these children and their relationship to malnutrition in early childhood

1.2.4 Food Intake and Security:

- To assess the dietary intake among children, women and adolescent girls on representative samples using validated food frequency and semi-quantitative food intake recall tools.
- To assess the status of household food insecurity based on access, availability and utilization of food and their relationship with household level nutrition status

1.2.5 Water, Sanitation and Hygiene (WASH)

- To assess the Water, Sanitation and Hygiene indicators including access and use of improved water and hand washing practices at household level
- To test the household water quality as per the standards of Pakistan Council of Research in Water Resources PCRWR for Microbiological contaminations; i.e. Total e-coli counts and Total coliforms
- To test the household water quality as per the standards of PCRWR for Heavy and Trace metals includes: PH, hardness, TDS, arsenic, iron, fluoride, and nitrate

1.2.6 Common infectious disease & access to health services

- To determine the prevalence of diarrhea, febrile episodes and acute respiratory infections among children aged 0-59 months of age in the last 2 weeks through validated recall tools
- To determine the health seeking patterns for diarrhea and respiratory infections especially for antibiotics, Oral rehydration Solution (ORS) and zinc therapy
- To determine the proportion of pregnant women making ANC/PNC visit and receiving adequate iron-folic acid supplementation, MNT during pregnancy;

1.2.7 Programmatic coverage

- To estimate the proportion of households with access to adequately iodized salt
- To estimate proportion of children under-5 years who have received Vitamin A supplementation in the last 6 months
- To estimate proportion of children under 5 years who have received deworming tablets or suspension in the last 6 months
- To estimate the proportion of families benefiting from Benazir Income Support Program (BISP), Bait ul Maal, Zakat etc.

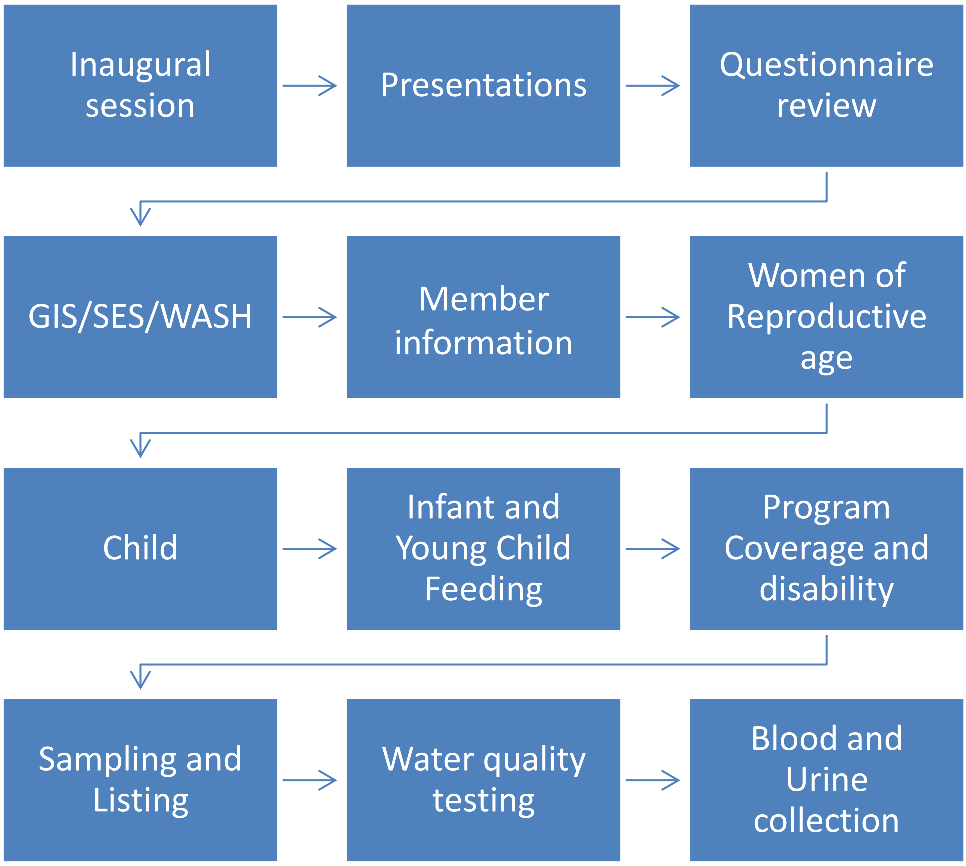
1.2.8 Access to and utilization of fortified foods

- To determine quantitative and qualitative level of Iodine in salt collected from selected households

1.2.9 SES variables

- To collect data on socio demographic variables permitting classification of households into various income/asset strata

Figure 1 Training Flow diagram



2 Malnutrition and IYCF Practices

2.1 Malnutrition

Malnutrition literally means “bad nutrition” and refers to deficiencies, excesses or imbalances in a person’s intake of energy and/or nutrients. World Food Program defines malnutrition as “a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance process such as growth, pregnancy, lactation, physical work and resisting and recovering from disease”.

2.1.1 Types of Malnutrition

The term malnutrition covers 2 broad groups of conditions, under nutrition and over nutrition. In the context of developing countries, under-nutrition is generally the main issue of concern, though industrialization and changes in eating habits have increased the prevalence of over-nutrition. Under nutrition can be of the following types;

- Failure to grow over a prolonged period of time i.e. chronic malnutrition resulting in stunting in height (low height for age)
- Loss of the tissues of the body i.e. acute malnutrition resulting in wasting (low weight for height)
- Underweight (low weight for age)
- Macronutrient (carbohydrates, protein and fat) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals)

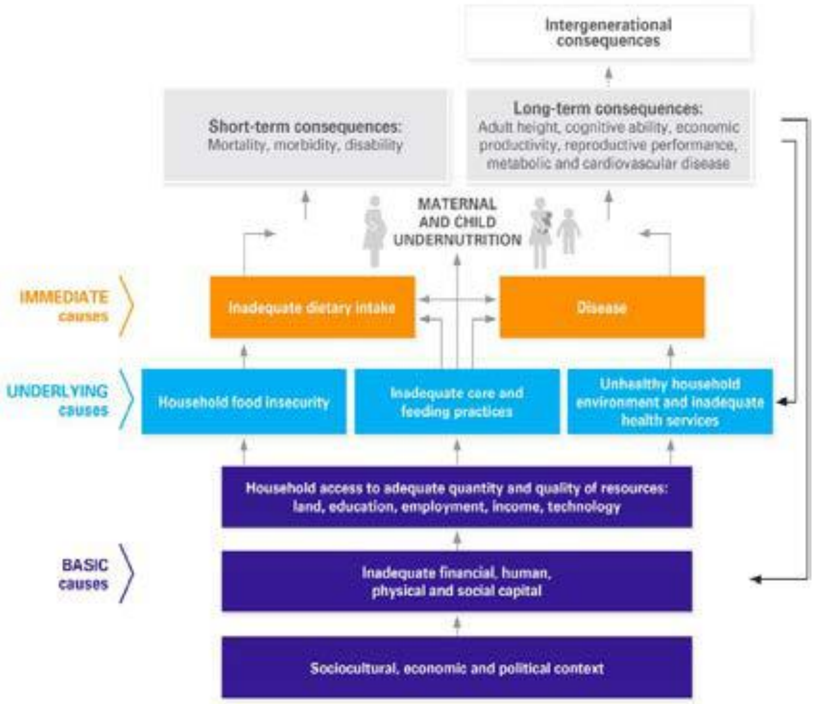
Chronic malnutrition or stunting, is a form of growth failure which occurs over time, unlike acute malnutrition. A child who is stunted or chronically malnourished often appears to be normally proportioned but is actually shorter than normal for his/her age. Stunting starts before birth and is caused by poor maternal nutrition, poor feeding practices, poor food quality as well as frequent infections which can slow down growth.

Acute malnutrition results from sudden reductions in food intake or diet quality and is often combined with pathological causes. Acute malnutrition, or wasting, is defined using anthropometric cutoffs and clinical signs. The currently accepted definitions, set out by the WHO, are as follows:

- Severe acute malnutrition (SAM), defined as WHZ <−3 or MUAC < 115 millimeters, or the presence of bilateral pitting edema, or both.
- Moderate acute malnutrition (MAM), defined as WHZ between <−2 and > −3 or MUAC between 115 millimeters and <125 millimeters.
- Global acute malnutrition (GAM) refers to MAM and SAM together; it is used as a measurement of nutritional status at a population level and as an indicator of the severity of an emergency situation.

Marasmus and kwashiorkor are common terms historically used to differentiate between types of SAM. Marasmus refers to children who are very thin for their height but do not have bilateral pitting edema; kwashiorkor refers to edematous malnutrition.

Figure 2 Conceptual Framework of Malnutrition



2.2 Infant and Young Child Feeding and Food Diversity

Breastfeeding and complementary feeding are a critical aspect of caring for infants and young children. Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development. WHO recommends feeding a newborn within the first hour after birth and Colostrum, the yellowish, sticky breast milk produced at the end of pregnancy is considered as the perfect food for the newborn. Appropriate feeding practices stimulate bonding with the caregiver and psycho-social development. They lead to improved nutrition and physical growth, reduced susceptibility to common childhood illnesses and better resistance to cope with them. It can also promote optimal growth and development, especially in the critical window from birth to 2 years of age. Adequate complementary feeding from 6 months onwards can prevent under nutrition and decrease the risk of infectious diseases, such as diarrhea and pneumonia.

2.2.1 Indicators for assessing infant and young child feeding practices:

These reflect current guidance on breastfeeding, complementary feeding, and feeding of non-breastfed infants and young children less than 2 years of age. Following are set of indicators for IYCF:

Indicators

1. Early initiation of breastfeeding
2. Exclusive breastfeeding under 6 months
3. Continued breastfeeding at 1 year
4. Introduction of solid, semi-solid or soft foods
5. Minimum dietary diversity
6. Minimum meal frequency
7. Minimum acceptable diet
8. Consumption of iron-rich or iron-fortified foods
9. Children ever breastfed
10. Continued breastfeeding at 2 years
11. Age-appropriate breastfeeding
12. Predominant breastfeeding under 6 months
13. Duration of breastfeeding
14. Bottle feeding
15. Milk feeding frequency for non-breastfed children

2.3 Immunization Status:

Vaccines keep children alive and healthy by protecting them against disease. According to UNICEF immunization is one of the most successful and cost-effective public health investments we can make for future generations as almost one third of deaths among children under 5 are preventable by vaccine. Over the past several decades, immunization has achieved many things, including the eradication of smallpox, an accomplishment that has been called one of humanity's greatest triumphs. Vaccines have saved countless lives, lowered the global incidence of polio by 99 percent and reduced illness, disability and death from diphtheria, tetanus, whooping cough, measles, Haemophilus influenza type b disease, and epidemic meningococcal A meningitis.

2.4 Universally recommended routine Immunizations schedule for Infants:

At Birth: BCG and OPV-0
6 Weeks: DTP1, OPV-1, Hepatitis B-1, HIB-1, Pneumococcal Conjugate-1
10 weeks: DTP-2, OPV-2, Hepatitis B-2, HIB-2, Pneumococcal Conjugate-2
14 weeks: DTP-3, OPV-3, IPV, Hepatitis B-3 HIB-3, Pneumococcal Conjugate-3
9 months: Measles I
15 months: Measles II

2.5 Child Disability

Disability is defined as a restriction or loss of ability due to an impairment in performing an activity in a manner or range considered normal for a human being of that developmental stage. Child disability is an emerging global health priority. According to the International Classification of Functioning, Disability and Health: Children and Youth Version (ICF-CY) disability can occur at three levels:
An impairment in body function or structure,
A limitation in activity, such as the inability to read or move around;
A restriction in participation learning and working, such as exclusion from school
The Washington Group on Disability Statistics has developed, tested and adopted a short set of six questions on functioning for use on censuses and surveys. The basic actions represented in these questions are those that are most often found to limit an individual and result in participation restrictions. The Washington Group Short Set comprises questions on six core functional domains; seeing, hearing, walking, cognition, self – care and communication. NNS 2018 will be focusing on these set of questions.

2.6 Salt Iodization

Iodine is essential for healthy brain development in the fetus and young child. Iodine deficiency negatively affects economic productivity and quality of life. Most people need an additional source of iodine as it is found in relatively small amounts in the diet. Iodization is the process of fortifying salt for human consumption with iodine and is an effective strategy to increase iodine intake at the population level.

Monitoring the levels of iodine in salt and the iodine status of the population are critical for ensuring that the population's needs are met and not exceeded. The iodine content of salt can be determined both quantitatively and qualitatively (rapid test kits). Rapid test kits are advantageous as they can be used in the field to give an immediate result and ensure that salt is adequately iodized (>15 ppm iodine and <40 ppm, at the household level).

For more information refer to links below OR Annex A:

http://apps.who.int/iris/bitstream/10665/43895/1/9789241596664_eng.pdf

http://apps.who.int/iris/bitstream/10665/44306/1/9789241599290_eng.pdf

https://www.unicef.org/nutrition/files/IYCF_Indicators_part_III_country_profiles.pdf

3 Food Security and Livelihood and Water Sanitation & Hygiene (WASH)

3.1 Food Insecurity and FIES

Table 1 Food Insecurity and FIES

Food security	Food security is ensured when all people, at all times, have access economically, socially, and physically to sufficient, safe, and nutritious food that satisfies their nutritional needs and their dietary preferences, allowing them to lead active and healthy lives. Food security of the households corresponds to the application of this concept on the family level, with the center of attention focusing on the individuals making up the household (FAO, 1996). This definition contains three distinct but interlinking concepts that are each essential to attain a state of food security: **availability, access, and use**
Food Insecurity Experience Scale	FAO has developed an approach for measuring food insecurity at different levels of severity. It is an experience-based measure of the severity of the food insecurity condition of a household or an individual respondent (that is, the constraints on the ability to access food). The aspect of food insecurity measured by the FIES is a condition by which people are unable to access food. The severity of the food insecurity condition is not directly observable but is manifested by certain food related experiences and behaviors. Food insecurity is measurable on a one-dimensional scale using information from a set of questions analyzed together. *Refer to questionnaire for Food Insecurity Experience Scale.*
Livelihood	The term 'livelihood' refers to the assets available to people and how they use these to sustain their living. A livelihood becomes sustainable when a family or a community has sufficient assets and the capability to use them to create a life free from hunger, disease, illiteracy and all other factors associated with poverty.
Dietary Diversity	The number of different food groups consumed by an individual or collectively by a household over a given reference period is known as dietary diversity.

Infant and Young Child Minimum Dietary Diversity (IYCMDD)	The infant and young child minimum dietary diversity (IYCMDD) score is a diet quality indicator designed by WHO to assess IYCF practices among children 6-23 months old. This indicator is one of eight IYCF indicators developed by the WHO to provide simple, valid, and reliable metrics for assessing IYCF practices at the population level (WHO 2008). The IYCMDD is also used to calculate the minimum acceptable diet (IYCMAD) indicator, which is a composite indicator
Dietary Diversity for Women	The Minimum Dietary Diversity for Women (MDD-W) score is an indicator of diet diversity validated for women aged 15-49 years old. According to the MDD-W, women who have consumed at least 5 of the 10 possible food groups over a 24-hour recall period are classified as having minimally adequate diet diversity. The ten food groups required for the MDD-W are: (1) Grains, roots, and tubers (2) Pulses (3) Nuts and seeds (4) Dairy (5) Meat, poultry, and fish (6) Eggs (7) Dark leafy green vegetables (8) Other Vitamin-A rich fruits and vegetables (9) Other vegetables (10) Other fruits

For more information refer to link below OR Annex B:
www.fao.org/3/a-i5486e.pdf

3.2 Social Safety Nets

Social protection/safety nets provide transfers in cash or in-kind to poor and vulnerable people as a means to reduce poverty, boost inclusive growth, share prosperity, reduce food insecurity and malnutrition, increase demand for education and health services, better management of risks and absorb unprecedented shocks. It is the support that comes from government or non-governmental organizations such as religious, charitable, or community-based organizations, excluding support from family, other relatives, friends or neighbors.

3.3 Social Safety Programs in Pakistan:

NNS 2018 will be focusing on two types of Social safety programs in Pakistan; regular (those that are provided on a regular interval of time) and irregular. These are then further classified on the basis of Gender Sensitivity i.e. those that are primarily targeting women (proportion of women reached through social protection measures) and on the basis of Purchase of food i.e. proportion of social protection amount availed by household being used on food consumption. The following are a few regular social safety programs running in Pakistan;

- Social protection and social safety net programs through Benazir Income Support Program (BISP)
- Pakistan Bait-ul-Mal (PBM)
- Zakat
- Employees Old Age Benefit Institution (EOBI)
- Workers Welfare Funds

3.4 Water, Sanitation and Hygiene

Table 2 Water, Sanitation and Hygiene

Component	Details
Water, Sanitation & Hygiene (WASH)	WASH is the collective term for Water, Sanitation and Hygiene. While each a separate field of work, each is dependent on the presence of the other. For example, without toilets, water sources become contaminated; without clean water, basic hygiene practices are not possible.

Safe drinking Water	Water is essential for survival and development of all, without it we simply cannot stay alive or thrive in a healthy environment. Water safety and quality are fundamental to human development and well-being. Providing access to safe water is one of the most effective instruments in promoting health and reducing poverty. Universal access to safe drinking water is a fundamental need and human right. Securing access for all would go a long way in reducing illness and death, especially among children.
Water borne diseases	Diarrhea, infectious hepatitis, typhoid and paratyphoid enteric fever are all examples of waterborne diseases that are common problems in our country. These are all caused by microbial contamination. Lead poisoning and fluorosis, caused by chemical contamination, are also classified as waterborne diseases.
Household Water treatment methods	Household sand filter: Household filters are an attractive option for treatment because these filters can usually be made from locally available and inexpensive materials like clay pots or barrels Cloth filtration: Cloth filtration is a common water treatment technique that is easy to use and inexpensive. Cloth filtration can be very effective against cholera, guinea worm and other disease-causing agents. Solar disinfection: Solar disinfection, also known as SODIS, relies on energy from the sun to kill pathogenic organisms, especially bacteria. Ultraviolet light from the sun is an effective bactericide for water. Chlorine solution: Chlorine solution, also known as sodium hypochlorite solution or bleach, is the most affordable, easiest to produce, and most widely available chemical for household water treatment. Boiling: It is an optional water treatment at household level. Boiling is a simple way of killing any ova (eggs), cysts, bacteria and viruses present in contaminated water. Water should be heated until large bubbles are continuously coming to the surface of the water.
Hand washing	Hand washing is one of the most important hygiene practices and contribute to healthy and save lives. Hand washing with soap at critical times like after going to the toilet or before eating, can have a significant impact on health. Good hygiene practices play important role in reducing incidents of diseases such as pneumonia, trachoma, scabies, skin and eye infections and diarrhea-related diseases like cholera and dysentery.
Safe disposal of feces	Safe disposal of excreta, so that it does not contaminate the environment, water, food or hands, is essential for ensuring a healthy environment and for protecting personal health. This can be accomplished in many ways, some requiring water, others requiring little or none. Regardless of method, the safe disposal of human feces is one of the principal ways of breaking the fecal–oral disease transmission cycle

For more information refer to links below OR Annex C
http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/cltshandbook.pdf
http://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/images/wash_eng.pdf

4 Data Collection

4.1 Methodology

4.1.1 Design

The data collection of NNS 2018 will be carried out using the cross-sectional survey at district level in all areas of Pakistan. We will employ a mixed method data collection methodology which will use both quantitative and qualitative data collection. The quantitative data will be district-specific whereas the qualitative data will be regional specific based on cultural diversity and not on language because Pakistan's population diversity is more visible along cultural differences and less along linguistic, religious or genetic lines.

4.1.2 Approach

The survey will be conducted in all provinces and regions in all districts of Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Federally Administered Tribal Areas (FATA), Azad Jammu & Kashmir and Gilgit Baltistan. The survey will collect data on the proposed indicators especially those related to under-nutrition, micronutrient deficiencies food intake, dietary diversity, and food in-security and water quality at household level. Quantitative data collection techniques will be used for all aspects of the survey while qualitative data collection techniques will be used to explore the factors related to the suboptimal feeding practices and the aspects of gender empowerment in reference to decision making for nutrition and WASH practices. The total time period to conduct the NNS 2018 survey is 13 months.

4.1.3 Data Collection

Quantitative data collection will be the major component of the survey in which data collection will be carried out to achieve indicators for proposed survey objectives and outcomes related to socio-demographic information, Infant and Young child feeding (IYCF), dietary practices, food insecurity, anthropometry, micronutrient deficiencies and household water quality and testing, WASH, access to health care, support programs and nutritional indicators.

4.2 Target Population

The target population for the quantitative component of NNS 2017 will be:

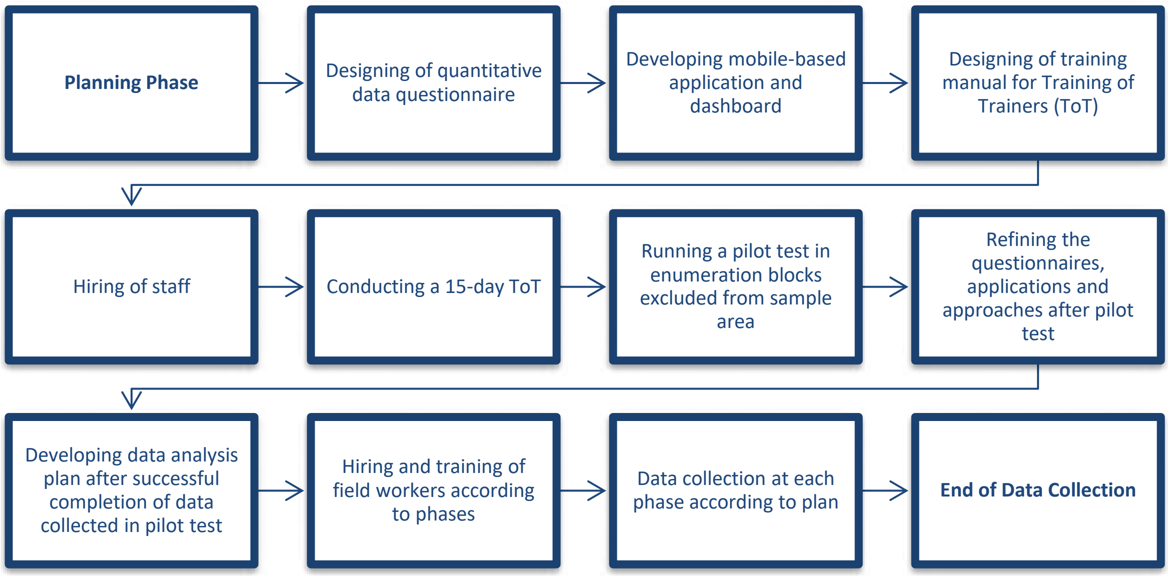
Table 3: Target Population

Women of Reproductive Age Group: women age 15 – 49 years	Adolescent girls and boys (10-19 years)	Children: 0-59 months of age	Children 6-12 years of age

4.3 Data Collection Approach

The data collection is an extensive exercise and will be conducted phase wise throughout the country. The data collection approach is a step wise approach mentioned below:

Figure 3 NNS Data Collection Process



For the range of indicators in the NNS 2018, the questions will be divided in following categories in line with pre-validated data collection instruments for various sets of information.

- Demographic Information and Socio Economic Status *(Adapted from last National Nutrition Survey)*
- WRA Reproductive History, Last ANC, IFA, MNP Supplements, 24 hours Food Recall and Food Frequency *(WHO Guidelines, MDD-W by Fanta, Modified MICS Questions)*
- Child Nutrition and IYCF Practices (WHO Guidelines for IYCF)
- USI, Social Safety Nets and Food Insecurity Experience Scale *(Adaptation of FIES by FANTA, Salt Iodization Test, Modified questions for safety nets)*
- Bio-Chemical Samples *(As per the protocols and lab guidelines)*
- Water Quality Testing *(Provided by PCRWR)*

The trainers will also monitor the data collection process at field level.

4.4 Data Collection Plan

The 35 divisions and 166 districts of Pakistan are divided in around 5780 PSUs or enumeration blocks. The enumeration blocks will be provided by PBS and the initiation of actual data collection from field is tentatively planned from third week of March 2018 following ToT and pilot test in Karachi. Subsequently, the training of data collectors to other divisions will be started and gradually will cover the other districts. The Training for the field staff - Karachi is scheduled to be held from mid of February 2018, soon after the training data collection will start. The detailed step wise plan is as under:

- The proposed sample size having district level representation is provided by PBS as mentioned in below table.

Table 4: Data Collection Plan

Scenario	Household Sample	Biochemical Sample	Water Testing Sample
District Specific sample for anthropometry, biochemical analysis and testing	115,600	30,400 for WRA 30,000 for U5 children	29,055 HHs

- To ensure the quantitative data collection, Pakistan Bureau of Statistics (PBS) will provide the available updated maps. Pakistan Bureau of Statistics will provide the enumeration blocks for the respective districts, and train the line listing team as well
- There will be two teams for collecting quantitative data, line listing team and data collection team. The line listing team will be a separate dedicated team for line listing and collection of SES data from head of household.
- Along with SES, Hand-washing areas will be identified and utilization of iodized salt will be tested, the test will also identify the texture of salt for classification.
- The line listing will be done a day before data collection and will also do the anthropometric measurement of all targeted groups
- Similarly, for bio chemical testing and water quality testing, 5 HHs will be randomly selected from each Secondary Sampling Unit
- Among the line listed households of respective enumeration block 20 households will be selected randomly by the devices
- Among the randomly selected 20 HHs the quantitative data will be collected by using questionnaire for IYCF, MDD-W, FIES, and program coverage from all mothers of under 5. However, the immunization history will be taken for children aged 11-23 and 23-35 months only.

Once the data collection process is launched a detailed monitoring plan will be devised by Master Trainers and they will also plan and organize the training in different regions simultaneously.
The data will be collected through handheld devices where possible, and for the areas where access is limited or permission is not granted to use electronic devices for collection of data; hard copies will be filled, and later on transferred to the application on the same day. The collected data will be transferred to central database and will automatically reflect on NNS dashboard after an optimum time against the selected indicators. Similarly, blood, urine and drinking water samples will be collected from the participants at household level. Data collection team will consist of team leaders, measurers, data collectors and phlebotomists.
For water quality, four (4) bottles of drinking water will be collected for chemical and microbiological tests. Similarly blood and urine will be collected and standard preservation methods will be used. Further the samples will be transferred to AKU collection points in districts where available, otherwise Courier Company will facilitate the transportation of samples (Blood and Urine) in temperature controlled environment to Nutrition Research Lab and water samples to PCRWR lab in Islamabad. Similarly as other information, the reports will be collected online and results will be triangulated.

The below summary table is drawn for an estimation of blood, urine and water samples:

Table 5 Summary for quantitative data collection

Region	Total PSU	Total* HH	Total anticipated Trainings	Total Blood Samples WRA*	Total Blood Samples Children*	Total Urine Samples WRA**	Total Urine Samples Children**	Total water testing for E.Coli*	Total water testing for other parameters **	# of FGDs/IDIs ***
Punjab	2051	41020	4	7704	7704	2051	2051	7704	4102	60/01
Sindh	945	18900	3	5656	5656	945	945	5656	1890	48/01
KP	807	16140	3	5096	5096	807	807	5096	1614	48/01
Baluchistan	794	15880	3	7297	7297	745	745	7297	1490	60/01
GB	328	6560	2	2640	2640	190	190	2640	380	24/01
AJK	410	8200	2	1025	1025	597	597	1025	1194	24/01
FATA	377	7540	2	2070	2070	377	377	2070	754	12/01
Islamabad	68	1360	1	340	340	68	68	340	136	-
TOTAL	**5780**	**115600**	**20**	**31828**	**31828**	**5780**	**5780**	**31828**	**11560**	

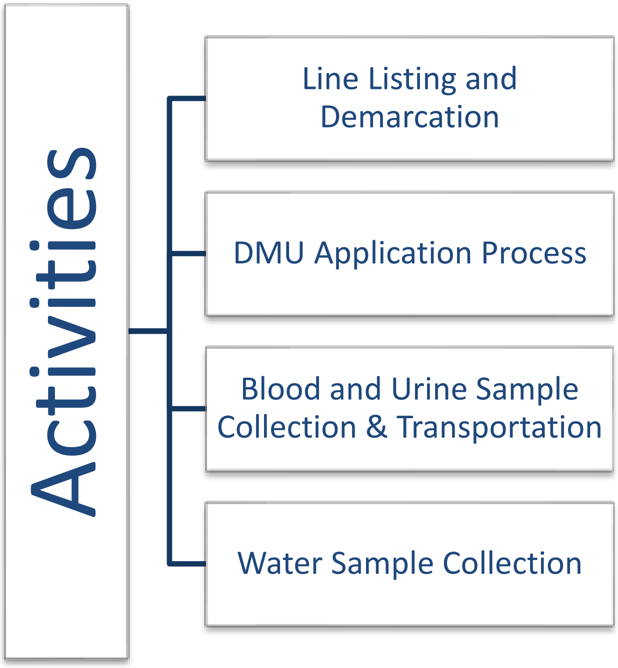
**District Specific*
*** Provincial Specific*
**** See distribution in below table*

A detailed tentative plan is designed and attached as Annex III, with this document. Changes can be anticipated after the completion of pilot test or even during Pre-Ramadan phase. Similarly, for qualitative data collection will start from March 2018. The tools for qualitative data collection are Focus Group Discussions (FGDs), In-depth Interviews (IDIs) and Semi-Structured interviews. These exercises will be conducted with the following targeted groups focusing themes and sub-themes; guidelines for FGDs and IDIs are attached as Annexure. A summary of qualitative data collection tools and audience has been appended in below table.

Table 6: Sample collection List

Name of Assay	Targeted Group
Vitamin A (Retinol)	Children 6-59 months and WRA
Vitamin D	Children 6-59 months and WRA
Ferritin	Children 6-59 months and WRA
C-reactive Protein (CRP)	Children 6-59 months and WRA
Alpha 1 Acid Glycoprotein (AGP)	Children 6-59 months and WRA
Zinc	Children 6-59 months and WRA
Calcium	Children 6-59 months and WRA
Albumin	Children 6-59 months and WRA
Vitamin B12	Children 6-59 months and WRA
Folic Acid	Children 6-59 months and WRA
Iodine	Children 6-12 years

Figure 4 Activities



4.5 Ethical Considerations

NNS 2018 will be conducted up to the highest ethical standards. This includes ensuring that expectations are not raised, confidentiality is maintained and respondents are informed about the purpose of the survey. Participation in the research will be voluntary and the participants will have every right to withdraw from the study at any point in time. The research staff and the participants will be informed about the purpose, methods and benefits and intended possible uses of the research. Informed verbal consent will then be obtained from the research subjects. Respondents will be free to stop interviews at any time or skip any questions they do not want to answer. They will have the right to ask questions at any point before, during or after the interview is completed. All interviews will be conducted by trained staff and in conditions of privacy. All interviews at the level of the health facility will be conducted in a private room, whereas interviews at the level of the community will usually be conducted at the person's dwelling, or in a private room. It will be ensured that only female interviewers take the consent and interview of the female respondent. Only highly trained enumerators will be allowed to take anthropometric measurements and blood samples. A formal written consent will also be obtained for blood sampling procedures from every participant. During the interview, if a child with SAM is identified he/she will be referred to the nearest health facility.

No personal identifiers will be used in any form of reporting or dissemination. Personal identifications will be linked with a unique identifier and will be kept securely. No information will be published that could identify the respondent. Paper copies of questionnaires will be stored for three years in a secure location; only the investigation team will be able to access them.

4.6 Line Listing/Demarcation by PBS

4.6.1 Identification of Enumeration Blocks and Households

- Before starting the process of line listing of selected households for NNS, PBS representatives will identify the clusters and provide demarcation maps.
- For data collection household is defined as a House with a child between 6-59 months of age.
- An enumeration Block (EB) will consist of 250 to 300 households.

- The team of line listers along with the help of PBS representatives will identify Enumeration Blocks. The line listers will then take GIS coordinates of identified blocks and conduct line listing of households in identified blocks.
- Electronic device/tablets will be used for line listing.

4.6.2 Household line listing

1. A complete list of all residential households in each of the selected sample clusters is necessary for pre-selection of households. Without complete list of households, line listing/data collection is not acceptable possible?
2. After the selection of clusters for survey, a complete list of dwelling units/households in the selected clusters is conducted prior to the selection of households.
3. The listing process consists of the following steps:
    3.1. Visiting each of the selected cluster
    3.2. Collecting geographic coordinates of the cluster
    3.3. Drawing a location map of the cluster as well as a sketch map of the structures in the cluster
    3.4. Recording on listing forms a description of every structure together with the names of the heads of households in the structures and other characteristics
4. It is also not acceptable to attempt to avoid listing altogether by having interviewers create clusters as they go along.
5. As a general rule the average segment size should not be less than 250-300 in population (approximately 100 households) in both urban and rural areas. (Refer to guidelines)
6. After the household listing, data management unit (DMU) receives the completed listing for a cluster, they must first create a serial number for each of the occupied residential households, beginning with 1 and continuing to the total number of occupied residential households listed in the cluster.
7. Only occupied residential (those who refuse to cooperate at the time of listing or who were absent but neighbors confirmed that they would not be absent for long time and would be at home during the survey.
8. The household selection process will be based on the serial number. (Serial number is an ID number for the household).
9. Household listing will be performed on tablets/electronic devices.
10. After the household listing data collection will start immediately.
11. Prepare up-to-date maps to indicate the location of structures.
12. Record address information for each structure or describe their location (for areas lacking street names or numbers on structures)
13. Write numbers on structures
14. Make a list of the names of the heads of households in all of the structures

For more detailed information refer to below link OR Annex D:
https://dhsprogram.com/pubs/pdf/DHSM4/DHS6_Sampling_Manual_Sept2012_DHSM4.pdf

4.7 NNS Questionnaire (Annex) – Q by Q exercise

4.8 NNS Application Handling session/ Data Management and Data Analysis

Below describes the data management system (DMS), including both the field component (e.g., how the data are recorded) and the office components (e.g., how the data are stored and archived for permanent documentation).

Data entry, Verification and editing: The quantitative data collection for NNS 2018 will be carried out on hand held devices. Samsung T-285 tablets will be used, running android version 5.1. A customized application is being developed using Java language with SQLite running at the backend for data storage. The key features of the NNS 2018 data collection application include access control, on screen consistency and range checks, on screen tips, quick reports and GPS tracking. On those locations where use of tablets is not possible due to security reasons, data will be collected on paper forms and entered on tablets on the same day.

Data security and archiving: Data will be transferred from each handheld device at the end of each day. It will be transmitted directly to the AKU Server via internet. In case of non-availability of internet at a remote location, the team leader will manually export a copy of data to a USB and will store it in a laptop to avoid any data loss. The Data collection application will be password protected. Eligible users can add new data only if they can provide the correct password. Once a record is saved it will not be editable for the collection staff. Data stored on handheld devices as well as during transfer will be encrypted to avoid any breach of confidentiality of participant's personal information. Data will be archived and stored in a data repository at the Aga Khan University, Karachi, Pakistan. The access to NNS 2018 data repository will be limited only to data management personnel directly involved in the project through their AKU LAN identification. The level of access will be according to the role of the user. The data synchronized at the AKU data repository will be daily replicated to a remote location as back up. The fail-over/slave server will also be maintained for restoration of the NNS 2018 database in the event of a disaster that results in downtime of the primary database server. A data collection application installation guide, user's manual and database documentation will be created. The database documentation will include description of all variables, their type, description, codes and value labels.
The biological and water specimens will be barcoded and the barcode labels will be scanned and linked to the respective participant / household at the time of collection. GIS coordinates of all the sampled enumeration blocks will be obtained during line listing. GIS coordinates of participating households will also be stored in the database subject to security clearance.

Analysis methods: The design of NNS 2018 is powered to provide estimates of key indicators at district level. Initial analysis will include examining frequency distribution of all variables to identify possible errors. Final analyses will be performed after data cleaning and satisfactory quality assurance. Sampling weights will be added to the data at household and individual level to account for unequal selection probabilities and non-response. Standard survey module will be used to take into account the multi-stage survey design including stratification, clustering and sampling weights.
Descriptive statistics for the subjects will be estimated and reported as mean (±SD), median, ranges and frequencies as appropriate. Standard errors, confidence intervals and design effect will be reported for selected indicators. Pearson's Chi-squared test will be used to see association between categorical variables. The analyses will present estimates at national level with population subgroups such as age, gender, level of education, marital status, economic status, residence (urban/rural), districts, divisions and region of the country. Further disaggregation will be provided relevant to the domain of the indicators. STATA 15.1 is planned to be used for data analysis.

4.9 Blood and Urine Sample Collection by NRL and Transportation of Sample

4.9.1 Introduction

The quality of any laboratory test results is dependent on many variables, these include proper attention and technical skills of the phlebotomist, and knowledge when preparing the patient and specimen are essential for the highest quality standards for biochemical testing. The laboratory SOP's have been prepared specifically for the field teams, phlebotomies and lab technician for the National Nutrition Survey, Pakistan to perform the phlebotomy procedures and biological specimen (blood and urine) collection, processing, packaging and transportation to the testing laboratory in a timely manner and under environmental conditions that will not compromise the integrity of the specimen.

The SOP manual covers the specific requirements to ensure quality and consistency of the field aspects of biological sample collection. The essential tasks in biological sampling are to collect representative samples that meet the requirements of the survey, and to prevent deterioration and contamination of the samples before biochemical analyses. Specific specimen requirement for each test are mentioned in this manual. Specimen requirements include information such as specimen volume, collection and transport containers as well as transport temperature and storage.

4.9.2 Target Group for Nutritional Biomarkers

The target population for the quantitative component of NNS 2018 will be;
Women of Reproductive Age Group: women age 15 – 49 years

- Adolescent girls (10-19 years)
- Children: 0-59months of age
- Children 5-10 years of age

4.9.3 Description of Essential Biochemical Analyses

The following essential biochemical indicators for the assessment of micronutrient deficiencies in children 0 -59 months of age. Iron and urinary iodine deficiencies status will be assessed for the women of reproductive age. In addition Children 5 to 10 years of age will also be assess for urinary iodine concentration. Details are given in below table.

Table 7: Description of Biochemical Analysis

S.#	Description of Assays	Children 0-59 months	Children 6-12 years	Women of Reproductive age
1	Haemoglobin	Yes	No	Yes including adolescent
2	Ferritin	Yes	No	Yes
3	Vitamin A	Yes	No	Yes
4	Vitamin D	Yes	No	Yes
5	Zinc	Yes	No	Yes
6	Calcium	Yes	No	Yes
7	Serum Albumin	No	No	Yes
8	Folic Acid	No	No	Yes
9	Vitamin B_{12}	Yes	No	Yes
10	Urinary Iodine	No	Yes	No
11	C Reactive Proteins	Yes	No	Yes
12	Alpha 1 Acid Glyco Protein (AGP)	Yes	No	No

4.9.4 Training of Field Staff

Comprehensive training will be provided to all members of the survey team. The training will include a combination of classroom training and practical hands-on for biological sample, e.g. blood and urine collection, centrifugation, serum separation, aliquot preparation, labeling, maintenance of cold chain and sample transportation. Field teams involved in specimen collection will be provided training on spot Hemoglobin testing using HemoCue 301 Photometer.

4.9.5 Distribution of Lab Supplies for Bio samples Collection

Blood and Urine collection kits will be prepared at NRL, AKU and will be distributed to each field team in sufficient quantities. Sample processing, packaging and transportation supplies; such as cool boxes, ice packs, sample racks and biohazard zip-lock bags will also be distributed to each phlebotomy team.
Centrifuge machines, HemoCue 301 Photometers and cuvettes for Hemoglobin measurement will be provided to each survey team. All these lab supplies for the NNS Survey will be distributed to field sites in every province using the TCS courier service on a Universal Account.

4.9.6 Blood Samples Collection Procedure

Personal hygiene and cleanness of the blood collection area will be ensured to avoid blood contamination. Disposable Nitrile Gloves will be used to maintain sterility of the procedure. Before collecting the blood the skin will be cleaned properly with 70% alcohol swab, if it requires a double cleaning should be done with another alcohol swab to ensure complete disinfection of the skin. A tourniquet will be used for the both Child and Women to make the vein prominent, the needle is gently inserted in the popped up vein the tourniquet is released and the blood is gently drawn in to the blood collection tube. Care is taken to collect the blood in the first attempt to avoid double puncturing of the veins. The blood is transferred gently into the blood collection tube, the last drop in the syringe is used for the measurement of the Hemoglobin concentration.

The collection of the bio-samples for micronutrient assays will be performed by trained phlebotomists, this is one of the most important task in the field surveys. The sample collection will be with the active involvement of bio-sample collection teams in the field.

In order to obtain 1000 microliters serum from Children 0-59 months and approximately 1.4mL serum from Women of Reproductive Age (WAR), at least 3.5 ml of venous blood will be collected in a trace element free vacutainer tube from Children 0-59 months and 5 ml venous blood from the Women. After collection of blood, the vacutainer tubes will be placed in a cool box with frozen ice packs and allowed them to clot for at least 30 minutes. Sample ID pre-printed bar coded tags will be pasted on each of the vacutainer tube and cryovials.

At the end of each day, the whole blood will be centrifuged and the serum will be aliquoted into 4.5ml cryovials by pipetting using a disposable pipette. Aliquoted serum of the same clusters/district will be kept in a zip lock bag with a label of the same cluster on the cool box. In this way, the laboratory could easily identify, which particular clusters are to be tested in a batch and thus minimizing the possibilities of increasing freeze/thaw cycles. A lab request form/sample log sheet will be filled up indicating name of the participants, ID number, sample ID number, and sample volumes. The samples will be transported for temporarily storage at field offices in cool box with frozen ice packs maintaining the cold chain at +2 to +8 Celsius. Cool box temperature will be monitored by using a digital thermometer.

Samples received at field offices will be properly checked and packed in a sturdy styropform boxes with enough frozen ice packs and will be transferred to the nearest Aga Khan University, Hospital (AKUH), Clinical Lab Pick up point on a weekly basis.

Samples received at AKUH collection points will be transported directly to the Nutrition Research Laboratory (NRL), Karachi in dry ice through Aga Khan University Hospital, Clinical Laboratory transportation system.

Samples received at the Nutrition Research Laboratory will be checked for quality and hemolysis and further aliquoted in cryo vials. One aliquot of approximately 500µl will be used for the analysis of vitamin A, Vitamin D, Zinc, Ferritin, CRP and AGP. An aliquot of 500 µl will be used for the analysis of Calcium, Albumin, Folate and Vitamin B12. Sample ID bar coded tag will be affixed on each of the Cryovial. The serum vials will be stored in an ultra-low freezer (ULT-70ºC) until the analysis. Sample receiving and quality of sample status will be updated to the Survey Manager’s on a daily basis.

4.9.7 Collection and Processing of Bio samples

Blood Collection Procedure

This section has guidelines for collection, processing, storage and transportation of blood and urine specimen. The quality of the samples collected defines the accuracy of any laboratory test; the quality of the results is dependent upon the integrity of the specimen on which it is performed. The requirements of specific tests are also mentioned in this section.

Blood collection and Processing Supplies

The following materials are required for blood collection;

- Trace Element Free (Royal Blue Top) Vacutainer Tube 6mL
- Disposable, powder free Nitrile gloves.
- Alcohol Wipes

- Syringes 5-10CC
- 23 gauge butterfly blood collection system
- Aluminum Foil
- Cotton Ball
- Adhesive bandage (Saniplast)
- Test tube Racks
- Zip-lock Bag
- Sharps disposal container
- Cooler with frozen ice packs
- Digital Thermometer
- Lab Requisition Form
- Centrifuge Machine

4.9.8 Other considerations

It is vitally important that all the materials - syringes, tubing, needles, stoppers, vacutainer, and gloves - be certified by the manufacturer for use for trace minerals.

For determination of Fat Soluble Vitamin, such as Vitamin B12, Vitamin D, Folic Acid and Vitamin A (Retinol), it is important that light exposure to blood samples is minimized. Serum and plasma both are more sensitive to light than whole blood, and available means to limit light exposure should be used. In the field, this includes drawing blinds/shades, turning off existing lighting, and covering the collected sample tube with aluminium foil prior to putting on cold packs.

4.9.9 Phlebotomy Procedure

a. The subject must first be properly prepared so that the best possible specimen can be collected.
b. Personal hygiene and cleanness of the blood collecting area will be ensured to avoid blood contamination. The venepuncture procedure is simple but requires trained phlebotomists to collect the blood.
c. Field worker should introduce the nurse / phlebotomist to the caregiver. Be warm and friendly, establish eye contact, and show concern for the child’s health and comfort. You first should instil trust and confidence in parent and child.
d. Ask about the child’s past experience with blood drawing.
e. Wash hand and put on gloves.
f. Blood samples should be taken from the vein. Before blood collection, the subject should remove tight rest on a pillow or other supportive prop.
g. Disinfect the site with 70% isopropyl alcohol swab in concentric circles. Let alcohol air dry.
h. The phlebotomist sets the tourniquet around the upper arm of the subject, searches the proper vein by inspecting and palpation and then sterilizes the injection site.
i. Immediately after the insertion of the needle, the tourniquet should be released to minimize the effect of hemo-concentration.
j. As soon as blood appears in the tubing of the butterfly, pull the syringe plunger to fill with blood
k. Remove the needle and hold direct pressure on the puncture site with cotton or gauze sponges until bleeding stops. Apply an adhesive bandages.
l. Engage Safety-Lock feature on butterfly needle and hand the syringe and butterfly tubing to the lab tech.
m. Disconnect butterfly from the syringe and extracts the blood from the tubing in the cuvette for the HemoCue. Use one drop of blood contained in the collection tubing (between the butterfly needle and the syringe) for the HemoCue assay of Hemoglobin. (NOTE: This essay is ordinarily done soon after the blood draw.

4.9.10 Blood Sample Processing

Purpose: This SOP describes the procedure for processing, transport and storage of bio samples from the study site to the testing laboratory for the National Nutrition Survey, Pakistan. The proper processing of the collected samples is critical because deviation from the protocol can significantly affect the future use of the samples. It is particularly important that appropriate collection and rapid processing of samples and other precautionary measures (samples are not left open to the atmosphere longer than necessary) are taken to avoid sample loss.

Material and Equipment

- Centrifuge Machine
- Blood Collection kit
- Coolers with frozen Ice packs
- Barcode Labels
- Sample rack
- Lab requisition Form

Serum Preparation Procedures

- Put 3/5 mL whole blood into pre labelled Barcoded Trace Element-Free Vacutainer tube to yield the required serum volume for the survey participants.
- Place collection tube upright in the rack and allow blood to clot (no longer than 30 minutes).
- When clot has formed, The tube with the 5 mL blood specimen should be centrifuged at 2000 x g for 10-15 minutes
- Turn the centrifuge off and let it come to a complete stop without stopping it with your hand or break.
- Remove tubes carefully without disturbing the red cells at the bottom.
- Hold the tube in upright position and carefully remove the stopper.
- Aliquot serum into a pre labelled Barcoded 4.5mL RED colour coded Cryovial tube with a disposable plastic transfer pipe, being careful not to aspirate the interface of the serum and the red cells. If cells are disturbed, re-centrifuge specimen.
- Wrap the Cryovial in aluminum foil to protect from light exposure.
- Store at +2 to +8 degree centigrade until the transportation.
- Note: It is important that the sample be centrifuged and processed within 6-8 hour window period. If not possible, the sample should be refrigerated for maximum 24 hours until processing.

Caution:

- Prolonged centrifugation may cause hemolysis.
- Be sure to use a balance tube of the same size with an equivalent volume of water.

4.9.11 Rejection of Samples

- Insufficient sample (QNS) - certain additive tubes must be filled completely. Incorrect blood to additive ratio will adversely affect the laboratory test results. When many tests are ordered on the same tube be sure to know the amount of sample needed for each test.
- The wrong tube collected for test ordered. Always refer to the procedure manual when uncertain.
- Improper storage - certain tests must be collected and placed on ice, protected from light, or be kept warm after collection.
- Improperly labeled
- Hemolysis - this is usually caused by a procedural error such as using too small of a needle or pulling back too hard on the plunger of a syringe used for collecting the sample. The red cells rupture resulting in hemoglobin being released into the serum/plasma, making the sample unsuitable for many laboratory tests.

4.9.12 Procedure Notes

Risk of contamination is high in the laboratory unless proper procedures are maintained. Trace mineral free supplies must be used, and care must be taken to reduce exposure of the sample to air, dust, water, hair, and skin cells from the lab technician. Samples should be processed in laminar flow hoods, or otherwise clean, dust and smoke free room. Laboratory technicians should use trace element free polyethylene gloves, free of talc or other coatings.

To the extent possible, samples should be processed in a lab with indirect lighting. There is special lighting that can be used, or the lab can put amber crepe paper over the lights to enable work without compromising the sample for retinol and other vitamins determination, or to work in natural (indirect) light. If such safe lighting conditions are not possible, the sample should be covered in aluminum foil to shield it from the light.

All sharps used for blood collection and separation must be discarded in puncture resistant danger bins and other consumables; vacutainer tubes, gloves etc. must be disposed in Biohazard Red bags. Care is taken not to touch the red cells with the tip of the dropper to avoid breakage of red cells.

4.9.13 Labeling of sample tubes

Utmost care must be taken by the phlebotomist to match the samples with log books in preparing labels to be placed on the collection tubes and Cryovial. It is recommended to handle the processing and labeling of each sample individually to avoid labeling errors. A properly labeled sample is essential so that the results of the test will be linked with individual information, each sample must have a unique identification number that is very important for the tractability of the result. The key elements of labeling are; Subject's full name, Date of Collection Subject's unique ID number.

Figure 5 Blood Processing for Women of Reproductive Age

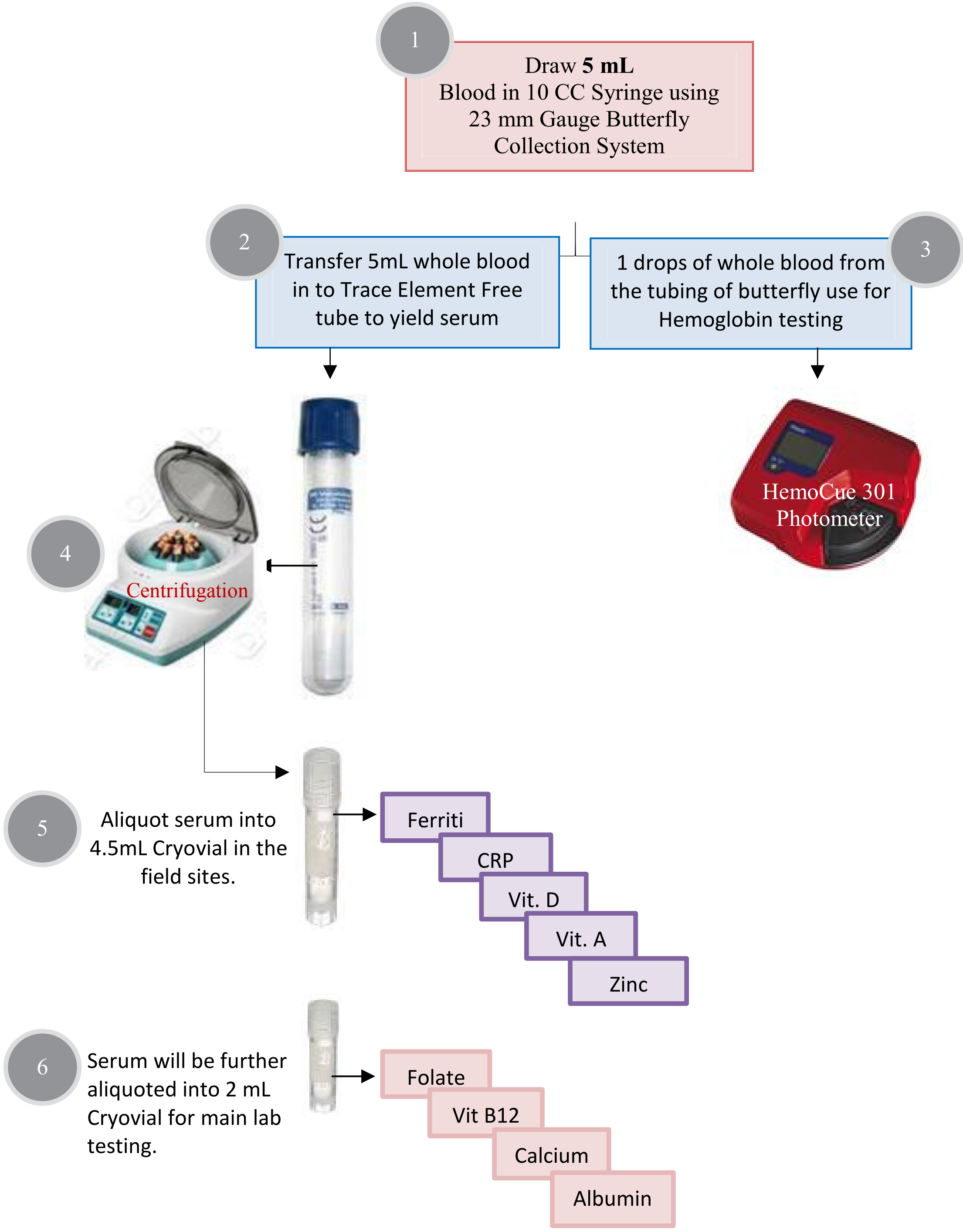
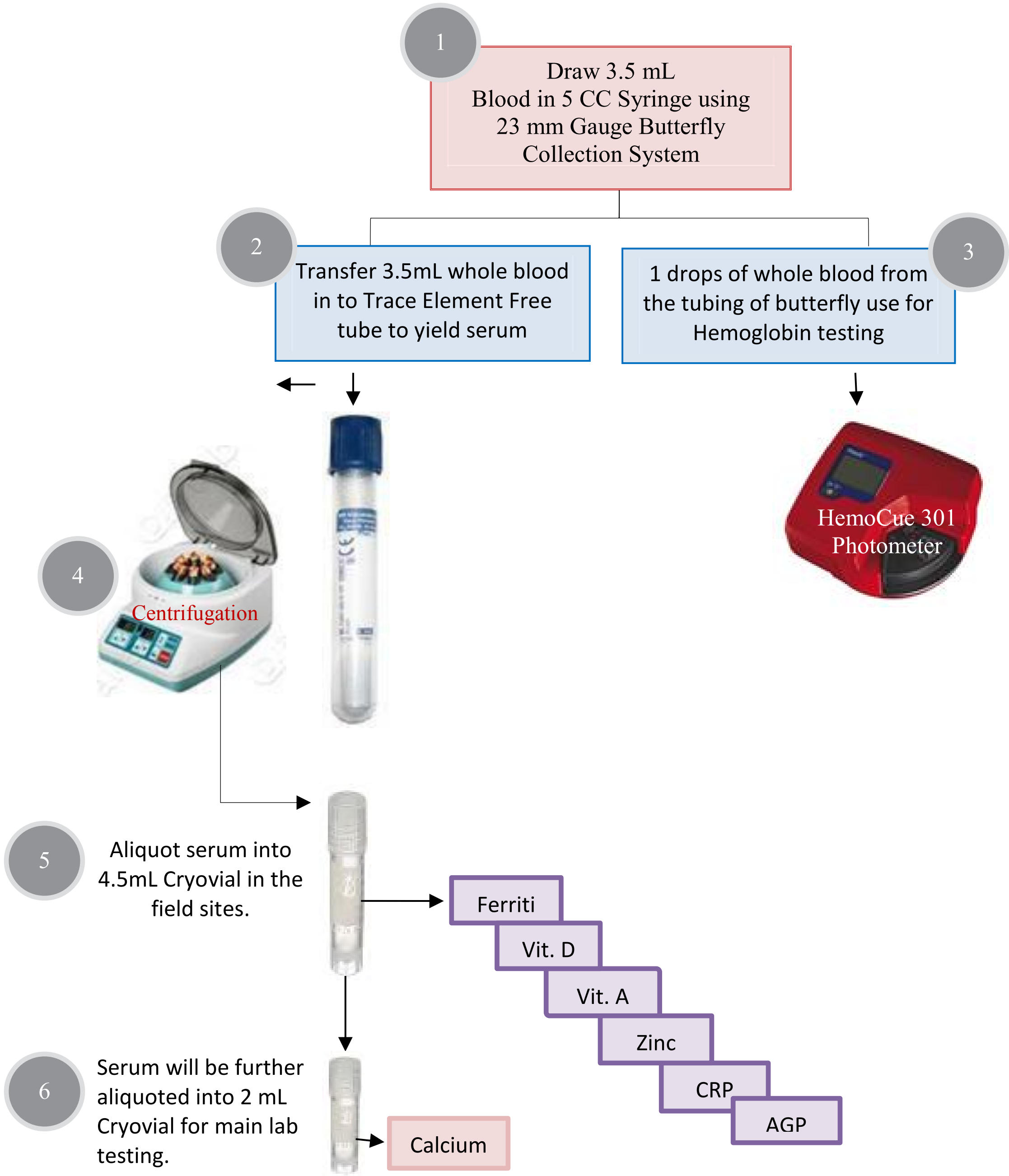


Figure 6 Blood Processing for Children 0-59 month of Age



Description of Samples Volumes Requirement for Micronutrient Assays

Table 8: Women of Reproductive Age (15-49 years)

S.#	Description of biochemical test	Serum (micro liters -µL)	Whole Blood (milliliters- mL)
1	Spot Hemoglobin levels using HemoCue	1-2 drops	Total volume of whole blood **5 mL**
2	Ferritin	200	
3	Vitamin A	200	
4	C Reactive Protein (CRP)	200	
5	Zinc	200	
6	Vitamin B12	200	
7	Folic Acid	200	
8	Vitamin D	200	
9	Calcium	200	
10	Albumin	200	

Table 9: Children (0-59 months of Age)

S.#	Description of biochemical test	Serum (micro liters -µL)	Whole Blood (milliliters- mL)
1	Spot Hemoglobin levels using HemoCue	1-2 drops	Total volume of whole blood **3.5 mL**
2	Ferritin	200	
3	Vitamin A	200	
4	C Reactive Protein (CRP)	200	
5	Alpha 1 Acid Glycol Protein (AGP)	200	
6	Zinc	200	
7	Vitamin D	200	
8	Calcium	200	

4.9.14 Collection of Urine Samples

The children (5-10 years of age) and women 915-49 years of age) selected in order to determine urine iodine levels. 3 mL of urine sample will collected in urine container. The collected urine sample will transferred in to 4.5mL cryo vials. All the samples from one cluster/district will be packed in one zipper bag.

Urine sample information indicating name of the participants, ID number, and sample ID number will be recorded in lab requisition forms and log sheets. The urine will be carried to the nearest AKUH, Clinical Lab Pick up point in cool box with frozen ice packs. Cool box temperature will be monitored by using a digital thermometer.

At collection points, urine samples will be packed in in a sturdy Styropform boxes with enough frozen ice packs and will be transported to Nutrition Research Laboratory, Karachi maintaining the cold chain at 2-8 Celsius. Urine samples received at the Nutrition Research Laboratory will be checked for properly checked and stored in the ultra-low freezer (-70ºC) until the analysis.

Urine Collection Supplies

- Urine Container 20mL
- Cryo vials 4.5 ml
- Disposable Sterile Pipette 3mL
- Nitrile Glove Powder Free
- Cooler with frozen ice packs
- Digital Thermometer
- Lab Requisition Form

Urine Collection Procedure

- Collect 3mL urine in sterile plastic container.
- Cover the urine container immediately with the lid being careful not to touch the inside of the container or the inside of the lid.
- Transfer 3 mL urine in 4.5mL Cryovial tube using a disposable transfer pipette.
- Remove gloves and wash hands.
- Store at -70 ºC temperature until the analysis.

The reason for the use of disposable cups and pipettes for urine collection is to prevent contamination from specimen to specimen and the possibility of contamination in cleansing the equipment. Disposable gloves are required to protect survey team members handling urine specimens from the potential of infectious diseases transmitted via urine.

- All urine collection and/or transport containers should be clean and free of particles or interfering substances.
- The collection and/or transport container should have a secure lid and be leak-resistant. Leak-resistant containers reduce specimen loss and healthcare worker exposure to the specimen while also protecting the specimen from contaminants.
- It is good practice to use containers that are made of break-resistant plastic, which is safer than glass.
- The container material should not leach interfering substances into the specimen.
- Specimen containers should not be reused.

Figure 7 Urine Processing

Collect 10-20mL Urine in urine sterile container

Transfer 3-5mL urine into 4.5ml cryovial from the urine container using sterile pipette.

4.9.15 Safety and Infection Control

It is important to follow safety and infection control procedures. All needles and sharps will be disposed-off in puncture resistant danger bins. Extra care will be made not to leave any needles or sharps in the enrolments household to prevent any kind of hazard. All filled sharp containers from the field sites will be transferred to the Regional Laboratory, to be disposed-off and incinerate as per their contaminated waste disposal policy

Practice universal precautions:

- Protect Yourself
- Wear gloves and a lab coat or gown when handling blood/body fluids.
- Change gloves after each subject or when get contaminated.
- Wash hands frequently.
- Dispose of items in appropriate containers.
- Dispose of needles immediately upon removal from the subject's vein. Do not break or recap.

If you stick yourself with a contaminated needle:

- Remove your gloves and dispose of them properly.
- Squeeze puncture site to promote bleeding.
- Wash the area well with soap and water.
- Clean with alcohol prep.
- Record the subject's name and ID number.
- Follow institutional guidelines regarding treatment and follow-up.

Protect the Subject:

- Place blood collection equipment away from subjects, especially children.
- Practice hygiene for the subject's protection. When wearing gloves, change them between each subject & wash your hands frequently. Always wear a clean lab coat or gown.

Bio-Hazard Waste Disposal:

- How will waste products, such as lancets, needles, syringes, be safely disposed?
- In all settings where specimens are collected and prepared for testing, laboratory and healthcare personnel should follow current recommended sterile techniques, including precautions regarding the use of needles, lancets, needles, syringes and other sterile equipment as well as guidelines for the responsible disposal of all biological material and contaminated specimen collection supplies. Some wastes associated with biological materials must be disposed of in special ways because they may have been contaminated with infectious organisms or agents. These wastes include; all sharps, e.g. glass implements, needles, lancets, syringes, blades, etc.
- All bio-hazard waste and puncture resistant container containing sharps are properly packed and sealed and are sent with the rider to regional labs to be disposed and incinerated by the housekeeping staff.

For disposal of these wastes:

- Place all biohazard wastes, except for sharps, directly into the red bag-lined medical waste boxes/puncture resistant danger bins.
- Place sharps in to labeled sharps containers which when three forth filled are sealed and sent for disposal and incineration by the housekeeping staff.
- When the red bag is three fourth filled seal the bag and notify assigned staff for pick-up.
- All biohazard sharps and waste must be incinerated.

Universal precautions:

- Conduct good hand washing technique prior to venipuncture.
- Assume that all human blood is potentially infectious for HIV, hepatitis, and other infectious agents.
- Practice Universal Precautions using Personal Protective Equipment such as gloves, and lab coats.
- Always use sterile, single-use, disposable supplies for sample collection.
- All danger bins from the field site will be submitted to the regional Labs to be disposed- off and incinerate as per their **contaminated waste disposal policy**.
- When working with needles and other “sharps”, be careful not to prick your finger.
- If injury occurs, wash injury with soap and water. If injury occurs, apply pressure to injury wound to curtail bleeding if necessary and apply a bandage.
- Report any injury involving sharps to Study Supervisor and report to your local Casualty Department for treatment and assessment.

4.9.16 Bio samples Transportation

The blood and urine will be collected from all provinces of Pakistan namely Sindh, Punjab, Khyber Pakhtoon Khawa (KPK), Baluchistan, Azad Jamu and Kashmir and Gilgit & Baltistan sampling and all the samples will be sent to AKU for biochemical analysis.

- ✓ The standard transportation procedure will be adopted for transportation of bio-samples for laboratory analysis of the proposed micronutrients.
- ✓ The safe deposition of samples according to the agreed protocol, the maintenance of the cold chain with standardized packaging material for rapid transportation of samples from field sites to AKU Karachi.
- ✓ As indicated previously, Nutrition Research Lab at AKU will undertake this laboratory analysis of micronutrients; we would adopt the extensive sample transportation system of Aga Khan University Hospital (AKUH) Laboratory pick up points all over the country and TCS courier service.

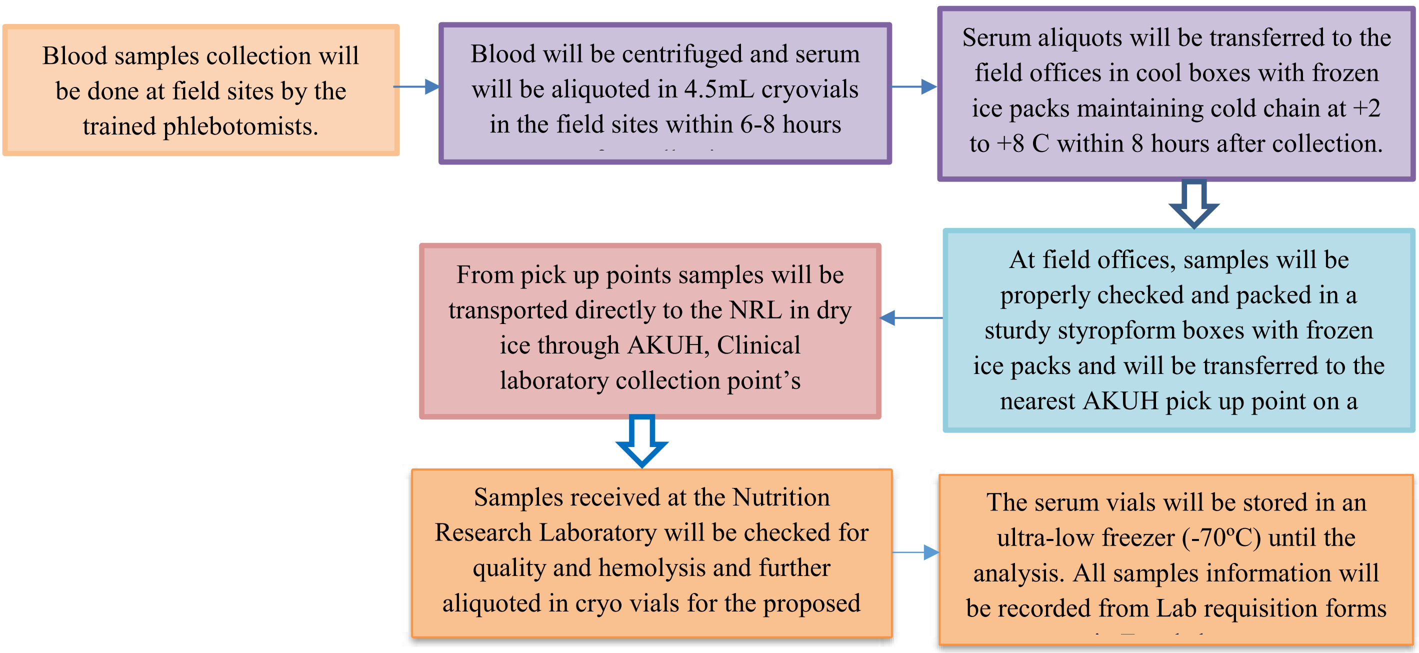
Satellite Laboratory Collection Points of the AKUH, Clinical Labs. Pakistan

As indicated previously, Nutrition Research Lab at the Aga Khan University will undertake this laboratory analysis of micronutrients; we would use the AKUH laboratory pick up points all over the country for biosamples transportation of the NNS Survey. The following are the addresses and contact details of the concerned laboratory pick-up points. Following safe deposition of samples at these pick up points according to the agreed protocol, the maintenance of the cold chain using dry ice and rapid transportation (by air) of specimens to the Nutrition Research Lab in Karachi will be the responsibility of the AKUH collection points.

All serum and urine samples will be transported in sturdy designated research coolers with ice packs maintaining temperature of 2-8 C from field collection to satellite AKUH collection points from where they will be transported in dry ice through AKUH collection point sample transportation system. The samples will be transported along with the all lab requisition form and log sheets separately of each subject in a plastic zip lock bag. The samples will be packed in special research lab marked styropform boxes and transported directly to main Nutrition Research Lab at AKU, Karachi.

4.9.17 Field Samples Processing and Transportation Mechanism

Figure 8: Samples processing and Transportation



4.9.18 Spot Hemoglobin Measurement in Field Site

Spot Hemoglobin will be measured using the HemoCue Photometer 301 in the field sites. 1-2 drop of whole blood for hemoglobin will be obtained from the tubing when using butterfly syringe for blood collection. Hemoglobin results values for every participating Child and Women will be recorded on the Lab Requisition Forms. This document provides instructions to ensure safe and accurate hemoglobin measurement using the HemoCue 301 system.

Table 10: Material and Equipment for HemoCue

Description	Unit	Qty
HemoCue 301 Photometer	Each	1
Microcuvette for 301	Btls	1/50each
HemoCue Cleaner	Each	1
AA Batteries	Pair	4
Sharp Bin	Each	1

4.9.19 Hemoglobin Testing Procedure

4.9.20 Introduction:

Hemoglobin is the protein molecule in red blood cells that carries oxygen from the lungs to the body's tissues and returns carbon dioxide from the tissues to the lungs. The iron contained in hemoglobin is also responsible for the red color of blood. Hemoglobin also plays an important role in maintaining the shape of the red blood cells. Abnormal hemoglobin structure can, therefore, disrupt the shape of red blood cells and impede its function and its flow through blood vessels.

The absorbance of whole blood is measured at Hb/HbO2 isobestic point. It is read by spectrophotometry at 506 and 880 nm to compensate for turbidity.

4.9.21 Equipment and reagents:

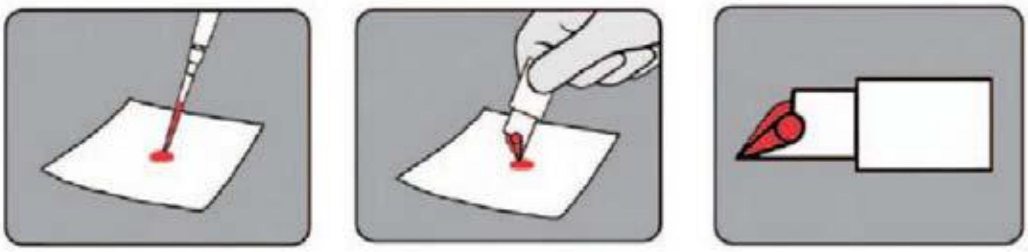
- HemoCue Hb 301 analyzer
- HemoCue Hb 301 microcuvettes
- 4 type AA batteries (1.5 V) and/or mains adapter
- Gloves
- Tissue or gauze
- Alcohol swabs
- Venous blood collection set (needles, syringe, sample tubes)

- Control solutions (Eurotrol Hb 301 control Low/Normal/High)
- HemoCue Cleaner swabs
- Pipette
- Parafilm

4.9.22 Procedure:

- Check the expiry date of the microcuvettes and the date of opening of the vial. If expired, do NOT use the cuvettes. Take a new batch of cuvettes that are not expired.

- Switch on the machine: Press and hold left button. The display is activated.
- Optronic unit is automatically checked.
- The display shows 3 flashing dashes: the analyzer is ready to use.
- Pull out the cuvette holder
- The most recent result is displayed
- Place a drop of blood onto a hydrophobic surface (e.g. parafilm), using a pipette.
- Fill the microcuvette in one continuous process. The correct amount of blood (10 µl) is drawn into the microcuvette. The microcuvette should be completely filled. Do NOT refill!!
- Wipe away any excess of blood on the outside of the microcuvette tip
- Check for air bubbles in the filled microcuvette. If present, use a new microcuvette



- Place the filled microcuvette in the cuvette holder (within 40 seconds after filling the cuvette!)
- Push the cuvette holder to its measuring position
- After 10 seconds the hemoglobin measurement is displayed
- Read and record the result on Lab Requisition Forms. Remove and discard the microcuvette in the appropriate bio-hazard container. Push the cuvette holder back into the instrument.

4.9.23 Quality control

The analyzer has an internal electronic self-test, to check the optronic unit. This test is performed every time the analyzer is switched on and at regular intervals when the analyzer remains switched on.
A daily quality control has to be done with the recommended controls:
Eurotrol Hb 301 control Low/Normal/High

4.9.24 Sample Requirement:

The HemoCue measures hemoglobin using capillary, venous or arterial blood. EDTA (purple top tube) is the recommended anticoagulant for venous or arterial blood. Venous or arterial blood may be tested directly from a syringe.
Note: Hemolysis or clotted samples are unacceptable for testing. Blood collected in sodium citrate (blue-stoppered tube), or in tubes containing a gel separator

4.9.25 Reporting results

In g/dl
Measuring range: 0 - 25.6 g/dl
The normal ranges are: (depending on altitude/region, check local data) o Male adult: 14 - 18 g/dl o Female adult: 12 - 16 g/dl o Newborn: 17 - 23 g/dl o Infants: 11 - 14 g/dl

4.9.26 Storage and stability

- Use the microcuvettes prior to expiry date
- Store the microcuvettes at 15 - 40°C. Do NOT refrigerate.
- Keep the vial closed. When opened, the microcuvettes are stable for 3 months. Write down the date of opening on the vial. An unopened vial can be stored for a shorter period (6 weeks) between -18°C - 50°C. Store the analyzer at 0-50°C. Operate the analyzer at 10 - 40°C, 5 - 90% non-condensing relative humidity.

4.9.27 Maintenance

- Check that the analyzer is turned off
- Clean the cuvette holder every day with alcohol or mild detergent (check operating manual)
- Clean the optical unit once a month with a HemoCue cleaner (cleaning swab). Clean also after 50 measurements or when an error message is shown. (check operating manual) Wait for 15 minutes before replacing the cuvette holder.
- Clean the cover with alcohol or mild detergent.

4.9.28 Causes of error

- Insufficient or non-uniform filling of the microcuvette (Rouleaux, agglutination): repeat the test
- Air bubbles in the microcuvette
- Incorrect mixing of the venous/arterial blood
- Excessive squeezing of the finger when collecting capillary blood
- High humidity (use individually wrapped microcuvettes)
- Troubleshooting: (see operating manual for more troubleshooting)

GB/US Troubleshooting Guide

If you are unable to resolve the problem by following this Troubleshooting Guide, please contact your local HemoCue distributor or HemoCue AB. The analyzer should be cleaned as recommended under "Maintenance" prior to service or disposal. Consult local environmental authorities for proper disposal. The analyzer has no serviceable parts.

Symptom	Explanation	Action
The analyzer shows an error code.	May be a temporary fault.	Turn off the analyzer and turn it on again after 30 seconds. Take a new microcuvette and repeat the measurement. If the problem continues, see specific error code below.
E00	No stable endpoint of the measurement is found within the time range. 1. The cuvette is faulty. 2. The circuit board is out of order.	1a. Check the expiration date for the microcuvettes. 1b. Take a new microcuvette and repeat the measurement. 2. The analyzer needs service. Contact your distributor.
E01–E05	1. Dirty optronic unit or faulty electronics or optronic unit.	1a. Turn off the analyzer and clean the optronic unit as described in the maintance section. 1b. The analyzer needs service. Contact your distributor.
E06	1. Unstable blank value. The analyzer might be cold.	1. Turn off the analyzer and allow it to reach room temperature. If the problem continues, the analyzer needs service. Contact your distributor.
E07	1. The battery power is too low.	1a. The batteries need to be replaced. Turn off the analyzer and replace the batteries, 4 type AA. 1b. Use the power adapter.
E08	The absorbance is too high. 1. Light blocking item in the cuvette holder	1a. Check that the analyzer and microcuvettes are used according to the HemoCue Hb 301 operating manual and instructions for use. 1b. The analyzer needs service. Contact your distributor.

4.9.29 Quality Assurance (QC) of the Laboratory Biochemical Analysis

All biochemical analyses of the nutritional biomarkers for the NNS Survey will be conducted in Nutrition Research Lab (NRL) at Aga Khan University, Karachi, the NRL lab is well equipped with standard laboratory equipment, including: HPLCs with UV/Vis and photodiode array detectors, Atomic Absorption Spectrometer, Automated Immunoassay chemistry analyzers (Cobas c311, Cobas e411, Diasorin and Beckman Access 2), in addition to this the NRL lab have analytical balances, high speed centrifuges, ultra-low freezers, refrigerators to store bulk volumes of biosamples aliquots. Instrument operating, service, and calibration and maintenance records are maintained for audit purpose.

Sample analysis, quality assurance depend on mainly on replicate analysis and use of certified reference material and commercially available controls as factors of precision and accuracy, respectively. Replicates are the primary determinants of variance. For in-house quality control the lab uses quality control materials: PreciControl Anemia 1, 2 and 3, (Roche Diagnostics GmbH, D-68298 Mannheim, Germany) for ferritin, folate and vitamin B12. Precinorm Protein and, Precipath Protein (Roche Diagnostics GmbH, D-68298. Mannheim, Germany) for CRP and AGP 3. Bi - level serum toxicology and vitamins control (UTAK LABORATORIES, INC, 25020 AVENUE TIBBITTS, VALENCIA, CA 91355).

As per the lab protocol, at least 1-2% of the NNS Survey biosamples will be analyzed randomly in replicates to evaluate analytical variance and to calculate the Percent Coefficient of Variation (%CV) for the intra-assays and the inter-assays for each QC sample in the lab. These procedures will be prudently conducted by the experienced lab technologist follow the standard laboratory protocols and lab internal quality assurance procedures. An aliquot of the matching analyzed samples will be shipped to abroad any accredited testing laboratory for comparison of results with independent methodologies to evaluate quality assurance of the NNS survey biochemical analyses.

I. References:

1. HemoCue Hb 201^{+} Operating Manual HemoCue, Inc. Lake Forest, CA

4.9.30 Section E: Phlebotomy Guideline by WHO

For more detailed information refer to below link OR Annex G:
http://apps.who.int/iris/bitstream/10665/44294/1/9789241599221_eng.pdf

4.10 General Methodology for Sample Collection Transportation and Field Analysis for NNS

In PCRWR the sample receiving and processing is as per protocols developed in NWQL technical manual for ISO-17025 (based on 22nd Edition of Standard Methods for Examination of Water and Waste Water, American Public Health Association, APHA, 2012).

4.10.1 Sample Collection and Preservation

Water samples for physico-chemical analysis are collected in polystyrene bottles of 0.5 and 1.5 liter capacities. Before collecting the samples, the bottles are washed properly and rinsed thoroughly several times with water. Nitric Acid (HNO_3) and Boric Acid are added as preservatives in the sampling bottles for trace elements and nitrate nitrogen, respectively before going to field.

The water samples for microbiological analysis are collected in clean, sterile plastic bottles (200 ml). The care must be taken to ensure that no accidental contamination occurs during sampling. Samples are taken from those taps, which are not leaking between the spindle and gland to avoid outside contamination and also do not have any pipe extensions. The samples were kept cool and in the dark while transporting to the laboratory.

Type –A: This sample type is for microbiological analysis and required sampling in pre-sterilized plastic bottles of 200ml

Type –B: 2 ml/liter Nitric Acid (HNO_3) as preservative for trace elements i.e. Arsenic and Iron

Type –C: This type is for the analysis of Nitrate in drinking water 1 ml of 1 molar Boric Acid solution will be required for the preservation of 100 ml sample it mean that if you have to collect sample in 0.6 liter bottle than 6 ml boric acid as preservative will required to be added in the sampling bottle before taking sample.

Type –D: No preservative for other water quality parameters like Hardness, TDS and Fluoride.

Following procedure and precautionary measures were followed while collecting samples from the field.

Tap Water

Un-rusted taps were selected for collection of water samples. These taps were properly cleaned and allowed to flow for a few minutes before collecting the sample.

Tube well Water

The water samples from tube wells were collected after allowing them to flow for at least 10 minutes to get representative sample of the groundwater. The depth of groundwater level was also recorded and the location of the tube well was properly marked on the topographic survey sheet.

Distribution Network Water

The water samples from the distribution network were collected from the source of supply (as closely as possible) to minimize the effects of pollution in the distribution system and from consumers end to evaluate the actual quality of water being used. All water sample containers were filled slowly to avoid turbulence and air bubbles after flushing the system for sufficient time.

Hand Pump/Dug Well Water

Water samples were collected from hand pumps or dug wells after purging of the hand pump or well. The purging was carried out by making one stroke for every foot of depth (a hand pump or dug well having 30 feet of depth, needs 30 strokes for its purging).

Stream Water

Water samples will be collected from the center by standing in the middle of the stream. Care will be taken to keep the bottle well above the bed of the stream to avoid unwanted bed material going into the sample.

Spring Water

Water samples will be collected directly from the spring in sterilized sampling bottles for microbiology and bottles used with or without preservatives for other water quality parameters.

Dam, River and Lake Water

It is difficult to obtain a truly representative sample when collecting surface water samples. Sampling point will be selected carefully to avoid any kind of debris in the water. For sampling from surface water sampling bottle will be submerged up to a depth of about 20 cm with the mouth facing slightly upwards. Bottle's mouth faced towards the current and then filled. The bottle then be capped carefully.

Sample Labeling Strategies:

Sampling Performa's should be filled with detailed information about the sampling location and sample. The Sampling bottles should be labeled with sample type (A, B, C, D), date and sample ID with undeletable ink. Sample ID for monitoring purpose are marked on the basis of actual sampling visit sequence of various sites.

Sampling team should complete the questionnaire about the sampling location and sample and anything unusual around the sampling location should be noted down. The sample bottles should be labeled with a permanent marker and deliver the sample to laboratory or to a designated drop-off location for the laboratory within required holding time.

Sample Transportation to PCRWR Laboratory

The sample collected for the microbiological analysis must be kept in iceboxes after collection. The iceboxes must have enough coolant which can maintain the temperature of the samples at about 4^{o}C up to 6-12 hours until the samples reached in the laboratory.

The samples for chemical parameters would be collected with preservatives and transported to the PCRWR laboratory within 4-5 days after sampling the samples should transported in wooden boxes to avoid any damage during the transportation.

Field Analysis of Microbiological parameters

Field analysis of microbiological samples would be preferable because to carry samples to the laboratory with controlled conditions and stipulated time is difficult.

The field testing can also be performed through Petri-films or compact dry plate, which would require field incubators. The range of temperature of the incubator should be 15-50ºC. The incubators must be potable with enough battery backup.

Testing of Total Coliforms and E-Coli Using 3M Petrifilm Count Plates

4.10.2 Description:

- 3M Petrifilm Count Plates are used to identify both *E Coli* and other Coliforms simultaneously.
- These are simple testing kits which will give results in just 24 to 48 hours.
- Petrifilm plates are simple, ready and provide the most cost-effective, convenient and reliable method for testing water samples.

4.10.3 Procedure:

Inoculation

Inoculate and spread each Petrifilm plate before going on to the next plate.

i) If a Petrifilm plate pack has been stored in the refrigerator, let the package come to room temperature before opening it. This step prevents condensation from forming inside the package.

ii) Place the Petrifilm plate on a level surface, with the gridded side down. Lift the top film (Figure-9).

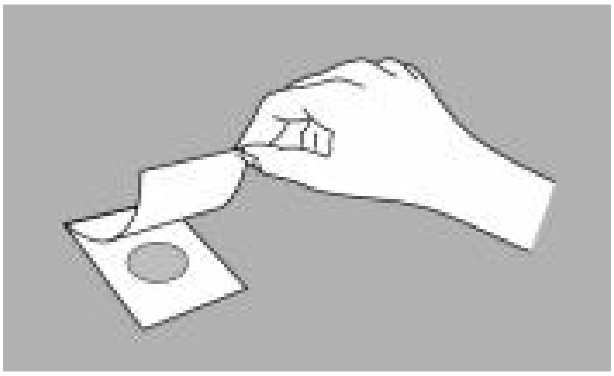


Figure 9: Step one lifting of the top film

iii) With pipette perpendicular to the Petrifilm plate, place 1 mL of sample onto the center of the bottom film (Figure-10). If necessary, samples can be diluted with distilled water, liquid culture medium, or buffers with pH between 6.6 and 7.2.

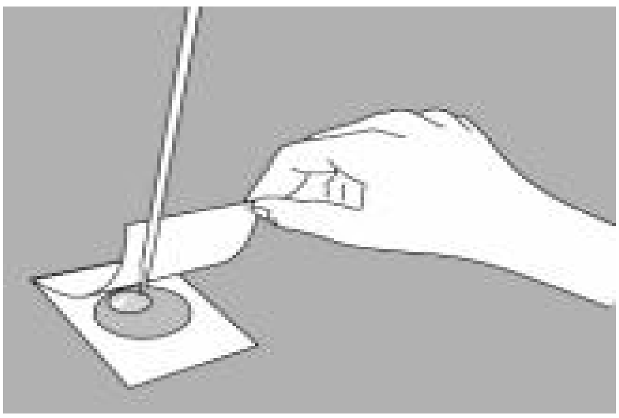


Figure 10: Step two placing sample on bottom film

iv) Roll back the top film onto the bottom film. Do not drop the top film down (Figure. 11).

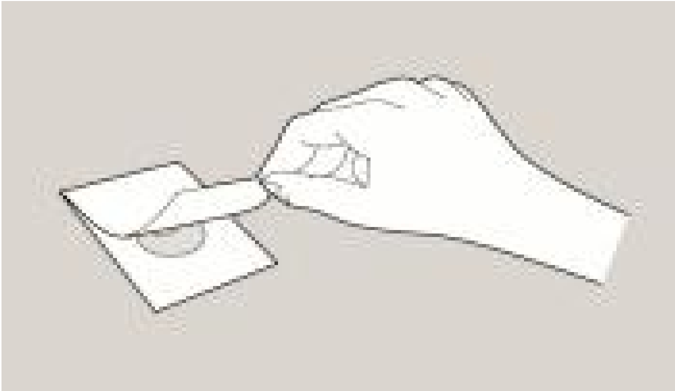


Figure 11: Step three Rolling back top on bottom film

v) With the flat side down (not the side with the circular ridge), place the spreader on the top film over the inoculums (Figure-12).

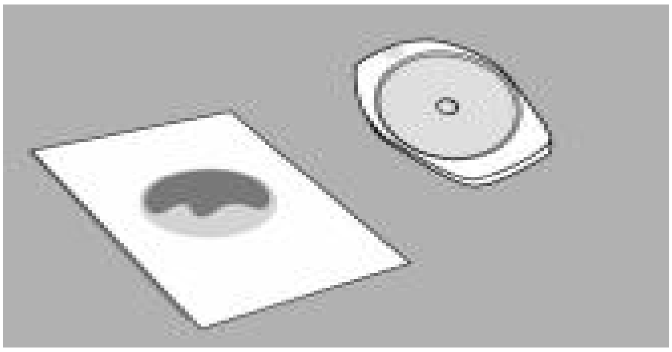


Figure 12: Step four placing the spreader on inoculums

vi) **Gently** apply pressure on the spreader to distribute the inoculums over a circular area. Do not twist or slide the spreader Figure-13.

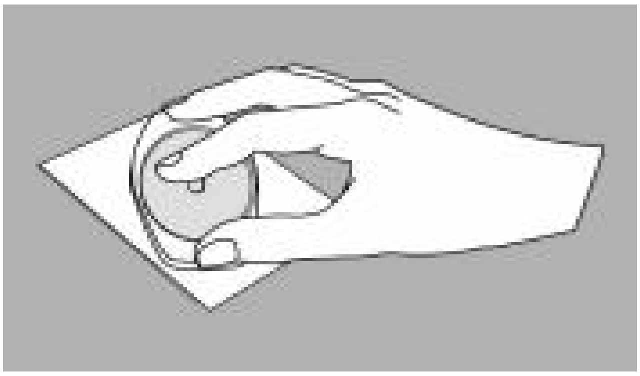


Figure 13: Step five Applying pressure on the Spreader

vii) Lift the spreader. Wait at least 1 minute for the gel to solidify as in Figure-14

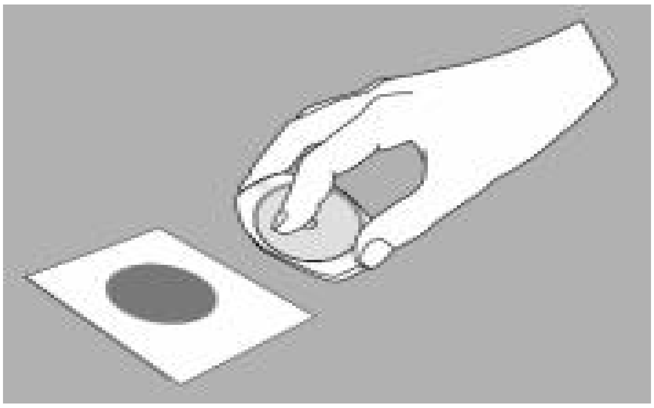


Figure 14: Step six lifting the spreader and solidification on media

viii) After inoculation Petrifilm is incubated at 35 ± 0.5 °C for 24 hours. Incubate plates with the gridded side down in stacks of up to 20 plates.

ix) Colonies on Petrifilm plates can be counted on a standard colony counter or other light source (Figure-7). Bacterial colonies on Petrifilm plates are red or blue because of the indicator dyes in the medium.

x) All the red colonies with gas after 24 or 48 hours of incubation are Total Coliforms. All the blue colonies with gas after 24 or 48 hours of incubation as *E-Coli*. Results are reported as CFU/ml.

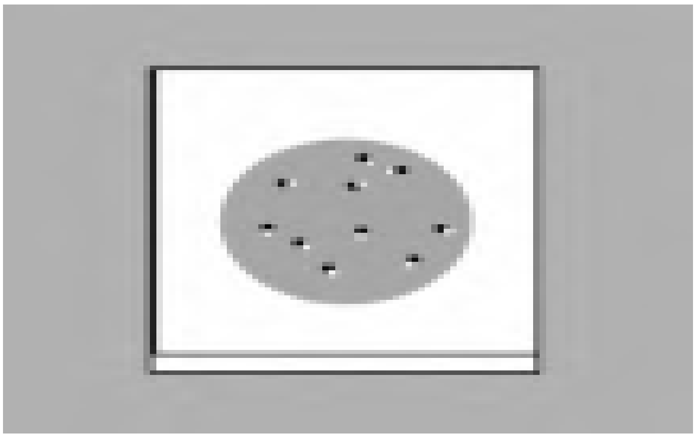


Figure 15: Colonies on the Petrifilm after incubation

Disinfection before disposal

Petrifilm plates can be disinfected by autoclaving or by soaking in 20% bleach for 1 hour. Then, they can be placed in the trash.

Precautions:

- Use sterile technique when handling Petrifilm plates.
- Disinfect the work area by wiping thoroughly with alcohol or other disinfectant before and after use.
- Used Petrifilm plates may contain viable organisms. Do not open the plates unnecessarily.

4.11 Anthropometry

4.11.1 Introduction

This section is intended for all National Nutrition Survey field staff and outlines the required steps that need to be taken during MICS data collection in order to accurately measure and weigh children. It is easy to make errors in measurements when not being careful. Measurers in particular should carry these instructions with them in the field and review them regularly to make sure they are always following the correct procedures. Supervisors should also frequently refer to this section in the field when observing the work of measurers.

Responsibilities of Field Team Members during the Collection of Anthropometric measurements

Measurers: Taking anthropometric measurements of children is the main responsibility of the team measurer and requires that he or she follows the procedures specified in this section and that no steps in the procedures are omitted. Measurers will be assisted by another trained team member however it should be emphasised that the measurer will hold the overall responsibility for determining final measurements and making sure they have been properly recorded on the under-five questionnaire.

The measurer is also responsible for carrying and taking care of the equipment used for anthropometric measurements and reporting to the supervisor immediately if any of the equipment is malfunctioning.

Interviewers, field editors, and field supervisors: Two trained people are always required to measure a child's height and length; a measurer and an assistant. The assistant may be an interviewer, field editor, or a field supervisor as long as they have undergone the MICS anthropometry training. The measurer holds the child and reads the measurements while the assistant helps hold the child and records the measurements on the questionnaire.

Under no circumstances should an untrained person such as a mother or other caregiver of the child assist in taking the length or height measurement. It is however recommended that a mother or caretaker be near to the child to comfort them and assist in putting the child at ease so that the child can be measured.

Field editors: Editors will be expected to check the recorded anthropometry measurements on each completed Questionnaire for Children under Five as part of their routine editing work. Editors should pay special attention to the values to make sure they lie within the ranges specified in Table 1 at the end of this Manual (and in the Instructions for Supervisors and Editors). If a value falls outside the acceptable range, the editor should ask the measurer to revisit the household, re-measure the child, and check that the child's age has been correctly recorded. Please note that measurements outside the ranges given in Table 1 are possible, but incredibly rare (no more than a few per survey).

Field supervisors: Supervisors will be responsible to coordinate the work of the measurer by making sure he/she knows where to find the households that interviewers are conducting interviews in and to know approximately how many children and at what time the measurer should visit the household. The supervisor is also expected to regularly observe the measurer and assistants performing anthropometric measurements. The supervisors will be responsible for ensuring that measurements are taken following the exact steps and procedures outlined in this Manual. In situations where measurers are routinely making errors in taking and/or reading measurement, in manipulating children and/or equipment, and in reporting the information on the questionnaire, the supervisor should consult with the fieldwork director and/or survey coordinator when necessary.

General Precautions for Measurers and Assistants

Placement of the measuring board and electronic scale

Measurers should begin to observe possible places where the electronic scale and board can be positioned as soon as they walk into a sample household. They should be selective about where the measuring board and electronic scale is placed. During daylight hours, it is best to measure outdoors. If it is cold, rainy, or if too many people congregate and interfere with the measurements, it may be more comfortable to weigh and measure a child indoors. Make sure there is adequate light and ensure you place the equipment on a flat and even surface.

When to weigh and measure

Weights and heights of all eligible children age under five living in the household will be measured after all the Questionnaires for Children under Five are completed. However, if some respondents or children have to leave the household before all questionnaires in the household have been completed, or if a call-back has to be made to interview another respondent, it is best to complete the measurements of those children who are present. Do not weigh and measure at the beginning of the interview, that is, as soon as you enter a household, since this would likely be perceived as overly intrusive.

It is the supervisors' responsibility to coordinate the work of the measurer so that the measurers visit households at the convenient time before the interviewers leave to their next household. If households within a cluster are scattered then transport and logistics issues need to be well planned. Good planning will help to ensure that measurers are not wasting time waiting in one household for the interviews to finish, while other interviewers have completed their interviews and are waiting with the respondents and children for the measurer to arrive.

Weigh and measure one child at a time

In cases when there is more than one eligible child of the same mother/caretaker, complete all the questionnaires for the mother/caretaker, and then weigh and measure all her/his children one after the other making sure not to confuse questionnaires. If there is more than one mother/caretaker with children under 5 in the same household, care should be taken over the timing and the organization of the measurements, and good judgement be applied in such cases. If it is considered that leaving all of the measurements until after the completion of all questionnaires will cause confusion and errors, then measurements of children by the same mother/caretaker should be conducted once the questionnaires administered to that mother/caretaker have been completed, and then the measurer moves on to children of the next mother/caretaker. However, in reality, it is often the case that interviewing all mothers/caretakers first, and measuring all children at the end is more practical – use this option if it will not cause confusion. It is very important to complete both the weight and the height/length measurements for one child before continuing with the next eligible child.

Controlling and taking care of the child

When children are weighed and measured, the measurer and assistant must take care to gently control the child. The strength and mobility of even very young children should not be underestimated. Needless to say, a gentle but firm approach is necessary. Do not apply excessive force on children's limbs to get measurements. The measurer's own sense of calm and self-confidence will be felt by the mother and the child.

When a child comes into contact with any measuring equipment, that is, a measuring board or electronic scale, children must be held carefully so they do not trip or fall. Children should never be left alone with a piece of equipment; physical contact with the child, except for the few seconds while taking his or her weight, should always be maintained.

Measurers and assistants should keep objects out of their hands and pens out of their mouth, hair, or breast pocket when a child is being weighed and measured so that the child will not get hurt due to carelessness. When the pen is not being used it should be placed in the equipment pack, pen case, or on the survey form. Measures and assistants should not have long fingernails and should remove rings and watches before they weigh and measure children to prevent them from getting in the way or harming the child. No member of the field team should smoke when in a household or in the process of taking measurements.

Coping with stress

Since weighing and measuring requires touching and handling children, normal stress levels for this part of the survey work is higher than for where only verbal information is collected.

Measurers should explain the weighing and measuring procedures to the mother and, to a limited extent, the child, to help minimize possible resistance, fear, or discomfort. It should be determined if the child or mother is under so much stress that the weighing and measuring must stop. Remember, young children are often uncooperative; they tend to cry, scream, kick, and sometimes bite. If a child is under severe stress and is crying excessively, attempts to calm the child should be made for example by returning the child to the mother for a moment before proceeding with the weighing and measuring.

If a child is terrified and cries too much this can have a big impact on the other children of the household that need to measured. It is better to leave the distressed child to calm down and to come back later to try and weigh and measure the child again. In some cases it may be possible to weigh and measure a distressed child after he or she has seen other children such as his or her siblings in the household being measured.

Do not weigh or measure a child if:

- The mother refuses.
- The child is too sick or too distressed.
- The child is physically deformed, which will interfere with or give an incorrect measurement. To be sensitive to the feelings of such a child, its parents, and other children, you may want to measure the child and make note of the deformity on the questionnaire.

Take good care of the equipment and keep it clean

The equipment needs to be cleaned on a very regular basis as it easily becomes dirty. As a courtesy it is important to clean the wooden height boards in between children as the feet and head are placed on the same spot of the wooden board depending on the age of the child.

Strive for improvement

People can become very skilled in taking measurements if they strive for improvement and follow every step of every procedure the same way every time. The quality and speed of measurements will improve with practice. Do not take these procedures for granted, even though they may seem simple and repetitious and do not omit any of the steps.

Hygiene

Do not handle children without clean hands. Likewise, cleaning hands after handling a child is recommended. It is advisable to carry wet napkins/wipes, an alcohol-based hand gel, or similar to clean hands before and after handling a child. There will be households in which soap and water is not available and others where measurement without cleaning hands will not be allowed.

Measuring a Child's Weight: Summary of Procedures

The Seca 874 U Electronic Scale

During MICS data collection children should only be weighed using the Seca 874 U Scale. If for any reason the scale is not working during field work then the measurer should immediately inform the team supervisor who will contact the fieldwork director to request a new scale. It is highly recommended that teams carry a back-up scale, so that fieldwork is not interrupted due to problems with one scale.

Setting up the scale for use

- To turn on the scale, carefully turn it over so that the base is accessible. Open the battery compartment and insert the supplied batteries. To activate the power supply, push the switch located in the battery compartment in position “ON”.

- Scales should always be placed on a hard, level surface (wood, concrete, or firm earth). Soft or uneven surfaces may cause errors in weighing.
- The scale will not function correctly if it becomes too warm or too cold. It is best to use the scale in the shade, or indoors. If the scale becomes hot and does not work correctly, place it in a cooler area and wait 15 minutes before using it again. Make sure to check the surface if the scale for any reason has been left in direct sunlight, as the black surface can become extremely hot and easily burn bare feet. If it becomes too cold, place it in a warmer area.
- The scale must adjust to changes in temperature. If the scale is moved to a new site with a different temperature, wait for 15 minutes before using it again.
- It is a sturdy yet sensitive electronic piece of equipment. The scale must be tested every single day of fieldwork. This is best done using a labelled standard weight of 2.5 – 5.0 kg. This can be purchased locally, but must be tested initially to ensure that the indicated weight is accurate. Record the results of the daily test of the scale, including the date and weight.
- Using other types of standard weights is possible, but is not recommended. Some surveys have in the past used filled water bottles for testing, but as water or other liquids evaporate, this technique is flawed. Sand is a viable alternative, but only if labelled weights are not available.
- In addition, it is recommended that the tared weight function is tested.
- In reference to the scale's minimum and maximum operating temperatures, it is advisable to test the scale before every measurement when the scale is moved and operated in extreme weather conditions.
- Actual calibration cannot be done in the field, but only by a technician. Therefore the scale should be immediately replaced if readings are off.

Switching off the scale

The scale switches off automatically;

- After 3 minutes in normal mode or
- After 2 minutes, if the mother-and-baby function is switched on.

Maintaining and storing the scale

Always handle the scale carefully:

- Do not drop or bump the scale.
- Do not weigh loads totaling more than 150 kilograms.
- Protect the scale from excess moisture or humidity.
- Do not use the scale at temperatures below 10º C or above 40º C. Test the scale if transported or used under such circumstances.

To clean the scale, wipe surfaces with a damp cloth. Never put the scale into water.

Do not store the scale in direct sunlight or other hot places.

The Seca 874 U scale is powered exclusively by batteries. 120,000 weighing operations can be performed with one set of batteries. The scale uses four type AA 1.5 V batteries that are easily replaceable.

Preparing the child for weighing

Explain to parents/caretakers that the child needs to remove outer clothing in order to obtain an accurate weight. A wet diaper, or shoes and jeans, can weigh more than 0.5 kg. Babies should be weighed naked; wrap them in a blanket to keep them warm until weighing. When using the **2 in** 1 or tared weighing described below, the adult can be weighed holding a blanket, which he/she can then wrap around the naked baby during measurement. Older children should remove all but minimal clothing, such as their underclothes.

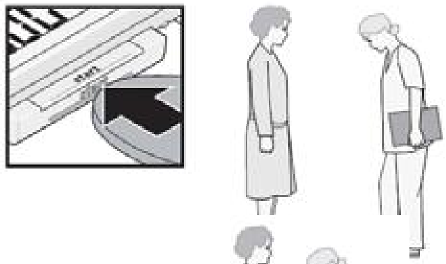
If it is too cold to undress a child or if the child resists being undressed and becomes agitated, please weigh the clothed child, but code in the questionnaire (AN3A) that the child could not be undressed to the minimum and take a note of the circumstances.

Weighing a child that is less than 2 years old (tared weighing)

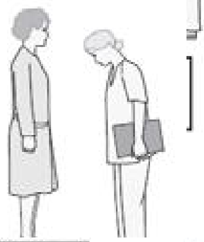
The **2 in 1** function enables the body weight of infants and young children to be determined. The child is held in the arms of the mother/caretaker (or another adult if necessary).

(1) Measurers:

- Switch on the scale with no weight applied.
  Wait until **0.0** appears on the display

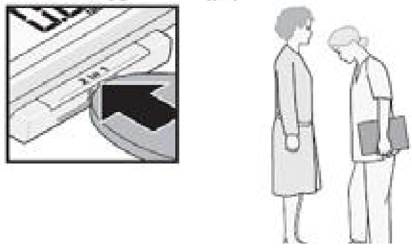


- Ask the mother/caretaker to step onto the scale.
  The weight is displayed.
  <u>Note</u>: The person being weighed on the scale must stand very still.



(2) Measurers:

- Press the **2 in 1** key.
  The weight is stored. and the word **NET** appear on the display.



- Ask the mother/caretaker to hold the first baby while standing on the scale and to try not to move.
- Wait until the weight **0.0** display and the message **HOLD** are no longer flashing.
- Read out the baby's weight to the assistant.
- Confirm the correct weight has been recorded.
- Ask the mother to step off the scale with the baby.
- The baby's weight remains displayed.
- The adult's weight remains stored. A new child measurement is automatically taken as soon as any weight is placed on the scale again.
- You can therefore take measurements of other babies in the same way with the same adult. You do not need to reactivate the **2 in 1** function or switch the scale off and on again between measurements. It is important that this person's weight does not change (e.g. by taking off a garment). If no measurements have been taken for two minutes, the **2 in 1** function and the scale automatically switch off and the process needs to begin again.

After each child's weight has been taken, the measurer reads out the value on the display of the scale and the assistant repeats back the value. If the measurer confirms this is correct the assistant records the value on the questionnaire in AN3. The measurer should check the weight that has been recorded after the weight measurement of each child has been completed.

Weighing a child that is 2 years or older

If the child is 2 years or older and willing to stand still, weigh the child alone.

- Explain to the child that they will need to step on the scale alone and stand very still. Communicate with the child in a sensitive, non-frightening way.
- **Measurer:** Switch on the scale with no weight applied.
- Wait until the display shows before asking the child to step on the scale.
- Ask the child to stand in the middle of the scale, feet slightly apart and to remain still until the weight appears on the display. Do <u>not</u> hold or support the child as this will interfere with the measurement.
- Once the value is stable for about 3 seconds, the display is retained. This avoids the display jumping around as a result of the child's movements.

- If the child jumps on the scale or will not stand still, you will need to use the tared weighing procedure instead (please see above).
- Read out loud the child's weight from the display.
- **Assistant**: Repeat the weight that has just been called out.
- **Measurer:** Confirm if this is the correct weight. If it is correct then the assistant will record the weight on the questionnaire.
- **Assistant**: If measurer confirms, record weight in AN3.
- **Measurer:** Check the weight recorded in AN3 to confirm that it matches the weight that was on the display.
- The child can then leave the scale.

NOTE:
Even though the displays of the Seca 874 U scales show two decimals, the last decimal is set to always show. To be consistent with the corresponding question (AN3) in the Questionnaire for Children under Five, the scales provided by UNICEF have a sticker on the display facing the measurer, allowing the measurer to see only the first decimal of the measurement. Two decimals are shown on the display facing the child.

4.11.2 Measuring a Child's Height: Summary of Procedures for when a child is over 2 years of age

(1) **Measurer or assistant:** Place the measuring board on a hard flat surface against a wall, table, tree, staircase, etc. Make sure the board is stable. If the only level surface available to place the board does not have a steady structure against where to lean it, and there are no sturdy pieces of furniture that can be moved behind it, have an adult stand behind the board and provide the support for it not to tip over.

(2) **Measurer or assistant:** Ask the mother/caretaker to remove the child's shoes and socks. Also ask, if necessary, the mother to remove any hair accessories that would interfere with the height measurement and add to the child's height. Then ask her/him to walk the child to the board and to kneel in front of the child.

(3) **Assistant:** Place the questionnaire and pen on the ground (Arrow 1). Kneel with both knees on the child's right side (Arrow 2).

(4) **Measurer:** Kneel on your right knee only, for maximum mobility, on the child's left side (Arrow 3).

(5) **Assistant:** Place the child's feet flat and together in the centre of and against the back and base of the board. Place your right hand just above the child's ankles on the shins (Arrow 4), your left hand on the child's knees (Arrow 5), and push against the board. Make sure the child's legs are straight and the heels and calves are against the board (Arrows 6 and 7). Tell the measurer when you have completed positioning the feet and legs.

(6) **Measurer:** Tell the child to look straight ahead at the mother if she is in front of the child. Make sure the child's line of sight is level with the ground (Arrow 8). Place your open left hand on the child's chin. Gradually close your hand (Arrow 9). Do not pinch the jaw. Do not cover the child's mouth or ears. Make sure the shoulders are level (Arrow 10), the hands are at the child's side (Arrow 11), and the head, shoulder blades, and buttocks are against the board (Arrows 12, 13 and 14). With your right hand, lower the headpiece on top of the child's head. Make sure you push through the child's hair (Arrow 15).

(7) **Measurer and assistant:** Check the child's position (Arrows 6-14). Repeat any steps as necessary.

(8) **Measurer:** When the child's position is correct, read and call out the measurement to the nearest 0.1 centimetre. Remove the headpiece from the child's head, your left hand from the child's chin and support the child during the recording.

(9) **Assistant:** Immediately record the measurement in AN4 and show it to the measurer. Alternatively, the assistant could call out the measurement and have the measurer confirm by repeating back.

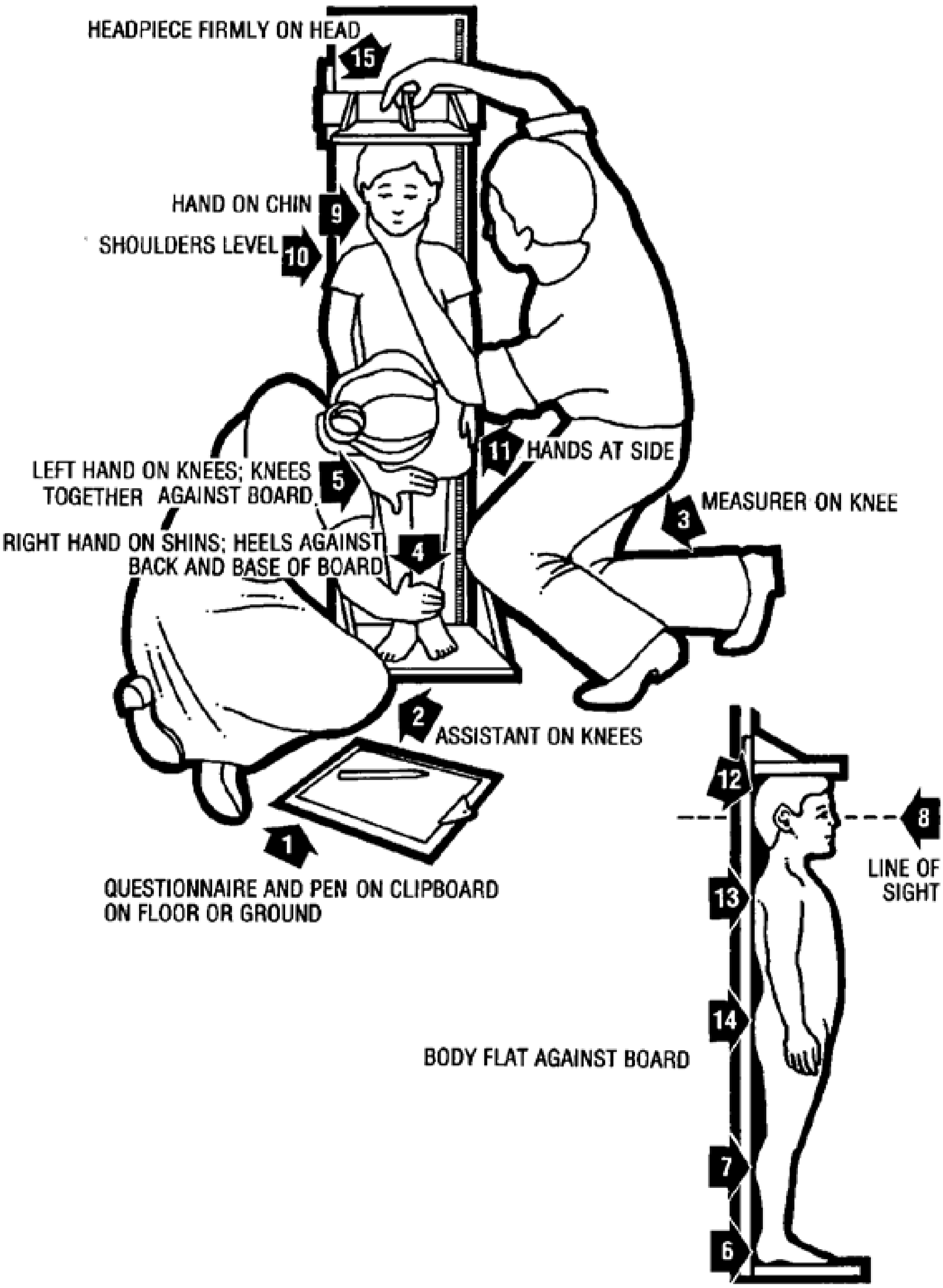
(10) **Assistant:** Record in AN4A whether the child was measured lying down or standing up.

(11) **Measurer:** Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to cancel and correct any errors.

<u>NOTE:</u>

If the interviewer is not confident in the precision of the child's age (over age 2), please take measurement as described above. If the child's height is measured to less than 85 cm, you must instead measure the child's length.

Figure 16 Measuring a Child's Height



4.12 Measuring a Child's Length: Summary of Procedures for when a child is under 2 years of age

Measurer or assistant: Place the measuring board on a hard flat surface, such as the ground, floor or a steady table.

(1) **Assistant:** Place the questionnaire and pen on the ground, floor or table (Arrow 1). Kneel with both knees behind the base of the board, if it is on the ground or floor (Arrow 2).

(2) **Measurer:** Kneel on the child's right side so that you can hold the foot piece with your right hand (Arrow 3).

(3) **Measurer and assistant:** With the mother's/caretaker's help, lay the child on the board by doing the following:
Assistant: Support the back of the child's head with your hands and gradually lower the child onto the board.
Measurer: Support the child at the trunk of the body.

(4) **Measurer or assistant:** Ask the mother/caretaker to kneel on the opposite side of the board facing the measurer to help keep the child calm.

(5) **Assistant:** Cup your hands over the child's ears (Arrow 4). With your arms comfortably straight (Arrow 5), place the child's head against the base of the board so that the child is looking straight up. The child's line of sight should be perpendicular to the ground (Arrow 6). Your head should be straight over the child's head. Look directly into the child's eyes.

(6) **Measurer:** Make sure the child is lying flat and in the centre of the board (Arrow 7). Place your left hand on the child's shins (above the ankles) or on the knees (Arrow 8). Press them firmly against the board. With your right hand, place the foot piece firmly against the child's heels (Arrow 9).

(7) **Measurer and assistant:** Check the child's position (Arrows 4-9). Repeat any steps as necessary.

(8) **Measurer:** When the child's position is correct, read and call out the measurement to the nearest 0.1 centimetre. Remove the foot piece, release your left hand from the child's shins or knees and support the child during the recording.

(9) **Assistant:** Immediately release the child's head, record the measurement in AN4 and show it to the measurer. Alternatively, the assistant could call out the measurement and have the measurer confirm by repeating back.

(10) **Assistant:** Record in AN4A whether the child was measured lying down or standing up.

(11) **Measurer:** Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to cancel and correct any errors.

NOTE:

If the interviewer is not confident in the precision of the child's age (under age 2), please take measurement as described above. If the child's length is measured to 85 cm or more, you must instead measure the child's height.

Figure 17 Measuring a Child's Length

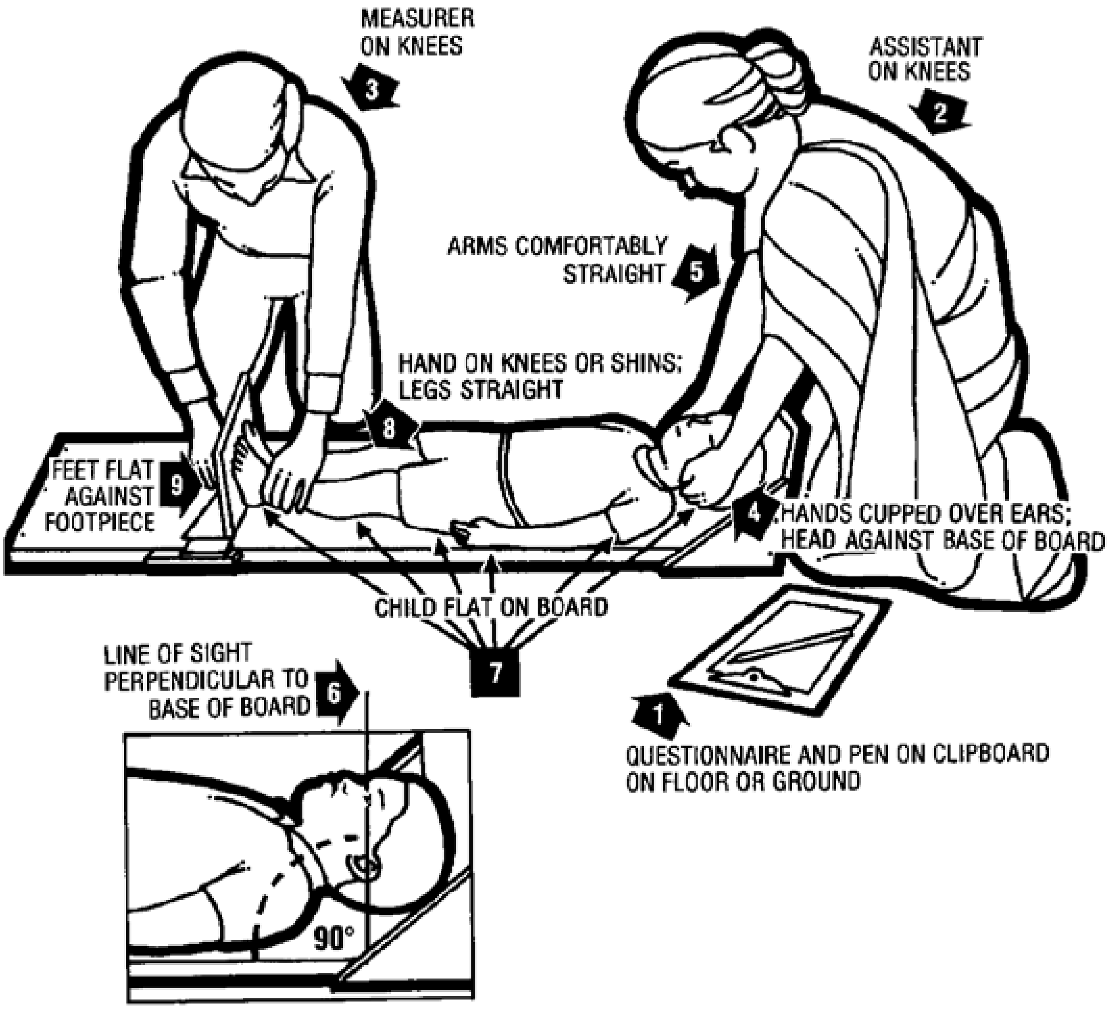


Table 11: Expected Length and Weight of Children by Sex and Age in Months

In editing the recorded length and weight of children to ensure that no data entry errors are made, the following values are used as the minimum and maximum expected values. The ranges are dependent on the sex and age of the child and are given in centimeters for the length (height) of the child and kilograms for the weight of the child.

Age in Months	**Length/height (cm)**				**Weight (kg)**			
	Males		Females		Males		Females	
	Min	Max	Min	Max	Min	Max	Min	Max
0–2	36.0	74.0	36.0	72.0	0.5	10.0	0.5	9.0
3–5	45.0	83.0	44.0	80.0	1.0	13.0	1.0	12.0
6–8	51.0	87.0	50.0	86.0	2.0	15.0	2.0	14.0
9–11	56.0	91.0	54.0	90.0	3.0	16.5	2.5	15.5
12–14	59.0	96.0	57.0	95.0	4.0	17.5	3.0	16.5
15–17	62.0	100.0	60.0	99.0	4.0	18.5	3.5	17.5
18–20	64.0	104.0	62.0	102.0	4.0	19.5	3.5	18.5
21–23	65.0	107.0	64.0	106.0	4.5	20.5	4.0	19.5
24–26	67.0	108.0	66.0	107.0	4.5	23.0	4.5	21.5
27–29	68.0	112.0	68.0	111.0	5.0	24.0	5.0	23.0
30–32	70.0	115.0	69.0	114.0	5.0	24.5	5.0	24.5
33–35	71.0	118.0	71.0	117.0	5.0	25.5	5.0	25.5
36–38	73.0	121.0	72.0	120.0	5.0	26.0	5.0	27.0
39–41	74.0	124.0	74.0	122.0	5.0	27.0	5.0	28.0
42–44	75.0	127.0	75.0	124.0	5.0	28.0	5.5	29.0
45–47	77.0	129.9	77.0	126.0	5.0	29.0	5.5	30.0
48–50	78.0	132.0	78.0	129.0	5.0	30.0	5.5	31.0
51–53	79.0	134.0	79.0	131.0	5.0	31.0	5.5	32.0
54–56	80.0	136.0	81.0	133.0	5.5	32.0	6.0	33.0
57–59	82.0	139.0	81.0	136.0	5.5	33.0	6.0	34.5

4.12.1 Mid Upper arm circumference *(MUAC)*

It directly assesses the amount of soft tissue in the arm and is another measure of thinness (or fatness), like WFH. Although it is easier to measure MUAC, it is more difficult to make a precise measurement as it is not standardized for age, and the cutoff points are not universally accepted. Nevertheless, MUAC is the best index to use in the community (for screening) to identify individual children in need of referral for further assessment or treatment.

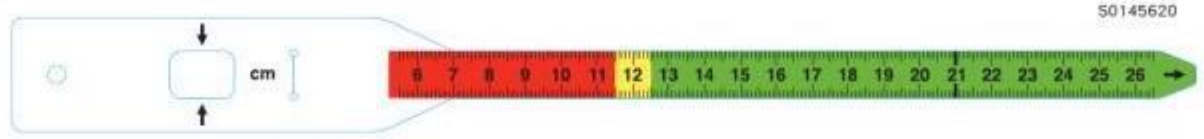
Because MUAC is used in this way in the community, it is useful to know the relationship between WFH and MUAC in a particular community to establish a full nutrition program including screening.

Measuring MUAC

There are many types of MUAC tapes including some with colours and numbers and one with just colours. The colours red, yellow and green indicate the level of malnutrition. MUAC tapes are predominately used to measure the upper arm circumference of children but also that of pregnant women, helping identify malnutrition. There are different types of MUAC tapes available. All are graduated in millimeters and some are colour coded (red, yellow and green) to indicate the nutritional status of a child or adult. The colour codes and gradations vary depending on the tape type.

Figure 18 MUAC tape

Red:	0 – **11.5 cm**
Yellow:	**11.5 cm** - 12.5 cm
Green:	from 12.5 cm



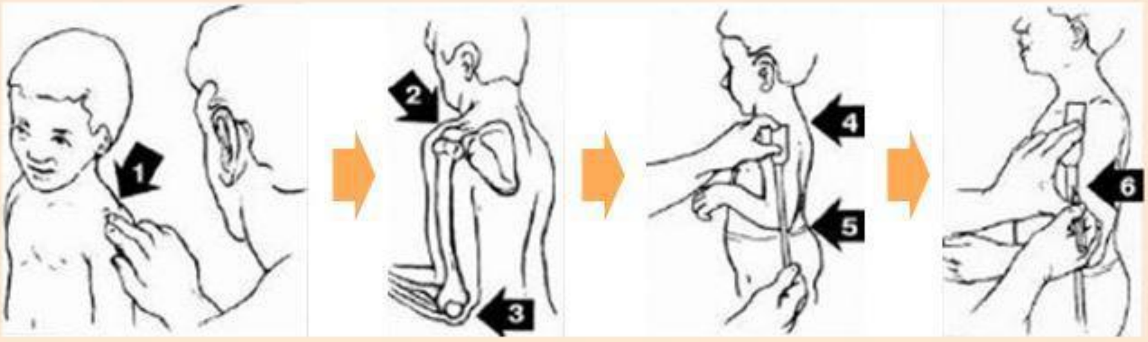
The following steps should be taken:

1. Explain procedure to the child's mother or caretaker.
2. Ensure that the child is not wearing any clothing on their left arm.
3. If possible, the child should stand straight and sideways to the measurer.
4. Bend the child's left arm at 90 degrees to the body.
5. Place the MUAC tape window (0 cm) at the acromioclavicular (AC) joint on the upper arm and find the mid-point of the upper arm. The mid-point is between the tip of the shoulder (acromion process of the scapula) and the elbow (olecranon process of the ulna).
6. Mark with a pen the mid-upper arm point using the measurer's free hand.
7. Ask child to relax arm so it is hanging by their side.
8. Using both hands place the MUAC tape window (0 cm) on the mid-point.
9. While keeping the left hand planted, wrap the MUAC tape around the outside of the arm with the right hand.
10. Plant the right hand and feed the MUAC tape through the hole in the tape while keeping the right hand planted on the arm.
11. Pull the tape until it fits securely around the arm while keeping the right hand planted.
12. Read and record the measurement at the window of the MUAC tape to the nearest millimeter (mm).

Figure 19 Measuring MUAC - 1

Measuring MUAC

Let's review the procedure to measure MUAC. The first step is to find the mid point:



First locate the tip of the shoulder (1)

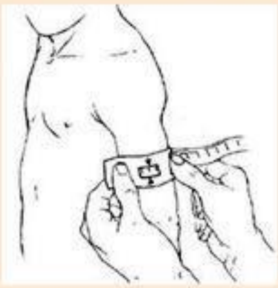
From the tip of the shoulder (2), with the elbow bent, find the tip of the elbow (3).

Place the tape or string at the tip of the shoulder and extend it to the tip of the elbow (4 and 5).

Mark the mid point between the two (6).

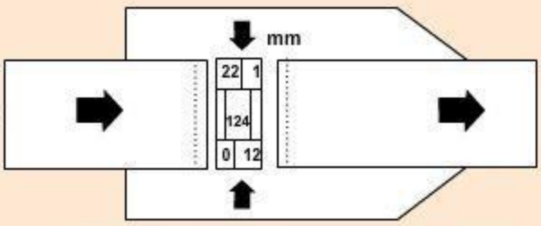
Figure 20 Measuring MUAC - 2

Taking the measurement



Then, slide the tape around the midpoint and take the reading.

For the **numbered tapes**:
Feed the end of the tape down through the first opening and up through the third opening. The measurement is read from the middle window where the arrows point inward



Read the number in the box that is completely visible in the middle window.

In this example, the measure is 124 mm.

For the simple **three-colour tapes**:
Slide the end through the first opening and then through the second opening;

Read the colour that shows through the window at the point the two arrows indicate.

4.13 Job Aid

4.14 Identification of enumeration n blocks and households

Before the process of line listing of the selected households for National Nutrition Survey (NNS), Pakistan Bureau of Statistics (PBS) representatives will identify the clusters and provide demarcation maps. Enumeration Block (EB) will consist of 250 to 300 households. For data collection household is defined as a HH having a child aged 6-59 months.

4.15 Line Listing

1. Line listing
2. Demarcation

Prior to data collection, team of line listers with the help of PBS representative will identify the Enumeration Blocks. Line listers will take GIS coordinates of identified blocks and will conduct the line listing of households in identified blocks for NNS. Electronic device/tablets will be used for line listing.

4.16 Data Collection

Enumerators (Data collectors) will collect data from line-listed households (Refer to guidelines). Data collection will be carried-out through tablets/electronic devices. The whole process of data collection will be completed in two days along with 2 days for travelling and sample collection for micronutrients and water quality

4.17 Anthropometry

Height/Length, weight, MUAC will be obtained to determine nutrition status of different target age groups. Measurers will carry out this activity through measurement and weight of the children in selected households, following the proper steps.

4.18 Field team structure

1. Team Leader (TL) 01
2. Enumerator/data collectors 01
3. Line Listers (LL) 2
4. Measurers 2
5. Phlebotomist 1

4.19 Team Leader

1. Team leader will facilitate the process of implementation of survey field activities.
2. TL, with the support of other team members, will develop field level survey plan/itinerary, arrange logistics and facilitate team for execution of line-listing, data collection, phlebotomy, anthropometry and water sampling activities of NNS survey.
3. Before sending data to data management unit (DMU), TL will check that data is error free and meet the standard for quality results.
4. TL will check the data on tablets like questionnaire headings; name, cluster name, cluster number, date and household number etc. are properly filled in and all questions properly answered.
5. TL will conduct meetings (morning planning meeting & evening debriefing) with field staff. In the meetings staff will share work progress, discuss field related issues and will further plan to improve individual and team performances and quality of work.
6. TL will coordinate with DMU for day to day DMU related queries and to resolve the problems.
7. TL will also coordinate with local stakeholders (PBS representatives, Administration, NGOs, Local Government and notables) to seek their help for NNS survey activities in their respective areas.

8. TL will ensure blood, urine and water samples are collected safely, placed properly and transported to the designated places/labs. Height, weight and MUAC measurements are taken properly.
9. TL will ensure that data has been received and synced by DM.
10. TL will share daily, weekly and monthly progress reports with Area and zonal coordinators and core team members. (Refer to reporting guidelines).

4.20 Enumerator/Data Collectors

1. Female enumerator/data collector (DC) will be responsible for data collection from line listed households in identified enumeration blocks.
2. 20 households will be selected for data collection and five households will be selected from each enumeration block for blood and water sample collection to achieve the sample size of the survey.
3. DC will facilitate Team Leader in planning, data collection and other filed and office related activities assigned by the team leader.
4. DCs will follow the instructions given to them and share reports with TL.
5. In case of any field level problems DCs will contact TL and raise their quires to solve the problems.
6. DCs will ensure to participate in meetings (Morning/evening or any other meeting called by TL on any specific issues) to share progress of work, provide feedback and discuss field related issues.
7. At the time of departure for field, DCs will collect required material (Stationaries, tablets etc.) from TL or any designated person and will return them back in the evening.
8. After data collection and before leaving the household, DCs will review data and fill up any missing information thus ensuring the completion of data.
9. Data collectors will ensure rapport building with the respondents and head of the households.
10. Before starting data collection it is the responsibility of data collectors and other team members to inform local influential in the community.
11. Before starting the interview DCs must take consent from respondent to conduct the interview.
12. Assure confidentiality of responses to respondent.
13. Respect the privacy of respondents by asking them questions in person (individually) and not in the presence of other people or colleagues.
14. Be neutral throughout the interview and never appear to approve or disapprove of any of the respondent's replies. If respondent give ambiguous answers try to probe in neutral way.
15. Never suggest answers to the respondents, rather probe them in such a manner that the respondent himself/herself comes up with the relevant answers. They should never read out the list of coded answers to the respondents even if he/she has trouble answering.
16. Ask questions in local and simple language

4.21 Required Material for line-listing/ data collection

- Interviewer's Assignment Sheet
- Electronic tablets/devices
- Mapping and listing forms
- Stationary (Pen, pencil, writing pad, permanent marker)
- Interviewer's Manual
- Identification badge/card
- Blue ink pens
- A bag to carry tablets and materials

4.22 Measurers

1. Measurers will conduct anthropometric measurements and measure height, weight and MUAC of children from sampled households in identified EBs and document the data properly. They will also collect the water samples for drinking water quality testing (Refer to guidelines).
2. Measurers will follow the instruction of team leader and coordinate with other team members to facilitate the survey work.
3. Measurers will ensure that the weighting scale is placed on a flat, hard, even surface. There must be enough light to operate the scale.
4. Measurer will calibrate the digital weight scale regularly, to minimize machine errors (Refer to guidelines).
5. Before conducting anthropometric activities, measurer will explain procedures to mother of the child in sampled household.
6. Babies should be weighed naked; wrapped in a blanket or other covering until weighing. Older children should be weighed with minimal clothing. If it is socially unacceptable to undress the child, remove as much clothing as possible.
7. Measurers will report to team leader, participate in meeting and share feedback, issues and progress of work.
8. Measurer will also test salt using the Rapid test or Parts per Minute (ppm) kits.
9. Measurer will also collect water samples from sampled HHs for water quality testing as per the Pakistan Council for Research on Water resources protocol (PCRWR).

4.23 Required Material

1. Bag
2. Pen/pencil
3. MUAC tap
4. Digital Weight Scale
5. MUAC measurement form

4.24 Phlebotomist

1. Phlebotomist will collect blood and urine samples from sampled households and send to nearest AKU laboratory for further analysis (Refer to guidelines).
2. Phlebotomist will follow the instructions and work plan devised by the TL for carryout the field activities.
3. He/she will coordinate with other team members and will facilitate survey work.
4. He/she will ensure that blood and urines samples are placed properly and delivered to nearest labs in time (Please refer to detailed guidelines on phlebotomy manual).
5. He/she will ensure that each step in the process of phlebotomy will be handled properly and professionally to avoid any laboratory error or injury.
6. They will ensure safety measures during the collection of blood and urine samples i.e. wearing gloves and safeguarding hygiene etc.
7. Phlebotomist will ensure labeling the blood and urine samples properly.
8. Phlebotomist will participate in morning and evening meetings and report directly to team leader and coordinator.

4.25 Required material

- Gloves
- Tourniquet
- Antiseptics
- Gauze Pads
- Lancets
- Sharps Containers
- Evacuated Collection Tubes
- Blood Drawing Tray

4.26 Household line listing

1. A complete list of all residential households in each of the selected sample clusters is necessary for pre-selection of households. Without complete list of households, line listing and data collection is not possible.
2. After the selection of clusters for survey, a complete list of dwelling units/households in the selected clusters is conducted prior to the selection of households.
3. The listing process consists of following steps;
    - Visiting each of the selected clusters
    - Collecting geographic coordinates of the cluster,
    - Drawing a location map of the cluster as well as a sketch map of the structures in the cluster,
    - Recording on listing forms a description of every structure together with the names of the heads of the households in the structure and other characteristics

It is also not acceptable to attempt to avoid line listing altogether and interviewers trying to create clusters as they go along.

4. As a general rule the average segment size should not be less than 250-300 in population (approximately 100 households) in both urban and rural areas (Refer to guidelines)
5. After the household listing DMU receives completed listing for a cluster, they must first create a serial number for each of the occupied residential households, beginning with 1 and continuing to the total number of occupied residential households listed in the cluster.
6. The household selection procedures will be performed based on the serial number. Serial number is an ID number for the household.
7. House hold listing will be performed on tablets/electronic devices.
8. After the household line listing data collection will start immediately.
9. Record address information for each structure or describe their location (for areas lacking street names or numbers on structures.
10. Make a list of the names of the heads of households in all of the structures.

4.27 Required Material for line-listing/ data collection

- Interviewer's Assignment Sheet
- Electronic tablets/devices
- Mapping and listing forms
- Stationary (Pen, pencil, writing pad, permanent marker)
- Interviewer's Manual
- Identification badge/card

- Blue ink pens
- A bag to carry tablets and materials

4.28 Water Sample collection

Enumerators will receive training to collect, handle and sample drinking water from selected households. Later they will carry out the process of collection of drinking water from sampled households.

1. Drinking water samples will be collected from sampled households.
2. Before collecting water samples, they will ensure that sampling equipment, preservatives are present and procedures for sample collection are followed (Refer to guidelines).
3. Remove any attachments on the faucet.
4. Do not rinse or overfill container.
5. Always collect room temperature water; never sample hot water.
6. Do not touch the inside of the sampled bottles or its caps to avoid contamination.
7. Collect samples in an area free of excessive dust, rain, snow or other sources of contamination.
8. For preservative use cold water with a temperature of ≤ 4 °C (But do not freeze).
9. Wear gloves when collecting samples.
10. Place it into a cooler with ice for delivery/overnight shipment to the laboratory.
11. Ensure barcode and labels are linked with SES questions.

5 Module: Monitoring Protocol

The monitoring protocol is designed to provide guidelines and tools to monitor NNS activities before, during and after data collection. In line with monitoring protocols, AKU along with collaborating partners including; UNCIEF, MoH and other stakeholders (as identified by Ministry) will monitor the activities both internally and externally.

There will be two stages of monitoring; real time and back check monitoring. In real time monitoring teams will directly observe data collection activities while in back check monitoring Data Management Unit (AKU) will provide 5% of collected data for re-verification via randomization process. Specific tools and indicators are defined for both types of monitoring.

Monitoring on all aspects of project field activities will be done by the below team on the standardized monitoring and quality assurance tools and will be duly recorded and reported. The selected independent supervisor staff will be trained on monitoring technique and checklist. They will independently monitor the presence of teams in EB, household selection, interviewing, anthropometric measurement, salt iodization test, blood, urine and water sampling, packaging and handling techniques and transportation of specimens. Monitoring reports will be shared with MoH and UNICEF on regular basis.

5.1 Monitoring Tools and modalities

Tool Name	Responsible	Frequency
Monitoring Indicators	· Zonal Coordinator · Area Coordinator · Internal / External Monitoring Team · Team leader	· Zonal Co: According to plan · Area Co: According to plan · Internal and External Monitoring team: According to availability · Team Leader: Daily basis

Logs Checks	• Team Leader • Area Coordinator • Zonal Coordinator • Internal / External Monitoring Team	• Team Leader: Daily basis • Area Coordinator: Daily basis • Zonal Coordinator: Optional • Internal / External Monitoring Team: Optional
Enumerator (Individuals check)	• Team Leader	• Team Leader: Daily basis
Phlebotomist	• Team Leader	• Team Leader: Daily basis
Line Listing Monitoring tool	• Team Leader • Area Coordinator • Zonal Coordinator • Internal / External Monitoring Team	• Team Leader: Daily basis • Area Coordinator: Daily basis • Zonal Coordinator: Optional • Internal / External Monitoring Team: Optional

Independent Monitoring is very important to assess and keep track of the activities of a program or a project in accordance to its objectives. To ensure the quality of activities some important indicators, required for each category has been listed, on the basis of which assessment will be done. Considering the scope of work in accordance with distinct categories of field staff, following are the tools and modalities of monitoring will be taken into account:

1. Distribution of work (Timely and equally)
2. Morning Meeting (Does the Supervisor conduct morning meetings with all team members effectively and in a productive manner)
3. Sampling Strategy (Are the teams following the sampling strategy)
4. Survey general rules (Are the team members following general survey rules)
5. Cross checking and back-checking of collected data by enumerators as well as the team leaders
6. Anthropometry observation (Do they following standards)
7. Blood samples collection (Do they follow standard procedures)
8. Safe Injection Practice and disposal of waste (Do they follow standard procedures)
9. Centrifuge and storage process of specimens (Do they follow standard methods)
10. Process of performing Hb tests (Are they carrying out the tests and recording the results in a standard way)
11. Necessary logistics related to survey activities (Do all team members have proper resources)
12. Proper coordination among field team members especially between team leaders and other field staff.
13. Punctuality, work load and distribution of work
14. Documentation (Daily Progress and Log sheets)
15. Duration (Time required to complete the survey in an EB if all necessary arrangements are made in timely manner)
16. To monitor the satisfaction level of staff

5.2 Methodology

We are proposing a participatory observation of all survey activities by each team member. The field team comprises of five team members working in different capacities; one team leader, two measurers, an enumerator and a phlebotomist. Following activities as per the job descriptions will be monitored.

Team leaders

- Coordination /supervision
- Timely coordination with health facility staff to collect demographic information of eligible subjects
- Timely availability of demographic information
- Distribution of daily work by team leader (timely, equally)
- Morning meetings with all team members
- Are the Sampling strategies followed
- Identification of assigned households
- Cross checking of collected data
- Necessary items for project activities are present (for e.g. check lists)
- Maintaining daily progress reports and Documentation (log sheets)
- Major difficulties (informing health facility staff, collecting demographic data, distribution of work, sampling procedures etc.)

Enumerators

- Are the survey rules being followed
- Self-Introduction (how are the enumerators introducing themselves)
- Proper administration of written consent
- How are they explaining the purpose and objectives of the survey
- Are they following the criteria for selection of eligible subjects
- Way of asking question
- Skip patterns
- Completeness of questionnaire (are they checking the questionnaire before leaving household for completeness)
- Motivation for collection of blood, urine and water samples
- Coordination with lab technicians and other staff regarding physical examination and specimen collections
- Major difficulties (in asking questions, locating household, selecting subject etc.)
- Reporting strategy to team leader

Measurers

- Way of motivation of respondent for anthropometry
- Process of performing physical examination
- Process of performing Anthropometry measurements
- Process of transcribing the information and readings
- Reporting strategy to team leader
- Difficulties in performing physical examination and collection, labeling and storage of samples from the eligible respondents

Phlebotomist

- Administration of consent
- Motivation of respondent to collect blood samples
- Procedures followed by lab technicians during blood collection
- Availability of necessary items related to sampling
- Responsible for keeping the supplies, equipment and tools in good working condition throughout the survey period
- Following centrifuge and storage process of specimens in the designated way

- Documentation/record of hemoglobin test results
- Major difficulties in drawing blood, motivating respondents, centrifuging samples, performing Hb tests and logistics
- Reporting strategy to team leader

Name of Monitoring Officers: ________________________________
Province: ________________________________
Zone number: ________________ **District name:** ________________
EB Number: ________________ **Date of Visit** ________________

5.3 Monitoring Indicators

(To be filled by each monitoring officer) – *Question with * are mandatory for both male and female monitoring officer*

Team	Name	Code	Availability
Team Leader			Yes-------1 No-------2
Enumerator			Yes-------1 No-------2
Phlebotomist			Yes-------1 No-------2
Measurer 1			Yes-------1 No-------2
Measurer 2			Yes-------1 No-------2

N	Indicator	Response	Observation			
Module - A						
1	*Self-Introduction (how enumerator is introducing *him/herself)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
2	*Explaining the purpose and objectives of survey	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
3	*Identification of assigned household (Make sure enumerator selected the assigned household or not)	Yes-------1 No-------2				
4	*Was eligible respondent selected for interview?	Yes-------1 No-------2				
5	*Verbal Consent taken	Yes-------1 No-------2				
6	*Did HH member information is matched with collected data?	Yes-------1 No-------2				
7	Did sequence for HH member is followed according to given guideline in the questioner (H203 to H211)?	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐

8	How well enumerator probing information about WASH facilities (**Drinking water, method to make water safe, toilet, hand washing etc**)?		Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
9	*Iodization test performed, and followed testing procedure?	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
10	*Checked the texture and noted the results (**color and ppm accordingly**)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
11	How well enumerator probing information about FIES (**recall period, quality and quantity of food, practices**)		Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
12	How well enumerator probing information about SSN (**Observing cards, receipts, vouchers, asking about different programs**)		Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
Module - B						
13	Is each married couple of age (15-49 years) is HH selected for WRA section	Yes-------1 No-------2				
14	How well enumerator is probing information from WRA **(marital status, reproductive history, birth outcomes**)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
Module - C						
15	Does enumerator asked for birth certificate or any document related to birth record? In case of unavailability of birth certificate how well enumerator is probing age (**event calendar, EPI Cards, probing techniques and recall methods**)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
16	Is under 2 years child with mother selected for IYCF section?	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
17	How well enumerator using job **aids (pictorial material) for probing liquids, fluids, medicines, formula milk, food groups which child used to take during 24 hrs**	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
18	Physically checked BCG scar	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
19	Checked child immunization record (card), if card is not available how well probe information regarding child immunization history	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
20	How well enumerator probing information about Care seeking behavior and child morbidity and disability	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
Module - D						
Phlebotomy						
21	Motivation of respondent to collect blood samples (**need to check either technician did their level best to explain the purpose of taking blood from selected individuals)**	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
22	*Written informed consent taken	Yes-------1 No-------2				

23	Coordination between Phlebotomist and measurers regarding the physical examination and specimen collections		Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
24	*Gloves worn	Yes-------1 No-------2				
25	*Necessary item (availability)	Yes-------1 No-------2				
26	*Volume of blood taken **-5 ml for WRA** **-3.5 ml for children < 5 years**	_______ml	Complete☐		Not enough☐	
27	*Volume of urine sample **-10 to 20ml**	_______ml	Complete ☐		Not enough ☐	
28	*HemoCue performed?	Yes-------1 No-------2				
29	*Procedure followed	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
30	*Transfer of blood/urine in specific tubes	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
31	*Bar codes used for labeling	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
32	*Blood and urine samples stored in suggested temperature **(2-8 C)**	_______C	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
33	*Blood and urine handling and transportation	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
Anthropometry						
34	*Was the MUAC taken correctly	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
35	*Was the weight taken correctly	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
36	*Was the length taken correctly (children with <85 cm or age <24 months)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
37	*Was the height taken correctly (children with >85 cm or age >24 months)	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
38	*Examination of edema	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
39	Was Goiter checked?	Yes-------1 No-------2	Excellent ☐	Good ☐	Fair ☐	(NS) Not Satisfactory ☐
40	Was the clinical anemia checked?					
Water testing						
41	*HH water tested on petri film for coliform and Ecoli	Yes-------1 No-------2				
42	*Water sample collected sterile plastic bottles (4 bottles of 200 ml)	_______ml	Complete☐		Not enough☐	
43	*Water samples stored 4 °C using iceboxes	Yes-------1 No-------2				

ACTION POINTS:

5.4 Logistic Checklist

(Mandatory for Team Leader and Area Coordinator, Optional for Other monitoring team)

S.NO	Items		S.NO	Items	
HOUSEHOLD SURVEY TEAM					
1	Task /assignment sheet with map / work Plan		10	Weighing scales	
2	Survey Questionnaire / Tablet		11	Weighing scales Status (calibrated or not)	
3	Progress report sheet		12	Length board	
4	Manual (field guide) /Job aid		13	Height board	
5	Salt test Kit / Rapid Test		14	MUAC tapes	
6	Vitamin A capsules		15	ID card	
7	Note pad		16	Codelist	
8	Shoulder Bag		17	Homecue (Microcuvette, Cleaner, AA Batteries, sharp bin)	
9	Pen				
Blood, Urine and Water Collection kits material					
1	10 and 5 cc Syringes with Disposable Needles 23G		24	Sharps containers/safety boxes for safe syringe disposal	
2	Trace Element Free (Royal Blue Top) Vacutainer Tube 6mL		**Transportation of specimens**		
3	Urine Sterilized Container		25	Thermo Coolant Boxes / Ice boxes	
4	Medial Disposable Gloves (Small + Large)		26	Sample Racks	
5	Alcohol Swab		27	Dry ice packs	
6	Needle Cutter		**General Use**		
7	Cotton Wool Balls		28	Stationary	
8	Saniplast plaster		29	Tissues	
9	Tourniquets		30	Scotch Tape	
10	Aluminum Foil		31	Masking Tape	
11	Stickers for tubes labeling		32	ID Card and assignment sheet	
12	Bio-Hazard Stickers				
13	Bloating Sheets				
14	Sample Racks / Test tube Racks				
15	Lab requisition form				
16	Incubator for water storage				
17	sterile plastic bottles (200 ml)				
18	Petri-film				

19	Cotton Ball				
20	Zip-lock Bag				
21	Digital Thermometer				
22	Centrifuge Machine				
23	Barcode Labels				

5.5 Enumerators

Name of Enumerator ____ Code Number__________________________

(Mandatory for Team Leader, Optional for Other monitoring team)

Q #	Observation	Response
C.1	Survey General rules **(are they following the rules)**	Yes 1 No 2
C.2	Self-Introduction **(how enumerator is introducing him/herself)**	Excellent 1 Good 2 Fair 3
C.3	Explaining the purpose and objectives of survey	Excellent 1 Good 2 Fair 3
C.4	Identification of assigned household **(Make sure enumerator selected the assigned household or not)**	Yes 1 No 2
C.5	Selection of eligible subject **(did enumerator follow the rules for selection of eligible subjects i.e. WRA randomly, the youngest child among children aged 6 months to five years and for 6 to 12 years of age the oldest one from the list)**	Yes 1 No 2
C.6	Way of asking question **(need to observe how enumerator is asking questions from the respondent, note the face expressions of enumerator during asking question, also note confidence level of enumerator at the time of interview)**	Excellent 1 Good 2 Fair 3
C.7	Skip pattern **(take a questionnaire with you and check during the interview whether skip patterns are being followed or not)**	Yes 1 No 2
C.8	Completeness of questionnaire **(are they checking the questionnaire before leaving household for completeness)**	Yes 1 No 2
C.10	Motivation for the collection of blood, urine and water samples **(note the motivation of respondent for physical examination and for the collection of specimens)**	Yes 1 No 2
C.11	Coordination with Phlebotomist and measurers regarding the physical examination and specimen collections	Yes 1 No 2
C.12	Documentation **(need to check the documentation, do they maintain the daily log sheet of daily /weekly progress)**	Yes 1 No 2
C.13	Major difficulties **(in asking questions, locating household, selecting subject communicating with Enumerator and Phlebotomist regarding physical examination and collection of specimen)**	
C.14	Comments of observer about the performance of enumerator	

5.6 Phlebotomist

Name of Phlebotomist ______________________________________ **Code Number**________________________

(Mandatory for Team Leader, Optional for Other monitoring team)

Q #	Observation	Response
D.1	Verbal consent **(need to check whether the technician took verbal consent for collection of blood sample)**	Yes 1 No 2
D.2	Motivation of respondent to collect blood samples **(need to check either technician did their level best to explain the purpose of taking blood from selected individuals)**	Yes 1 No 2
D.3	Procedures followed by Phlebotomist during blood collection **(need to check did the technician followed the guidelines during collection of samples)**	Yes 1 No 2
D.4	Necessary item related to sampling (check list) (**Observe at the time of sample collection if technicians have all necessary items according to check list)**	Yes 1 No 2
D.5	Volume of blood **(check whether the volume of collected blood is sufficient for all laboratory tests)**	Yes 1 No 2
D.6	Labeling of specimens **(are they assigning correct ID on all sample tubes of an individual)**	Yes 1 No 2
D.7	Are Phlebotomist following the guidelines to keep samples after collection before centrifuge **(temperature and safe from sunlight)**	Yes 1 No 2
D.8	Documentation/record of hemoglobin test results **(need to check the documentation, do they maintain the daily log sheet of daily /weekly progress as well as hemoglobin results)**	Yes 1 No 2
D.9	Major difficulties (in drawing blood, motivating respondents, centrifuge samples, performing Hb test, and logistics)	
D.10	Observer's comments about the performance of Lab Technicians	

5.7 Line Listing Monitoring Checklist

(Mandatory for Team Leader and Area Coordinator, Optional for Other monitoring team)

Team members Information

	Name	**Code**	**Availability**
Member1			
Member 2			

Q #	Observation	Response
1	Availability of daily / weekly work plan (List of PSU's etc.)	Yes -------1 No -------2

2	Necessary items equipment for line listing activities **(need to observe by following logistic check lists)** a. Markers b. Pen c. Tablets (Availability) d. Tablets in working condition e. Vehicle f. Fuel g. Log Book h. Clean drinking water	 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2
3	Quality Control (**need to observe whether the TL is performing any steps to check the quality of data at the time interview as well as cross checking the collected data)**	Yes -------1 No -------2
4	**Observation** a. Greeting with the House hold b. Introduction to the survey c. Friendly attitude with household d. Proper marking of House hold (Structure ID and House hold ID)	Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2 Yes -------1 No -------2
5	**Re- Verification (5%)** **Sample 1** a. House hold Number assigned by Line listing Team. b. House hold line listing Number visible on door / Wall c. Number of children under 5 years of age d. Number of Women of reproductive age group (WRA) e. Number of Pregnant women (PW) **Sample 2** a. House hold Number assigned by Line listing Team. b. House hold line listing Number visible on door / Wall c. Number of children under 5 years of age d. Number of Women of reproductive age group (WRA) e. Number of Pregnant women (PW) **Sample 3** a. House hold Number assigned by Line listing Team. b. House hold line listing Number visible on door / Wall c. Number of children under 5 years of age d. Number of Women of reproductive age group (WRA) e. Number of Pregnant women (PW) **Sample 4** a. House hold Number assigned by Line listing Team. b. House hold line listing Number visible on door / Wall c. Number of children under 5 years of age d. Number of Women of reproductive age group (WRA) e. Number of Pregnant women (PW) **Sample 5** a. House hold Number assigned by Line listing Team.	 No.________________ Yes -------1 No -------2 _________ Children ___________ (WRA) ___________ (PW) No.________________ Yes -------1 No -------2 _________ Children ___________ (WRA) ___________ (PW) No.________________ Yes -------1 No -------2 _________ Children ___________ (WRA) ___________ (PW) No.________________ Yes -------1 No -------2 _________ Children ___________ (WRA) ___________ (PW)

	b. House hold line listing Number visible on door / Wall c. Number of children under 5 years of age d. Number of Women of reproductive age group (WRA) e. Number of Pregnant women (PW)	No.________________ Yes -------1 No -------2 _________ children ___________ (WRA) ___________ (PW)
06	Major difficulties in conducting line listing	
07	Comments of observer about the performance of line listers	

5.8 Back Check Monitoring – Indicator List

Name of Monitoring Officers: ________________________________

Province: ________________________________

Zone number: ________________ **District name:** ______________

EB Number: __________________ **Date of Visit** ________________

Module- A: Demographic Information and Socio Economic Status					
Household Information					
Q #	**Question**	**Indicator Reading (if any)**	**Response**		**Remarks**
H1O1	Cluster number marked		Yes	No	
H 102	Household no marked		Yes	No	
H 114	Consent taken		Yes	No	
List of Household Members					
H 211	Marital status if age 10 or more		Yes	No	
H 212	Line no recorded for child under 5		Yes	No	
H 213	Line no recorded for adolescent 10-19 years		Yes	No	
H 216	Household members Women Age 15-49 Adolescents 10-19 Children under age 5		Yes Yes Yes Yes	No No No No	
Social Economic Status					
H302	What is main source of drinking water in your household		Yes	No	
H304	What do you usually do to make water safe to drink		Yes	No	
Hand washing					
H406	In what situation do you wash your hand with soap		Yes	No	
Salt iodization					
H501	We would like to check whether the salt used in your household is				

	iodized. May I have a sample of the salt used to cook meals in your household		Yes	No	
H502	Observe the texture of the salt being used		Yes	No	
H606	Was there a time when your household ran out of food because of a lack of money or other resources		Yes	No	
H609	Was there a time when you or others in your household went outside for eating		Yes	No	
Social Safety Nets					
H705	Acquired financial assistance from any social safety nets		Yes	No	
Module B: Women of Reproductive Age					
Antenatal Care					
W 301	Did you see anyone for antenatal care during your last pregnancy with (name)		Yes	No	
W304	How many times did you receive antenatal care during your last pregnancy		Yes	No	
W310	How often did you take IFA during your last pregnancy		Yes	No	
Postnatal Care					
W401	Did anyone check on your health after delivery		Yes	No	
Minimum Meal Diversity					
W501	Yesterday during the day or at night, did you eat or drink		Yes	No	
Module C:Child Nutrition Under 5 years					
IYCF and Food Diversity					
C203	How long after birth did you first put (name) to the breast		Yes	No	
C 207	What was (name) given to drink		Yes	No	
C 302	Do you have a National Child Immunization Record, immunization records from a private health provider or any other document where (name)'s vaccinations are written down		Yes	No	
Module D: Anthropometry					
	MUAC(cm)		Yes	No	

	BCG Scar		Yes	No	
	Goiter		Yes	No	
	Clinical Anemia		Yes	No	
	Edema		Yes	No	

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ANNEX F1

Indicators for assessing infant and young child feeding practices 1

World Health Organization

Indicators for assessing infant and young child feeding practices

PART 1
DEFINITIONS

USAID
FROM THE AMERICAN PEOPLE

AED

FOOD AND NUTRITION TECHNICAL ASSISTANCE

UCDAVIS

IFPRI
INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
sustainable solutions for ending hunger and poverty
Supported by the CGIAR

unicef

World Health Organization

Indicators for assessing infant and young child feeding practices

PART 1
DEFINITIONS

Conclusions of a consensus meeting held 6–8 November 2007 in Washington, DC, USA

USAID
FROM THE AMERICAN PEOPLE

AED

FOOD AND NUTRITION TECHNICAL ASSISTANCE

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Introduction

The document *Indicators for assessing breastfeeding practices* (*1*) published in 1991 provided a set of indicators that could be used to assess infant feeding within and across countries and evaluate the progress of breastfeeding promotion efforts. Since then, there have been important developments in infant and young child feeding recommendations and scientific knowledge about what constitutes optimal breastfeeding and complementary feeding practices, which have led to the need for revision and expansion of the set of indicators initially recommended. In 2001, for example, the World Health Organization (WHO) recommended exclusive breastfeeding for 6 months (*2*, *3*), which was a change from the previous recommendation to introduce complementary foods at 4–6 months. The indicator for exclusive breastfeeding under 4 months thus no longer provides data reflective of current guidelines.

In addition, the document published in 1991 included only one indicator of complementary feeding – the timely complementary feeding rate. This indicator provided information about whether complementary foods were consumed, but not about the quantity or quality of those foods. In response to concerns about the lack of adequate indicators of complementary feeding, in 2002, WHO began a process to review and develop indicators of complementary feeding practices. A conceptual framework for identifying potential indicators of complementary feeding practices was published (*4*). At the same time, the *Guiding Principles for Complementary Feeding of the Breastfed Child* were being developed, which addressed the multidimensionality of complementary feeding practices (*5*). A similar effort to develop guidance and rationale for feeding non-breastfed children 6–23 months of age was undertaken shortly thereafter, which resulted in a technical document (*6*) and a parallel set of Guiding Principles (*7*). Beginning in 2004, members of the Working Group on Infant and Young Child Feeding Indicators initiated a series of activities aimed towards definition and validation of indicators to reflect dietary quality and quantity, using existing data sets from 10 different sites in developing countries (members of the Working Group are listed in Annex 1a). In addition to using the references listed above as guidance, the Working Group was also guided by the recommendations and targets of the *Global Strategy for Infant and Young Child Feeding* (*8*). The results of the analyses conducted by the Working Group were summarized in a report in the summer of 2006 (*9*) and presented at a WHO consultation in October, 2006. Additional analyses to address the remaining questions and concerns were subsequently completed and described in a report submitted in the summer of 2007 (*10*).

Based on the above work, a revised set of indicators was developed and then discussed by participants at the WHO Global Consensus Meeting on Indicators of Infant and Young Child Feeding held from 6–8 November, 2007 on the premises of the WHO Regional Office for the Americas. The list of participants is provided in Annex 1b. This report summarizes the discussion and consensus reached on 8 core indicators and 7 optional indicators for assessing infant and young child feeding practices that are population-based and can be derived from household survey data.

A. Purpose of the indicators

Infant and young child feeding practices directly affect the nutritional status of children under two years of age and, ultimately, impact child survival. Improving infant and young child feeding practices in children 0–23 months of age is therefore critical to improved nutrition, health and development of children. However, until now, indicators that can be used in population-based surveys to measure infant and young child feeding practices have focused mostly on breastfeeding practices. The lack of evidence and consensus on simple indicators of appropriate feeding practices in children 6–23 months of age has hampered progress in measuring and improving feeding practices, thereby constraining improvements in infant and young child nutritional outcomes.

The indicators described in this document are the result of a 5-year effort to develop a set of simple, valid and reliable indicators to assess infant and young child feeding practices. They focus on selected food-related aspects of child feeding, amenable to population-level measurement. Other aspects of optimal feeding such as responsive feeding and adequate texture of food are more complex to assess, and work is still in progress to develop valid and reliable indicator definitions and measurement approaches for these.

Population-level indicators of infant and young child feeding practices are used primarily for: (1) *assessment*: to make national and sub-national comparisons and to describe trends over time; (2) *targeting*: to identify populations at risk, target interventions, and make policy decisions about resource allocation; and (3) *monitoring and evaluation*: to monitor progress in achieving goals and to evaluate the impact of interventions. The indicators described herein are mainly designed for use in large-scale surveys or national programs. Smaller local and regional programs may also find uses for these indicators, but this limited set of measures is not intended to meet all of the needs for program monitoring and evaluation at this level. Programs and projects should augment these with more specific indicators that reflect their own interventions, messages, and behaviour change objectives.

The *indicator definitions should not be translated into caregiver messages* for improving feeding practices in young children. These should be derived from the Guiding Principles (*5*, *7*) and adapted to the local situation. While indicator definitions may not correspond exactly to adapted messages, the indicators will nevertheless reflect population-level progress towards optimal feeding practices.

The indicators described in this document are meant to be considered together. The indicators for assessing feeding practices in children 6–23 months of age in particular should not be considered in isolation, because of the multi-dimensional aspects of appropriate feeding at this age. It is therefore recommended that in surveys, efforts be made to assess data on the full set of indicators for any given population.

Finally, inasmuch as the sample sizes used in monitoring and evaluation of smaller scale programs may be quite small, some of the recommended indicators may be too imprecise to be of use in assessment or in monitoring change for these programs. This is particularly likely for indicators with narrow age ranges in the numerator and the denominator.

B. Methodology for measuring indicators

The proposed indicators should be derived from interviews conducted at the household level using a household survey methodology. Age groups are described in intervals of months completed. For example, a child 6–23 months has completed 6 months but has an age less than 2 years. Although the age group used for each indicator will vary, most indicators can be generated using the data from living[1] children less than 24 months of age.[2] Once core and optional indicators are selected as described below, the survey should be designed to provide adequate sample sizes for all age sub-groups of interest. Except for the indicators "early initiation of breastfeeding" and "children ever breastfed", all indicators are based on current status data, i.e., the current age of the child and other information for the day preceding the survey, rather than on retrospective data. Mothers will not be asked when they stopped or started particular feeding practices, which are questions that tend to produce a heaping of data at certain ages. The previous-day recall period was selected because it has been widely used and found appropriate in surveys of dietary intake when the objective is to describe infant feeding practices in populations. Because practices vary widely from day to day, indicators derived from the previous day recall period should not be used to make assessments of dietary adequacy at the level of the individual.

Criteria that define infant feeding practices used in the document are shown in Table 1. A child can be classified as following a certain practice if criteria listed for that practice are met. Relative to the 1991 guidance, one modification was made with regard to the criteria for exclusive breastfeeding. Since ORS is a medicine, it was agreed to allow this under the definition of exclusive breastfeeding. Exclusive breastfeeding now means that the infant receives breast milk (including expressed breast milk or breast milk from a wet nurse) and allows the infant to receive ORS, drops, syrups (vitamins, minerals, medicines), but nothing else.

[1] Exceptions are the core indicator "early initiation of breastfeeding" and the optional indicator "children ever breast-

TABLE 1. CRITERIA THAT DEFINE SELECTED INFANT FEEDING PRACTICES

Feeding practice	Requires that the infant receive	Allows the infant to receive	Does not allow the infant to receive
Exclusive breastfeeding	Breast milk (including milk expressed or from a wet nurse)	ORS, drops, syrups (vitamins, minerals, medicines)	Anything else
Predominant breastfeeding	Breast milk (including milk expressed or from a wet nurse) as the predominant source of nourishment	Certain liquids (water and water-based drinks, fruit juice), ritual fluids and ORS, drops or syrups (vitamins, minerals, medicines)	Anything else (in particular, non-human milk, food-based fluids)
Complementary feeding[a]	Breast milk (including milk expressed or from a wetnurse) and solid or semi-solid foods	Anything else: any food or liquid including non-human milk and formula	NA
Breastfeeding	Breast milk (including milk expressed or from a wet nurse)	Anything else: any food or liquid including non-human milk and formula	NA
Bottle-feeding	Any liquid (including breast milk) or semi-solid food from a bottle with nipple/teat	Anything else: any food or liquid including non-human milk and formula	NA

[a] The term complementary feeding, reserved to describe appropriate feeding in breastfed children 6 months of age or beyond, is no longer used in the indicators to assess infant and young child feeding practices. The previously used indicator ‘Timely complementary feeding rate’ (*1*), which combined continued breastfeeding with consumption of solid, semi-solid and soft foods, was difficult to interpret. This indicator has therefore been replaced by the indicator ‘Introduction of solid, semi-solid or soft foods’ which is a measure of a single feeding practice. Nevertheless, the term complementary feeding is still very useful to describe appropriate feeding practices in breastfed children 6–23 months of age and will continue to be used in programmatic efforts to improve infant and young child feeding as guided by the *Global Strategy on Infant and Young Child Feeding* (*8*). The timely complementary feeding rate can also be calculated using the data generated for measuring the new and updated indicators.

C. Definitions of indicators

The key indicators are defined and explained below. A summary list of the indicators is presented in Annex 2. For certain indicators, it is strongly recommended that figures (or area graphs) be created to depict the proportion of children receiving each of the relevant feeding practices by child age. Examples of such figures are given in Annex 3.

CORE INDICATORS

Breastfeeding initiation

1. **Early initiation of breastfeeding:** Proportion of children born in the last 24 months who were put to the breast within one hour of birth

$$\frac{\text{Children born in the last 24 months who were put to the breast within one hour of birth}}{\text{Children born in the last 24 months}}$$

Notes:

- This indicator is based on historic recall. The denominator and numerator include living children and deceased children who were born within the past 24 months.
- It is recommended that the indicator be further disaggregated and reported for (i) live births occurring in the last 12 months; and (ii) live births occurring between the last 12 and 24 months.

Exclusive breastfeeding

2. **Exclusive breastfeeding under 6 months:** Proportion of infants 0–5 months of age who are fed exclusively with breast milk

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

Notes:

- This indicator includes breastfeeding by a wet nurse and feeding expressed breast milk. It was, however, thought simpler to retain the term "exclusive breastfeeding" rather than the more precise but cumbersome term "fed exclusively on breast milk". (For the definition of "exclusive breastfeeding" see Table 1.)
- This is the first in the series of current status indicators based on recall of the previous day and includes living infants. All indicators that follow, except "children ever breastfed", are also based on recall of the previous day.
- Using the previous day recall period will cause the proportion of exclusively breastfed infants to be overestimated, as some infants who are given other liquids irregularly may not have received them in the day before the survey.
- As with other indicators that are based on current status, exclusive breastfeeding is based on a cross section of children in a given age range, in this case children from birth to just

under 6 months of age. It therefore does not represent the proportion of infants who are exclusively breastfed *until just under* 6 months of age and *should not* be interpreted as such. It is generally accepted that the proportion of children who are exclusively breastfed *until just under* 6 months of age is lower than the number derived from the indicator of current status. For example, if there is a linear rate of decline in the proportion exclusively breastfed from 100% at birth to 20% at 6 months, the indicator value for exclusive breastfeeding under 6 months would be 60% (as compared to 20% still exclusively breastfed at 6 months). However, the indicator recommended in this document represents the best option for estimating exclusive breastfeeding and is more sensitive to capturing changes. If there is interest in identifying differences in proportions of infants exclusively breastfed over smaller age ranges, creation of figures such as shown in Annex 3, and disaggregation as suggested in the bullet below may provide such information.

- It is recommended that the indicator be further disaggregated and reported for the following age-groups: 0–1 months, 2–3 months, 4–5 months and 0–3 months.

Continued breastfeeding

3. **Continued breastfeeding at 1 year:** Proportion of children 12–15 months of age who are fed breast milk

$$\frac{\text{Children 12–15 months of age who received breast milk during the previous day}}{\text{Children 12–15 months of age}}$$

Notes:

- This indicator includes breastfeeding by a wet nurse and feeding expressed breast milk.
- The title of this indicator on continued breastfeeding reflects an approximation of the age range covered. Because of the age interval, the indicator underestimates the proportion of children breastfed at one year.
- Because the indicator has a relatively narrow age range of 4 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.

Introduction of complementary foods

4. **Introduction of solid, semi-solid or soft foods:** Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods

$$\frac{\text{Infants 6–8 months of age who received solid, semi-solid or soft foods during the previous day}}{\text{Infants 6–8 months of age}}$$

Notes:

- This indicator is one of the two parts of the previous composite indicator for timely complementary feeding, which also included continued breastfeeding (*1*).
- The previous indicator included living infants 6–9 months in the numerator and denominator. A narrower age range has been chosen so as not to include infants first receiving foods as late as 9 months in the numerator.
- Because the indicator has a very narrow age range of 3 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.
- Figures of infant feeding practices by age, as shown in Annex 3, provide additional information and are a useful illustration of the pattern of introduction of solid, semi-solid or soft foods in the population.

Dietary diversity

5. **Minimum dietary diversity:** Proportion of children 6–23 months of age who receive foods from 4 or more food groups

$$\frac{\text{Children 6–23 months of age who received foods from} \geq 4 \text{ food groups during the previous day}}{\text{Children 6–23 months of age}}$$

Notes:

- The 7 foods groups used for tabulation of this indicator are:
  — grains, roots and tubers
  — legumes and nuts
  — dairy products (milk, yogurt, cheese)
  — flesh foods (meat, fish, poultry and liver/organ meats)
  — eggs
  — vitamin-A rich fruits and vegetables
  — other fruits and vegetables
- Consumption of any amount of food from each food group is sufficient to "count", i.e., there is no minimum quantity, except if an item is only used as a condiment.[1]
- The cut-off of at least 4 of the above 7 food groups above was selected because it is associated with better quality diets for both breastfed and non-breastfed children (*10*). Consumption of foods from at least 4 food groups on the previous day would mean that in most populations the child had a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable that day, in addition to a staple food (grain, root or tuber).
- Results may be reported separately for breastfed and non-breastfed children. However, diversity scores for breastfed and non-breastfed children should not be directly compared, because breast milk is not 'counted' in any of the above food groups. Breast milk is not counted because the indicator is meant to reflect the quality of the complementary food diet. As a consequence, this indicator may show 'better' results for children who are not breastfed than those who are breastfed in populations where formula and/or milk are commonly given to non-breastfed children.
- For the same reason, this indicator should not be used to compare populations that differ in prevalence of continued breastfeeding. This caution applies both to comparisons between different sub-populations at one point in time (e.g. urban versus rural comparisons) and the same population at different points in time (e.g. if continued breastfeeding has declined). The composite indicator (# 7 below) captures several different dimensions of feeding and can be used for comparisons across time and between populations with different rates in continued breastfeeding.
- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months.

[1] More guidance is provided in the operational guide that is a companion to this document.

Meal frequency

6. **Minimum meal frequency:** Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

   The indicator is calculated from the following two fractions:

   $$\frac{\text{Breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

   and

   $$\frac{\text{Non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

   Notes:

   - Minimum is defined as:
     — 2 times for breastfed infants 6–8 months
     — 3 times for breastfed children 9–23 months
     — 4 times for non-breastfed children 6–23 months
     — “Meals” include both meals and snacks (other than trivial amounts[1]), and frequency is based on caregiver report.
   - This indicator is intended as a proxy for energy intake from foods other than breast milk.[2] Feeding frequency for breastfed children includes only non-liquid feeds and reflects the Guiding Principles[3] (*5*). Feeding frequency for non-breastfed children includes both milk feeds and solid/semi-solid feeds, and also reflects the Guiding Principles for these children (*7*).
   - It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age. Results may also be reported separately for breastfed and non-breastfed children.

Summary infant and young child feeding indicator

7. **Minimum acceptable diet:** Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk).

   This composite indicator will be calculated from the following two fractions:

   $$\frac{\text{Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

   and

   $$\frac{\text{Non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

[1] More guidance is provided in the operational guide that is a companion to this document.
[2] True energy intake is impossible to capture in simple surveys.
[3] Milk feeds are not included for breastfed children because the minimum meal frequencies in this indicator assume average breast milk intake, and if a substantial amount of energy from other milk is consumed, breast milk intake is likely to be considerably lower than average. Nevertheless, the actual intake of breastfed children who also receive milk feeds may be more than what is captured by this indicator.

Notes:

- For breastfed children, see indicators 5 and 6 above for "Minimum dietary diversity" and "Minimum meal frequency" definitions.
- For non-breastfed children, see indicator 6 above for definition of "Minimum meal frequency". The definition of "Minimum dietary diversity" is similar to the definition for indicator 5, but milk feeds are excluded from the diversity score for non-breastfed children when calculating "Minimum acceptable diet". This is because milk feeds are considered as a separate and required element for non-breastfed children in this multi-dimensional indicator. Exclusion of milk feeds from the diversity score here avoids "double-counting" of this food group and allows use of this indicator in comparisons – across space and time – between populations with different rates of continued breastfeeding.
- See indicator 15 below for the rationale for at least 2 milk feedings for non-breastfed children.
- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age.

Consumption of iron-rich or iron-fortified foods

8. **Consumption of iron-rich or iron-fortified foods:** Proportion of children 6–23 months of age who receive an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the home.

$$\frac{\text{Children 6–23 months of age who received an iron-rich food or a food that was specially designed for infants and young children and was fortified with iron, or a food that was fortified in the home with a product that included iron during the previous day}}{\text{Children 6–23 months of age}}$$

Notes:

- Suitable iron-rich or iron-fortified foods include flesh foods, commercially fortified foods specially designed for infants and young children that contain iron, or foods fortified in the home with a micronutrient powder containing iron or a lipid-based nutrient supplement containing iron.
- While this indicator assesses a critical aspect of nutrient adequacy of food intake, guidance on how best to operationalize the data collection is difficult to standardize. Further work is being undertaken to develop the questions to allow for its tabulation.
- It is recommended that the indicator be further disaggregated and reported for the proportion of children receiving flesh foods only and the proportion of children who consume some fortified food specially designed for infants and young children that contains iron (with or without flesh foods).
- It is also recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age.

OPTIONAL INDICATORS

Considering the need to limit the number of indicators and quantity of data to be collected to a minimum, it is proposed that the indicators described above are the most critical for population-based assessment and programme evaluation. However, to ensure continuity in monitoring of previously used indicators and recognizing that some programmes may wish to measure additional indicators, the following optional indicators are recommended:

Breastfeeding

9. **Children ever breastfed:** Proportion of children born in the last 24 months who were ever breastfed

$$\frac{\text{Children born in the last 24 months who were ever breastfed}}{\text{Children born in the last 24 months}}$$

Notes:

- This indicator is based on historic recall. The denominator and numerator include living and deceased children who were born within the past 24 months.
- It is recommended that the indicator be further disaggregated and reported for (i) live births occurring in the last 12 months; and (ii) live births occurring between the last 12 and 24 months.

10. **Continued breastfeeding at 2 years:** Proportion of children 20–23 months of age who are fed breast milk

$$\frac{\text{Children 20–23 months of age who received breast milk during the previous day}}{\text{Children 20–23 months of age}}$$

Notes:

- The title of this indicator on continued breastfeeding reflects an approximation of the age range covered.
- Because the indicator has a relatively narrow age range of 4 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.

11. **Age-appropriate breastfeeding:** Proportion of children 0–23 months of age who are appropriately breastfed

The indicator is calculated from the following two fractions:

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

and

$$\frac{\text{Children 6–23 months of age who received breast milk, as well as solid, semi-solid or soft foods, during the previous day}}{\text{Children 6–23 months of age}}$$

12. **Predominant breastfeeding under 6 months:** Proportion of infants 0–5 months of age who are predominantly breastfed

$$\frac{\text{Infants 0–5 months of age who received breast milk as the predominant source of nourishment during the previous day}}{\text{Infants 0–5 months of age}}$$

Notes:

- As the proportion of infants aged *just less than* 6 months who are exclusively breastfed may be quite low in some populations, the intent of this indicator is to identify infants whose predominant source of nourishment is breast milk, but who also receive other fluids. These include liquids, such as water-based drinks, fruit juice and ritual fluids. Non-human milk and food-based fluids are not allowed. Table 1 describes in detail the criteria of predominant breastfeeding
- An area graph as illustrated in Annex 3 provides the clearest illustration of various infant feeding practices and when used, can replace this indicator.

Duration of breastfeeding

13. **Duration of breastfeeding:** Median duration of breastfeeding among children less than 36 months of age

The age in months when 50% of children 0–35 months did not receive breast milk during the previous day

Note: The population median duration of breastfeeding is the only indicator that requires collection of data on feeding practices in children above 23 months of age and is calculated using current status data among all children less than 36 months of age.

Bottle feeding of infants

14. **Bottle feeding:** Proportion of children 0–23 months of age who are fed with a bottle.

$$\frac{\text{Children 0–23 months of age who were fed with a bottle during the previous day}}{\text{Children 0–23 months of age}}$$

Notes:

- Information on bottle feeding is useful because of the potential interference of bottle feeding with optimal breastfeeding practices and the association between bottle feeding and increased diarrhoeal disease morbidity and mortality. Bottles with a nipple are particularly prone to contamination. Included in the numerator of this indicator are children less than 24 months of age who received any food or drink from a bottle with a nipple/teat during the previous day (including breast milk), regardless of whether or not the infant was breastfed.
- It is recommended that this indicator be further disaggregated and reported for each of 3 age groups: 0–5 months, 6–11 months and 12–23 months.

Milk feeding frequency for non-breastfed children

15. **Milk feeding frequency for non-breastfed children:** Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings

$$\frac{\text{Non-breastfed children 6–23 months of age who received at least 2 milk feedings during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

Notes:

- Milk feedings include liquid milk products such as infant formula, cow milk or other animal milk. The specific products to be included need to be defined for each target population, to take into account local milk products that are commonly fed to young children in substantial quantities (e.g. fermented dairy products).
- The minimum of 2 milk feedings was selected based on the following: Average energy intake from breast milk in developing countries is approximately 400 kcal/day between 6 and 11 months and 350 kcal/day between 12 and 23 months (*5*). For non-breastfed children, the dietary analysis results (*10*) indicated that 3 milk feedings per day would generally allow for an average intake of milk that is similar to this range (300–400 kcal from milk). Most children will probably not consume more than 180–240 mL of milk per feed, which would be equivalent to ~100–150 kcal/feed if consumed as liquid whole cow milk. Taking the upper end of this range (150 kcal/feed) and a slightly lower "target" for energy intake from milk than is consumed by breastfed children (300 kcal/day), a minimum of 2 milk feedings per day would be needed.
- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months.

D. Operationalizing the indicators

Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) and Knowledge, Practice and Coverage (KPC) Surveys are important sources of information on infant and young child feeding practices for many countries. Based on a comparison of the proposed indicators and comparable indicators that are currently (up to November 2007) used in these surveys, participants identified and discussed a number of methodological differences in measurement between the various surveys. While secondary analyses of selected differences indicated that this might not lead to significantly different results, it was nevertheless considered critical to work towards further harmonization of methodologies for measuring the indicators. It was thus agreed to constitute a working group of measurement experts to develop an operational guide to complement this document. The guide will include questions to elicit information and address methodological issues related to sampling. The operational guide will be available as a published document from the partner agencies that have contributed to this publication.

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ANNEX 1A

Members of the Working Group on Infant and Young Child Feeding Indicators

The Working Group on Infant and Young Child Feeding Indicators was constituted in December 2002, following an informal meeting organized by WHO and hosted at the WHO Regional Office of the Americas. The Working Group had a permanent Steering Team and a large number of contributors who participated in various tasks. Principal investigators were responsible for data analysis from 10 sites that generated the evidence base for formulation of new indicators for children 6–23 months of age. Additional analysis was conducted at the International Food Policy Research Institute (*9*, *10*).

Members of the Steering Team were:

Mary Arimond and Marie Ruel, Food Consumption and Nutrition Division, International Food Policy Research Institute, Washington, DC, USA

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An informal working group to update breastfeeding indicators was constituted in June 2007 and led by Chessa Lutter (Pan American Health Organization, World Health Organization). Other members of the informal working group were: Mary Arimond at IFPRI; Kathryn Dewey at UC Davis; Megan Deitchler at FANTA; Rae Galloway at the Infant and Young Child Nutrition (IYCN) Project; Monica Kothari at Macro International, PATH; Moazzem Hossein, Attila Hancioglu, Julia Krasevec, Nuné Mangasaryan and Tessa Wardlaw at UNICEF; André Briend, Bernadette Daelmans, Chika Hayashi, Peggy Henderson, Randa Saadeh, and Constanza Vallenas at WHO.

ANNEX 1B

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ANNEX 2
Summary list of indicators

Core indicators

1. Early initiation of breastfeeding
2. Exclusive breastfeeding under 6 months
3. Continued breastfeeding at 1 year
4. Introduction of solid, semi-solid or soft foods
5. Minimum dietary diversity
6. Minimum meal frequency
7. Minimum acceptable diet
8. Consumption of iron-rich or iron-fortified foods

Optional indicators

9. Children ever breastfed
10. Continued breastfeeding at 2 years
11. Age-appropriate breastfeeding
12. Predominant breastfeeding under 6 months
13. Duration of breastfeeding
14. Bottle-feeding
15. Milk feeding frequency for non-breastfed children

Top priorities for reporting among the core indicators

Since it may not always be feasible to report on all core indicators, the following four indicators are recommended in order of priority for two critical age groups, based on evidence of their positive association with child survival and/or nutrient intakes.

To assess breastfeeding practices in infants:

1. Exclusive breastfeeding under 6 months
2. Early initiation of breastfeeding

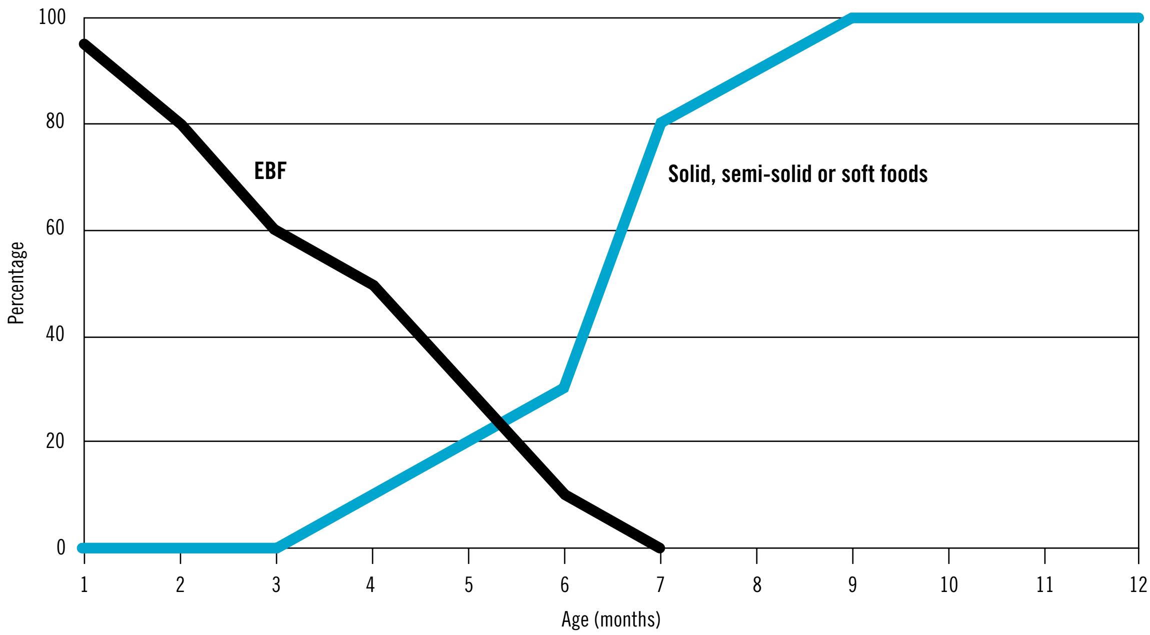
To assess feeding practices in children 6–23 months of age:

1. Minimum acceptable diet
2. Consumption of iron-rich or iron-fortified foods

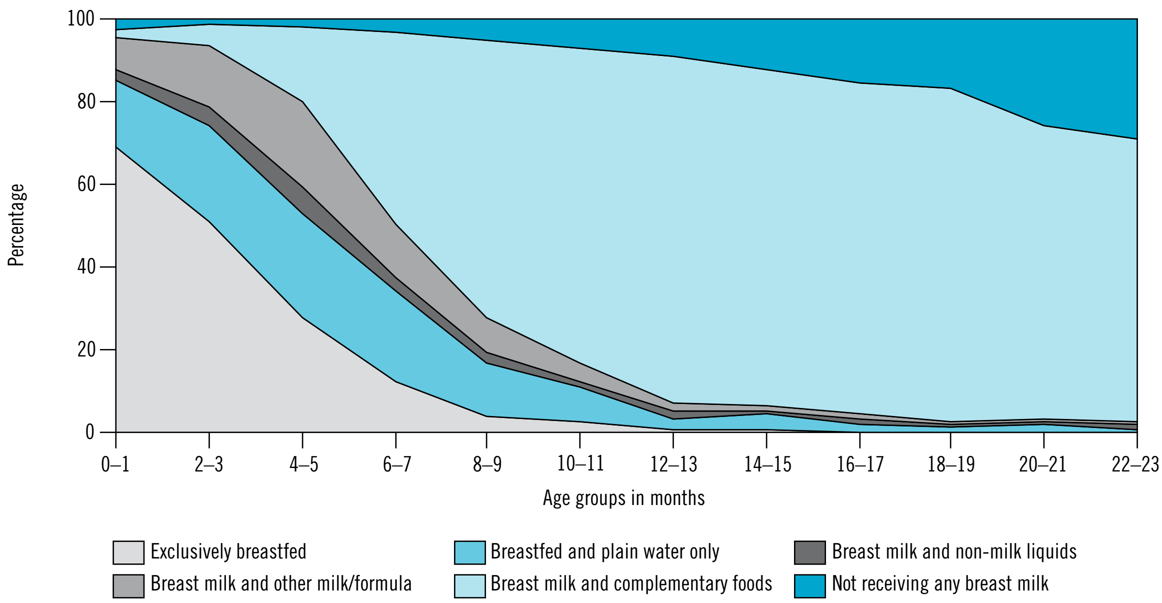
ANNEX 3

Examples of figures illustrating infant feeding practices by age group

Percentage of infants exclusively breastfed (EBF) and percentage receiving solid, semi-solid or soft foods



Infant feeding practices by age



ANNEX F2

Indicators for assessing infant and young child feeding practices 2

World Health Organization

Indicators for assessing infant and young child feeding practices

PART 2
MEASUREMENT

USAID
FROM THE AMERICAN PEOPLE

AED

FANTA · 2
FOOD AND NUTRITION TECHNICAL ASSISTANCE

UCDAVIS

IFPRI
INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
sustainable solutions for ending hunger and poverty
Supported by the CGIAR

unicef

World Health Organization

Indicators for assessing infant and young child feeding practices

PART 2
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AED

FANTA · 2
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unicef

World Health Organization

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Contents

Annexes

Acknowledgments

This document is the result of a collaborative effort to improve the measurement and use of indicators to assess infant and young child feeding practices, initiated by the World Health Organization's Department of Child and Adolescent Health and Development. A particular debt of gratitude is owed to the members of the working group that developed and contributed to all sections of the document under the leadership of Mary Arimond and Megan Deitchler. The working group was composed of:

- Mary Arimond, Program in International and Community Nutrition, University of California, Davis, USA; formerly International Food Policy Research Institute, Washington, DC, USA.
- Megan Deitchler, Food and Nutrition Technical Assistance II Project (FANTA-2), Academy for Educational Development (AED), Washington, DC, USA.
- Alfredo Fort (PATH), Monica Kothari (PATH), and Shea Rutstein, Demographic and Health Surveys, ICF Macro, Calverton, MD, USA.
- Attila Hancioglu and Holly Newby, Statistics and Monitoring Section, UNICEF, New York, USA.
- Julia Krasevec and Mandana Arabi, Nutrition Section, UNICEF, New York, USA.

Special thanks are also due to the reviewers who made extensive and invaluable comments on an earlier draft: Terri Ballard, Agnes Guyon, Sandy Huffman, Mary Lung'aho, Ali Maclaine, Josephine Obel and Helena Pachon. Garden Tabacchi contributed to Annex 4 of the document, while Bernadette Daelmans and Ann-Beth Moller coordinated inputs to the developmental process in WHO.

This document was made possible with the support of the Department of Child and Adolescent Health and Development, World Health Organization, Geneva, Switzerland; the International Food Policy Research Institute (IFPRI), Washington, DC; the Food and Nutrition Technical Assistance II Project (FANTA-2), Academy for Educational Development (AED), Washington, DC; and the Office of Health, Infectious Disease, and Nutrition, Bureau for Global Health, United States Agency for International Development (USAID), Washington, DC, USA.

Acronyms

AED	Academy for Educational Development
BF	Breastfeeding or breastfed
DHS	Demographic and Health Surveys
FANTA-2	Food and Nutrition Technical Assistance II Project
FAO	Food and Agriculture Organization of the United Nations
HH	Household
IBF	Initiation of breastfeeding
IFF	Iron-fortified foods and products
IFPRI	International Food Policy Research Institute
IYCF	Infant and young child feeding
KPC	Knowledge, Practice, and Coverage Surveys
LNS	Lipid based nutrient supplement
MICS	Multiple Indicator Cluster Surveys
NRV	Nutrient Reference Value
ORS	Oral rehydration solution
PAHO	Pan-American Health Organization
RAE	Retinol activity equivalents
RE	Retinol equivalents
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

Introduction

This document is a companion to the recently published *Indicators for assessing infant and young child feeding practices. Part 1: Definitions* (*1*). The new set of indicators reflects current guidance on breastfeeding, complementary feeding, and feeding of non-breastfed infants and young children less than 2 years of age (*2*, *3*). Readers are referred to *Part 1* for a discussion of the background, justification, uses, limitations, and definition of the following set of eight core and seven optional indicators:

Core indicators

1. Early initiation of breastfeeding
2. Exclusive breastfeeding under 6 months
3. Continued breastfeeding at 1 year
4. Introduction of solid, semi-solid or soft foods
5. Minimum dietary diversity
6. Minimum meal frequency
7. Minimum acceptable diet
8. Consumption of iron-rich or iron-fortified foods

Optional indicators

9. Children ever breastfed
10. Continued breastfeeding at 2 years
11. Age-appropriate breastfeeding
12. Predominant breastfeeding under 6 months
13. Duration of breastfeeding
14. Bottle feeding
15. Milk feeding frequency for non-breastfed children

This guide on measurement provides tools for collection and calculation of the indicators. Like the indicators, this guide is intended primarily for use by large-scale surveys; the tools provided herein should be of use to the managers of such surveys. The guide covers topics that are specific to data collection for the infant and young child feeding (IYCF) indicators, and does not cover other related survey research topics comprehensively; many other general sources of guidance are available.[1] The sections that follow present:

- A. An example questionnaire
- B. Example interviewer instructions
- C. Suggestions for adapting the questionnaire to the survey context
- D. Instructions for calculating indicator values

Sections A–D are followed by several Annexes, which provide additional technical guidance as well as references to more comprehensive resources on selected topics.

[1] See, for example, Gorstein J, Sullivan KM, Parvanta I, Begin F. *Indicators and Methods for Cross-Sectional Surveys of Vitamin and Mineral Status of Populations*. The Micronutrient Initiative (Ottawa) and the Centers for Disease Control and Prevention (Atlanta), May 2007.

- Annex 1: Sampling considerations
- Annex 2: Review of issues related to age data
- Annex 3: Alternate method for collecting information on food groups consumed
- Annex 4: Sample liquid and food group list
- Annex 5: Instructions for calculating duration of breastfeeding

This guide is informed by past experience with several large-scale survey programs (the Demographic and Health Surveys (DHS) and the UNICEF Multiple Indicator Cluster Surveys (MICS)) as well as with smaller-scale surveys implemented by many non-governmental organizations (for example, the Knowledge, Practice and Coverage (KPC) Surveys).[1] For some indicators, recent surveys implemented by the Nutrition and Consumer Protection Division of the Food and Agriculture Organization of the United Nations (FAO) have provided insights (*4*).

For some indicators (for example, Indicator #1, *Early initiation of breastfeeding*), measurement methods are extremely simple and have been used consistently across many surveys for years. For some newer indicators, measurement experience is thin or evolving. However, sufficient experience is available to provide a basis for concrete recommendations for operationalizing most indicators.

The example questionnaire in this guide was developed for situations where the objective is to calculate all core and optional indicators.[2] The questionnaire could be simplified when this is not the case; this is discussed in Section C on adapting the example questionnaire.

[1] Demographic and Health Surveys: http://www.measuredhs.com/; Multiple-Indicator Cluster Surveys: http://www.unicef.org/statistics/index_24302.html; Knowledge, Practice, and Coverage Surveys: http://www.childsurvival.com/kpc2000/kpc2004.cfm, all accessed February 12, 2010.

[2] The exception to this is the optional indicator "Duration of breastfeeding". This indicator requires sampling of a wider age range of children. See Annexes 1 and 5 for further explanation.

A. An example questionnaire

This section provides an example questionnaire to collect data for the IYCF indicators. Example interviewer instructions follow in Section B.

The questionnaire modules must be adapted, but should provide a very useful starting point for survey managers. Questionnaires will need to be adapted in two ways.

First, in most cases questions on infant and young child feeding will be part of a larger survey, with multiple objectives. The example questionnaire will need to be integrated into the larger survey, with attention to interview flow and order of modules, respondent burden, and other considerations. The example questionnaire may need to be reformatted in harmony with survey conventions, and appropriate identifying information should be added (for example, geographic location of households, household identification numbers, etc.). These adaptations are survey-specific and are not covered in this guide.

The second type of adaptation (and, closely related, translation) aims to ensure that the intent of each question is correctly operationalized in national or local settings. Section C provides guidance on this second type of adaptation, giving detailed suggestions on which items need to be adapted, and how. Section C also outlines how the questionnaire can be simplified, as, for example, when only a subset of the indicators will be calculated.

The example questionnaire begins on the next page and is comprised of three modules:

- Household Roster
- Initiation of breastfeeding (IBF) module
- Infant and young child feeding (IYCF) module.

HOUSEHOLD ROSTER

Please tell me the name and sex of each person who lives here, starting with the head of the household.

LIST THE HEAD OF THE HOUSEHOLD IN LINE 1. LIST THE NAMES OF ALL HOUSEHOLD MEMBERS (Q2). THEN ASK:

Does anyone else live here, even if they are not at home now? These may include children in school or household members at work.

IF YES, COMPLETE LISTING. THEN, COLLECT INFORMATION STARTING WITH (Q4) FOR EACH MEMBER, ONE PERSON AT A TIME. ADD A CONTINUATION SHEET IF THERE ARE MORE THAN 10 HOUSEHOLD MEMBERS. TICK HERE IF CONTINUATION SHEET WAS USED ☐

Line #	Name	Is ***NAME*** male or female? *1=MALE* *2=FEMALE*		Please tell me how old ***NAME*** is. How old was ***NAME*** on his/her last birthday? *RECORD AGE IN COMPLETED YEARS* *98=DK (ONLY FOR ≥50 YEAR OLDS)*	Eligible for: Initiation of breastfeeding module — *CIRCLE LINE NUMBER IF HH MEMBER IS A WOMAN AGED BETWEEN 15 AND 49 YEARS*	Eligible for: Infant and young child feeding module (under 3 year olds) — *CIRCLE LINE NUMBER IF HH MEMBER IS UNDER 3 YEARS*	Eligible for: Infant and young child feeding module (under 3 year olds) — *FOR EACH CHILD UNDER 3:* Who is the primary caregiver of ***NAME***? *RECORD LINE NUMBER OF CAREGIVER.*
(1)	(2)	(3)		(4)	(5)	(6)	(7)
		Male	Female				
1		1	2	|___|___|	1	1	|___|___|
2		1	2	|___|___|	2	2	|___|___|
3		1	2	|___|___|	3	3	|___|___|
4		1	2	|___|___|	4	4	|___|___|
5		1	2	|___|___|	5	5	|___|___|
6		1	2	|___|___|	6	6	|___|___|
7		1	2	|___|___|	7	7	|___|___|
8		1	2	|___|___|	8	8	|___|___|
9		1	2	|___|___|	9	9	|___|___|
10		1	2	|___|___|	10	10	|___|___|

Are there any other persons living here – even if they are not members of your family or do not have parents living in this household? Including children at work or at school?

IF YES, INSERT PERSON'S NAME UNDER Q2, ASK Q3 AND Q4 AND COMPLETE THE FORM.
THEN, COMPLETE THE TOTALS BELOW.

	WOMEN 15–49 YEARS (FROM Q5 ABOVE	*CHILDREN UNDER 3 YEARS (FROM Q6 ABOVE)*
TOTALS (TOTAL NUMBER ELIGIBLE PER MODULE)	|___|___|	|___|___|

FOR EACH WOMAN AGE 15–49 YEARS, WRITE HER NAME AND LINE NUMBER IN THE INFORMATION PANEL OF THE INITIATION OF BREASTFEEDING MODULE.

FOR EACH CHILD UNDER 3 YEARS OF AGE, WRITE HIS/HER NAME, LINE NUMBER AND THE NAME AND LINE NUMBER OF HIS/HER PRIMARY CAREGIVER (USUALLY THE MOTHER) IN THE INFORMATION PANEL OF THE INFANT AND YOUNG CHILD FEEDING MODULE.

A SEPARATE INITIATION OF BREASTFEEDING MODULE NEEDS TO BE COMPLETED FOR EACH ELIGIBLE WOMAN AND A SEPARATE INFANT AND YOUNG CHILD FEEDING MODULE NEEDS TO BE COMPLETED FOR EACH ELIGIBLE CHILD.

INITIATION OF BREASTFEEDING MODULE

INFORMATION PANEL

(*This information is entered after identifying eligible women from the Household Roster*)

Woman's Name *(FROM COLUMN 2 OF HOUSEHOLD ROSTER)*: ______________________

Woman's Line Number *(CIRCLED IN COLUMN 5 OF HOUSEHOLD ROSTER)*: |___|___|

THIS MODULE IS TO BE ADMINISTERED TO WOMEN IDENTIFIED IN THE HOUSEHOLD ROSTER TO BE BETWEEN 15 AND 49 YEARS OF AGE. A SEPARATE MODULE MUST BE COMPLETED FOR EACH ELIGIBLE WOMAN.

VERIFY THAT YOU ARE SPEAKING WITH THE CORRECT RESPONDENT BY CHECKING THAT THE RESPONDENT'S NAME IS THE SAME AS THE NAME LISTED IN THE INFORMATION PANEL ABOVE.

IF THE PERSON YOU ARE SPEAKING WITH IS NOT THAT INDIVIDUAL, ASK TO SPEAK WITH THE CORRECT RESPONDENT.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	In what month and year were you born?	MONTH .... |___|___| *IF MONTH IS NOT KNOWN, ENTER '98'* YEAR .... |___|___||___|___| *IF YEAR IS NOT KNOWN, ENTER '9998'*	
2	Please tell me how old you are. What was your age at your last birthday? *RECORD AGE IN COMPLETED YEARS.*	Age in Completed Years .... |___|___|	
3	*CHECK Q1 AND Q2: IS THE RESPONDENT BETWEEN THE AGES OF 15 AND 49 YEARS? IF THE INFORMATION IN Q1 AND Q2 CONFLICTS, DETERMINE WHICH IS MOST ACCURATE.*	YES .... 1 NO 2	 → END MODULE
4	I would like to ask you about pregnancies and births that you may have had. Have you ever been pregnant? *IF 'NO' PROBE BY ASKING:* Were you ever pregnant, even this pregnancy did not result in the birth of a live child?	YES .... 1 NO 2	 → END MODULE
5	Have you ever given birth? *IF 'NO' PROBE BY ASKING:* I mean, to a child who ever breathed or cried or showed other signs of life – even if he or she lived only a few minutes or hours?	YES .... 1 NO 2	 → END MODULE
6	When was the last time you gave birth (even if your child is no longer living)? *IF THE RESPONDENT DOES NOT KNOW THE BIRTHDATE ASK:* Do you have a health/vaccination card for that child with the birthdate recorded? *IF THE HEALTH/VACCINATION CARD IS SHOWN, RECORD THE DATE OF BIRTH AS DOCUMENTED ON THE CARD.*	Date of last birth DAY .... |___|___| *IF DAY IS NOT KNOWN, ENTER '98' ABOVE* MONTH .... |___|___| YEAR .... |___|___||___|___|	
7	*CHECK Q6: DID THE RESPONDENT'S LAST BIRTH OCCUR WITHIN THE LAST 2 YEARS, THAT IS, SINCE (**DAY AND MONTH OF INTERVIEW, YEAR XXXX**)?* ***[FOR XXXX, INSERT THE YEAR CORRESPONDING TO 2 YEARS PRIOR THE YEAR OF THE INTERVIEW]*** *YES, LIVE BIRTH SINCE (DAY AND MONTH OF INTERVIEW, YEAR XXXX)* |___| GO TO Q8 *NO LIVE BIRTH SINCE (DAY AND MONTH OF INTERVIEW, YEAR XXXX)* |___| END MODULE		
8	What is the name of your child who was born on ***(DATE INDICATED IN Q6)***?	Name: ______________________	
9	Is ***(NAME)*** a male or female?	MALE .... 1 FEMALE 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
10	Did you ever breastfeed ***NAME***?	YES .... 1 NO 2	 → END MODULE
11	How long after birth did you first put ***NAME*** to the breast? *IF RESPONDENT REPORTS SHE PUT THE INFANT TO THE BREAST IMMEDIATELY AFTER BIRTH, CIRCLE '000' FOR 'IMMEDIATELY'.* *IF LESS THAN 1 HOUR, CIRCLE '1' FOR HOURS AND RECORD '00' HOURS.* *IF LESS THAN 24 HOURS, CIRCLE '1' AND RECORD NUMBER OF COMPLETED HOURS, FROM 01 TO 23.* *OTHERWISE, CIRCLE '2' AND RECORD NUMBER OF COMPLETED DAYS.*	IMMEDIATELY .... 000 ***OR*** HOURS .... 1 |___|___| ***OR*** DAYS .... 2 |___|___|	

INFANT AND YOUNG CHILD FEEDING MODULE

INFORMATION PANEL

(This information is entered after identifying eligible children from the Household Roster)

NAME OF CHILD *(FROM COLUMN 2 OF HOUSEHOLD ROSTER)*: ____________________

SEX OF CHILD *(FROM COLUMN 3 OF HOUSEHOLD ROSTER)* (1=Male; 2=Female): |___|

LINE NUMBER OF CHILD *(CIRCLED IN COLUMN 6 OF HOUSEHOLD ROSTER)*: |___|___|

LINE NUMBER FOR CAREGIVER OF CHILD *(FROM COLUMN 7, FAR RIGHT COLUMN OF HOUSEHOLD ROSTER)*: |___|___|

NAME OF CAREGIVER *(FROM COLUMN 2 OF HOUSEHOLD ROSTER)*: ____________________

THIS MODULE IS TO BE ADMINISTERED TO THE CAREGIVER (USUALLY THE MOTHER) OF CHILDREN RECORDED IN THE HOUSEHOLD ROSTER AS LESS THAN THREE YEARS OF AGE.

A SEPARATE MODULE SHOULD BE COMPLETED FOR EACH ELIGIBLE CHILD.

VERIFY THAT YOU ARE SPEAKING WITH THE CORRECT RESPONDENT BY:

1. *CHECKING THAT THE RESPONDENT'S NAME IS THE SAME AS THE NAME OF CAREGIVER LISTED IN THE INFORMATION PANEL ABOVE.*
2. *CHECKING THAT THE RESPONDENT IS THE PRIMARY CAREGIVER (WHICH IS USUALLY THE MOTHER) OF **(NAME)**.*

IF THE PERSON YOU ARE SPEAKING WITH IS NOT THAT INDIVIDUAL, ASK TO SPEAK WITH THE CORRECT RESPONDENT.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	I would like to ask you some questions about ***(NAME)***. In what month and year was ***(NAME)*** born? What is his/her birthday? *IF THE RESPONDENT DOES NOT KNOW THE EXACT BIRTHDATE ASK:* Does ***(NAME)*** have a health/vaccination card with the birthdate recorded? *IF THE HEALTH/VACCINATION CARD IS SHOWN AND THE RESPONDENT CONFIRMS THE INFORMATION IS CORRECT, RECORD THE DATE OF BIRTH AS DOCUMENTED ON THE CARD.*	DAY .... |___|___| *IF DAY IS NOT KNOWN, ENTER '98'* MONTH .... |___|___| YEAR .... |___|___||___|___|___|	
2	How old was (***NAME***) at his/her last birthday? *RECORD AGE IN COMPLETED YEARS.*	LESS THAN 1 YEAR .... 0 1 YEAR .... 1 2 OR MORE YEARS 2	
3	How many months old is (***NAME***)? *RECORD AGE IN COMPLETED MONTHS.*	Age in completed months ...... |___|___|	
4	*CHECK QUESTIONS 1, 2 AND 3 TO VERIFY CONSISTENCY* *A) IS THE YEAR RECORDED IN Q1 CONSISTENT WITH AGE IN YEARS RECORDED IN Q2?* *B) ARE YEAR AND MONTH OF BIRTH RECORDED IN Q1 CONSISTENT WITH AGE IN MONTHS RECORDED IN Q3?* *IF THE ANSWER TO 4A OR 4B IS 'NO', RESOLVE ANY INCONSISTENCIES. IF THE BIRTHDATE WAS RECORDED ON A HEALTH CARD, THIS MAY BE USED AS THE CORRECT DATA SOURCE.*	YES .... 1 NO .... 2 YES .... 1 NO 2	
5	*CHECK QUESTION 3. IS THE CHILD LESS THAN 24 MONTHS?*	YES .... 1 NO .... 2 DON'T KNOW 8	 → END MODULE → END MODULE

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
6	Has ***(NAME)*** ever been breastfed?	YES .... 1 NO .... 2 DON'T KNOW 8	 → GO TO 7a → GO TO 7a
7	Was ***(NAME)*** breastfed yesterday during the day or at night?	YES .... 1 NO .... 2 DON'T KNOW 8	→ GO TO 8
7a[1]	Sometimes babies are fed breast milk in different ways, for example by spoon, cup or bottle. This can happen when the mother cannot always be with her baby. Sometimes babies are breastfed by another woman, or given breast milk from another woman by spoon, cup or bottle or some other way. This can happen if a mother cannot breastfeed her own baby. Did ***(NAME)*** consume breast milk in any of these ways yesterday during the day or at night?	YES .... 1 NO .... 2 DON'T KNOW 8	
8	Now I would like to ask you about some medicines and vitamins that are sometimes given to infants. Was ***(NAME)*** given any vitamin drops or other medicines as drops yesterday during the day or at night?	YES .... 1 NO .... 2 DON'T KNOW 8	
9	Was ***(NAME)*** given [*LOCAL NAME FOR ORS*] yesterday during the day or at night?	YES .... 1 NO .... 2 DON'T KNOW 8	

READ THE QUESTIONS BELOW. READ THE LIST OF LIQUIDS ONE BY ONE AND MARK YES OR NO, ACCORDINGLY. AFTER YOU HAVE COMPLETED THE LIST, CONTINUE BY ASKING QUESTION 11 (SEE FAR RIGHT HAND COLUMN) FOR THOSE ITEMS (10B, 10C, AND/OR 10F) WHERE THE RESPONDENT REPLIED 'YES'.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES				QUESTIONS AND CODING CATEGORIES
10	Next I would like to ask you about some liquids that ***(NAME)*** may have had yesterday during the day or at night. Did ***(NAME)*** have any ***(ITEM FROM LIST)***?: *READ THE LIST OF LIQUIDS STARTING WITH 'PLAIN WATER'.*		YES	NO	DK	11 How many times yesterday during the day or at night did ***(NAME)*** consume any ***(ITEM FROM LIST)***?: *READ QUESTION 11 FOR ITEMS B, C, AND F IF CHILD CONSUMED THE ITEM.* *RECORD '98' FOR DON'T KNOW.*
A	Plain water?	A	1	2	8	
B	Infant formula such as [**insert local examples**]?	B	1	2	8	B. TIMES I___I___I
C	Milk such as tinned, powdered, or fresh animal milk?	C	1	2	8	C. TIMES I___I___I
D	Juice or juice drinks?	D	1	2	8	
E	Clear broth?	E	1	2	8	
F	Yogurt?	F	1	2	8	F. TIMES I___I___I
G	Thin porridge?	G	1	2	8	
H	Any other liquids such as [**list other water-based liquids available in the local setting**]?	H	1	2	8	
I	Any other liquids?	I	1	2	8	

[1] Question 7a is shaded because it is an optional question. See Section C "Suggestions for adapting the questionnaire to the survey context".

12	Please describe everything that ***NAME*** ate yesterday during the day or night, whether at home or outside the home. a) Think about when ***NAME*** first woke up yesterday. Did ***NAME*** eat anything at that time? *IF YES*: Please tell me everything ***NAME*** ate at that time. *PROBE:* Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE. IF NO, CONTINUE TO QUESTION b).* b) What did ***NAME*** do after that? Did ***NAME*** eat anything at that time? *IF YES:* Please tell me everything ***NAME*** ate at that time. *PROBE:* Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE.* *REPEAT QUESTION b) ABOVE UNTIL RESPONDENT SAYS THE CHILD WENT TO SLEEP UNTIL THE NEXT DAY.* *IF RESPONDENT MENTIONS MIXED DISHES LIKE A PORRIDGE, SAUCE OR STEW, PROBE:* c) What ingredients were in that ***MIXED DISH***? *PROBE:* Anything else? *UNTIL RESPONDENT SAYS NOTHING ELSE.* *AS THE RESPONDENT RECALLS FOODS, UNDERLINE THE CORRESPONDING FOOD AND CIRCLE '1' IN THE COLUMN NEXT TO THE FOOD GROUP. IF THE FOOD IS NOT LISTED IN ANY OF THE FOOD GROUPS BELOW, WRITE THE FOOD IN THE BOX LABELED 'OTHER FOODS'. IF FOODS ARE USED IN SMALL AMOUNTS FOR SEASONING OR AS A CONDIMENT, INCLUDE THEM UNDER THE CONDIMENTS FOOD GROUP.* *ONCE THE RESPONDENT FINISHES RECALLING FOODS EATEN, READ EACH FOOD GROUP WHERE '1' WAS NOT CIRCLED, ASK THE FOLLOWING QUESTION AND CIRCLE '1' IF RESPONDENT SAYS YES, '2' IF NO AND '8' IF DON'T KNOW:* Yesterday during the day or night, did ***NAME*** drink/eat any ***FOOD GROUP ITEMS***?

	OTHER FOODS: *PLEASE WRITE DOWN OTHER FOODS IN THIS BOX THAT RESPONDENT MENTIONED BUT ARE NOT IN THE LIST BELOW:*

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES			
			YES	NO	DK
A	Porridge, bread, rice, noodles, or other foods made from grains	A	1	2	8
B	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside	B	1	2	8
C	White potatoes, white yams, manioc, cassava, or any other foods made from roots	C	1	2	8
D	Any dark green leafy vegetables	D	1	2	8
E	Ripe mangoes, ripe papayas, or (**insert other local vitamin A-rich fruits**)	E	1	2	8
F	Any other fruits or vegetables	F	1	2	8
G	Liver, kidney, heart, or other organ meats	G	1	2	8
H	Any meat, such as beef, pork, lamb, goat, chicken, or duck	H	1	2	8
I	Eggs	I	1	2	8
J	Fresh or dried fish, shellfish, or seafood	J	1	2	8
K	Any foods made from beans, peas, lentils, nuts, or seeds	K	1	2	8
L	Cheese, yogurt, or other milk products	L	1	2	8
M	Any oil, fats, or butter, or foods made with any of these	M	1	2	8
N	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits	N	1	2	8
O	Condiments for flavor, such as chilies, spices, herbs, or fish powder	O	1	2	8
P	Grubs, snails, or insects	P	1	2	8
Q	Foods made with red palm oil, red palm nut, or red palm nut pulp sauce	Q	1	2	8
Check categories A–Q		*IF ALL 'NO':* → GO TO 13 *IF AT LEAST ONE 'YES' OR ALL 'DK':* → GO TO 14			

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
13	Did ***NAME*** eat any solid, semi-solid, or soft foods yesterday during the day or at night? *IF 'YES' PROBE:* What kind of solid, semi-solid, or soft foods did ***NAME*** eat?	YES .... 1 *GO BACK TO Q12 AND RECORD FOODS EATEN. THEN CONTINUE WITH Q14* NO .... 2 DON'T KNOW 8	 → GO TO 15 → GO TO 15
14	How many times did ***NAME*** eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?	NUMBER OF TIMES .... I___I___I DON'T KNOW 98	
15	Did ***NAME*** drink anything from a bottle with a nipple yesterday during the day or night?	YES .... 1 NO .... 2 DON'T KNOW 8	

Additional questions to append to infant and young child feeding module

The questions on the next page relate to consumption of iron fortified foods and products. These questions have been separated from Q1-15 of the IYCF module because they are in an early stage of development and have not been field-tested.

Questions on iron-fortified foods and products are necessary in order to calculate a value for Indicator #8 (*Consumption of iron-rich or iron-fortified foods*).

Given that this indicator may be of particular relevance to some countries, there may be a desire to collect information on consumption of iron-fortified foods and products in surveys before a standard set of field-tested questions can be recommended. The questions on the next page can be considered for use until the time when standard field-tested questions can be recommended. Care should be taken to adapt the proposed questions to the local context and special attention given during pre-testing and translation of the questionnaire.

Consumption of iron-fortified foods and products

IFF Q1, IFF Q2, IFF Q3, and IFF Q4 can be used to collect information about the consumption of iron fortified foods and products by children less than two years of age. These questions can easily be incorporated into the IYCF module by appending them after Q15.

All of these questions require significant in-country adaptation. The **[bold text]** in square brackets will need to be adapted by the survey manager prior to interviewer training. The bold text should be replaced by a list of all of the iron-fortified food items specially designed for infants and young children and/or the specific names of the iron-fortified products available in the survey setting. Local names for the foods and products should be used. After inserting the list of these items into IFF Q1, IFF Q2, IFF Q3, and IFF Q4, the bold font should be changed to regular font in the questionnaires to indicate to the interviewer to read the list of items to the respondent. For example, for IFF Q3, a locally adapted version of the question in one country may read "Yesterday, during the day or night, did ***(NAME)*** consume any Plumpy'Nut™?"

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
IFF Q1	Now I would like to ask you about some particular foods ***(NAME)*** may eat. I am interested in whether your child had the item even if it was combined with other foods. Yesterday, during the day or night, did ***(NAME)*** consume any [**list iron fortified solid, semi-solid or soft foods designed specifically for infants and young children available in the local setting**]?	YES .... 1 NO .... 2 DON'T KNOW 8	
IFF Q2	Yesterday, during the day or night, did ***(NAME)*** consume any food to which you added a [**powder or sprinkles**] like this? *SHOW COMMON TYPES OF MICRONUTRIENT POWDERS AVAILABLE IN SURVEY AREA.*	YES .... 1 NO .... 2 DON'T KNOW 8	
IFF Q3	Yesterday, during the day or night, did ***(NAME)*** consume any [**list lipid based nutrient supplement (LNS) available in the local setting**]? *SHOW COMMON TYPES OF LNS AVAILABLE IN SURVEY AREA.*	YES .... 1 NO .... 2 DON'T KNOW 8	
IFF Q4	Yesterday, during the day or night, did ***(NAME)*** consume any [**list iron fortified infant/toddler formulas available in the local setting**]?	YES .... 1 NO .... 2 DON'T KNOW 8	

B. Example interviewer instructions

General instructions are followed by question-by-question instructions for each module.

General interviewer instructions

Asking questions and recording answers

It is very important that you ask each question exactly as it is written on the questionnaire. If the respondent does not understand the question, you may need to use extra probing questions. Probing questions are included in the questionnaire and are also discussed during interviewer training. It is important that all interviewers use the same probing questions.

In some cases, a respondent may truly not know the answer to a question or refuse to answer a question. However, you must record an answer for all questions that you ask the respondent. Do not leave any questions blank because it may look as though you forgot to ask the question. Some questions have a “don’t know” answer code. You can circle that code if the respondent is unable to remember despite the probing questions. For other questions, there is not a “don’t know” answer code. For these questions, if the respondent truly cannot remember despite your probing, or refuses to answer, you should leave the question blank and write a comment on the questionnaire, in the margin on the right. The margins should also be used to make notes on anything out of the ordinary or any problems you may encounter during the interview.

Throughout the questionnaire, there are statements that appear in *ALL CAPITAL LETTERS AND ITALIC FONT*. These are interviewer instructions, and should not be read aloud to the respondent.

Underlined letters in bold font indicate that you should replace the text with information that the respondent has already given you. For example in the IYCF module ***<u>(NAME)</u>*** will often appear in bold and underlined font. Here, ***<u>(NAME)</u>*** indicates that the text in parentheses needs to be replaced by the name of the child for the module.

Most questions have pre-coded responses. It is important that you do not read these choices aloud. When you ask a question, you should listen to the respondent’s answer, then circle the code next to the pre-coded response that best matches her answer.

Skip patterns

It is very important that you ask the respondent only those questions relevant to her situation. For certain questions, you will skip to the next appropriate question, or end the module, if the respondent gives a particular response. For example, in the IBF module, question 10 is “Did you ever breastfeed ***<u>(NAME)</u>***?” If the respondent answers “no” to this question, then she should not be asked question 11 (“How long after birth did you first put ***<u>(NAME)</u>*** to the breast?”). Skip instructions are usually located in the far right-hand column of the questionnaire.

Interviewer instructions: administering the household roster

The Household Roster is designed to collect information about the sex and age of all members of each household. Information for the Household Roster is usually collected from the head of the household.

The first step in completing the Household Roster is to request a list of all persons who usually live in the household. During interviewer training the definition of a household will be discussed, along with the criteria that must be met for an individual to be considered a member of that household. You will need to determine whom to include in the household and whom to leave out based on the specific definition of household that is being used for the survey. These definitions can vary depending on the setting and cultural context of the survey.

Q1: Line number

In the first column of the Household Roster, each row is pre-assigned a unique number. This number is referred to as the line number. It is used to identify the person listed on that row and to link all information collected in later survey modules to that individual.

Q2: Name of household member

After recording the name, sex, and age of the household head, ask for and record the name, sex and age of all other household members (columns 2, 3 and 4).

Q3: Sex of household member

Always ask the sex of a person before recording it since there are many names that may be given to either a male or female.

Q4: Age of household member

Obtain each person's age in completed years. Age in completed years is the person's age at the time of their last birthday. Completed age is also defined as the number of completed solar years since birth. With this definition, since a 6-month-old infant has not completed a full solar year, his/her age will be entered as "00". Note: later in the interview, you will obtain more accurate estimates for children under 3 years of age.

This column should never be left blank.

If you have difficulty obtaining the ages of very elderly members of the household, you may enter the code "98", meaning "Don't know/at least 50 years". For household members younger than 50 years, completed ages must be entered.

The information in the Household Roster can be useful for many reasons, but is particularly important for identification of respondents in the household who meet the eligibility criteria for each module included in the questionnaire. The eligibility criteria for the IBF and IYCF module are listed below.

- An eligible respondent for the IBF module is a woman from 15–49 years of age.[1]
- An eligible respondent for the IYCF module is the primary caregiver (or mother) of a child less than 3 years of age; children less than 3 years of age are also identified on the roster as "eligible".

Qs 5 and 6: Interviewer check for respondent eligibility

Questions 5 and 6 are not asked of the respondent. These two columns of the Household Roster are used to identify the household members that meet the eligibility criteria for each module. In Q5, circle the line number of each household member identified as a woman between the ages of 15 and 49 years old. In Q6, circle the line number of each household member identified as a child under 3 years of age.

[1] Throughout this document, the following convention is used for age ranges: women from 15–49 years include those who have reached their 15th birthday but have not yet reached their 50th birthday (i.e., it indicates 15.0–49.9 years).

Q7: Identification of primary caregiver (or mother) of child under 3 years

Question 7 is asked of the respondent. For the purpose of this module, the primary caregiver is the person who knows the most about how and what the child is fed. Usually (but not always) this will be the child's mother. The caregiver identified in Q7 is the individual who is asked the questions about the child under 3 years in the IYCF module. Record the line number of the caregiver for each child meeting the eligibility criteria. Note that a separate IYCF module is administered for each child under 3 years in the household.

Last probe for household members

When you have completed the listing of all household members and all questions in the Household Roster, probe to see if there are any other household members you have not included in the list: "Are there any other persons living here – even if they are not members of your family or do not have parents living in this household? Including children at work or at school?" If "yes", insert the individual's name and complete the form.

Totaling columns 5–7 at the bottom of the Household Roster

After you have made sure that there are no other household members to be included in the list, complete the row at the bottom of the household list, *"TOTALS"*. Sum the number of eligible women in the household and record the number under *"WOMEN 15–49 YEARS"*. Sum the number of children under three years of age, and record the number under *"CHILDREN UNDER 3 YEARS"*.

The numbers recorded here for the women 15–49 years and children under 3 years tell you the number of IBF modules and the number of IYCF modules you should complete for that household.

For example: If three women between the ages of 15 and 49 years are listed in the Household Roster, the IBF module should be administered three times, once with each woman 15–49 years in the household.

Similarly, if three children under 3 years are listed in the Household Roster, the IYCF module should be administered three times, each time collecting information about a different child. Depending on who is identified as the primary caregiver (or mother) of each child (Q7), the IYCF modules may need to all be administered to the same respondent, or may need to be administered to different respondents.

When an individual is identified in the Household Roster as meeting the eligibility criteria for either the IBF module or the IYCF module, complete the information panel at the top of the corresponding module.

For example, in the case that there are three women 15–49 years and three children under 3 years listed in the Household Roster, a total of three information panels would need to be completed for the IBF module and a total of three information panels would need to be completed for the IYCF module.

Interviewer instructions: administering the initiation of breastfeeding module

Selecting the respondent(s) for this module

The questions in the IBF module are asked of female household members identified in the Household Roster as age 15–49 years. A separate IBF module should be administered to each individual identified in the Household Roster in this age group.

Before starting with Q1, verify that you are speaking with the correct respondent. The respondent's name should be the same as the name listed in the information panel. If the respondent is not the individual identified in the information panel, you should ask to speak with the correct respondent.

Privacy

Some of the questions in the module are very sensitive, concerning children who may have died. It is important to try to find the most private space possible for asking the questions in this module.

Q1: Birthdate of respondent

Age, as identified from Q1 and Q2, is used to confirm if the woman is eligible for this module.

Questions in this module regarding birthdate and age must be asked independently of the information on the Household Roster. Even if you already asked the respondent her age when you were completing the Household Roster, you must ask again for her date of birth and age when administering the IBF module.

If the respondent knows her month and year of birth, write it in the appropriate spaces for "Month" and "Year". You will need to convert the month into numbers.

If the month or day contains only one digit, use a leading zero to fill in the first space.

Examples:	For January	record "01"
	For February	record "02"
	For March	record "03", etc.

If she does not know her month of birth, enter "98", indicating "don't know" month and ask her for the year of her birth. If she knows the year, write it in the spaces for "Year". Try under all circumstances to obtain at least the year of birth. If the respondent is unable to provide this information, ask whether she has any documentation such as an identification card, horoscope, or a birth or baptismal certificate that might give her date of birth. If such documentation is available, ask the woman if the information on the document(s) is correct. Do not enter "9998" (indicating "don't know" for year) *unless it is absolutely impossible to estimate the year of birth.*

Q2: Age of respondent

You must ask Q2 even if the woman provided her birthdate in response to Q1. If the woman knows her age, write it in the space provided. If the woman does not know her age, you will need to use one of the following methods to estimate her age.

(a) If the woman does not know her age, and year of birth is reported in Q1, compute the woman's age as follows:

- *Already celebrated birthday in the current year.* If the woman has had her birthday in the current year, subtract the year of birth from the current year.
- *Not yet celebrated birthday in the current year.* If the woman has not yet had her birthday in the current year, subtract the year of birth from last year.
- *Does not know her birthday.* If the woman does not keep track of the time within a year when her birthday falls, it is sufficient to subtract the year of birth from the current year.

(b) If the woman does not know her age, and year of birth is not reported in Q1, probe for clues to estimate her age. There are several ways to probe for age:

- Ask the respondent how old she was when she got married or had her first child, and then try to estimate how long ago she got married or had her first child. EXAMPLE: If she says she was 19 years old when she had her first child and that the child is now 12 years old, she is probably 31 years old.
- Relate her age to that of someone else in the household whose age is more reliably known.
- Try to determine how old she was at the time of an important event such as war, flood, earthquake, change in political regime, etc. and add her age at that time to the number of years that have passed since the event.

(c) The woman does not know her age, year of birth is not reported in Q1 and probing did not help:

- If probing does not help in determining the respondent's age and year of birth is not recorded in Q1, you will have to estimate her age. Remember, this is a last resort to be used only when all your efforts at probing have failed.

Q3: Interviewer check

Question 3 is not asked of the respondent. This question requires that you check the respondent's answers to previous questions to verify if the respondent is eligible (of the correct age) for the survey module.

Check the responses given in Q1 and Q2. Before moving on to the next question, verify that the respondent is at least 15 but no more than 49 years of completed age. If the information in Q1 conflicts with the information in Q2, discuss further and probe to determine which information is most likely to be correct.

If the woman is younger than 15 years or older than 49 years, you will need to end the interview. Do this tactfully by thanking the respondent and asking her if she can find the next person you need to interview.

Q4: Information about pregnancy

Question 4 asks if the respondent has ever been pregnant, whether or not that pregnancy resulted in a live birth. In some settings, a pregnancy not resulting in the birth of a child may not be considered a pregnancy. For this reason, if a respondent says "no" to Q4, probe by asking: "Were you ever pregnant, even if this pregnancy did not result in the birth of a live child?" If her answer is still "no", you need to end the interview. Do this tactfully by thanking the respondent and asking her if she can find the next person you need to interview.

Q5: Information about births

The purpose of Q5 is to find out whether the respondent has ever had a live birth in her lifetime. In some settings, a respondent may not consider a child who later died a birth. If a respondent says "no" to Q5, you should probe by asking: "By births I mean to a child who has ever breathed or cried or showed other signs of life – even if he or she lived only a few minutes or hours." If her answer is still "no", you need to end the interview. Do this tactfully by thanking the respondent and asking her if she can find the next person you need to interview.

Q6: Date of birth

Question 6 asks the respondent to report the day, month, and year of her most recent birth.

If she knows the exact birthdate, including the day, enter the day of birth.

If she does not know the exact day of birth, you can enter "98", indicating "don't know" for day. You do not need to probe further for day of birth.

Convert the month to a number (refer to instructions and examples above for Q1).

Note that you are **not** allowed to enter "don't know" for month or year of birth. *You must obtain month and year for the respondent's last birth.*

If the respondent is unable to provide the date of her most recent birth, ask whether she has any documentation such as an identification card, health card, horoscope, or a birth or baptismal certificate that might give the date of her last birth. Confirm with the respondent that the date of birth recorded on such documents is indeed correct. You can also use a local events calendar to help determine the birthdate, if such a calendar has been developed for the survey. If one is available you will be taught how to use the calendar during your training.

Q7: Interviewer check

In this module, we are only interested in collecting information about births that occurred within two years of the date of the interview.

Once the date of the respondent's most recent live birth is determined in Q6, use the calendar tool in Annex 2 (page 60) to identify if the birth was within the last two years. Follow the instructions on the top of the calendar. The calendar tool provides a visual method. You do not need to calculate the child's exact age at this time.

If the respondent's most recent birth is within the last two years continue with Q8. If the respondent's most recent birth was not within the last two years, you will need to end the interview. Do this tactfully by thanking the respondent and asking her if she can find the next person you need to interview.

Q8: Name of child

Ask the respondent the name given to that child and record this name in Q8 before continuing to Q9. You will need the child's name to ask subsequent questions. If the respondent gave birth to multiple children at one time (for example, twins, triplets), record the last born child in Q8. In case the infant died as a newborn and was not given a name, write "no name" in the space for name.

Q9: Sex of child

Ask the respondent the sex of the child and record this in Q9. Always ask the sex of the infant before recording it since there are many names that may be given to either a male or female.

Q10: Child ever breastfed

For this question it does not matter how long the respondent breastfed the child, only whether or not she ever gave the child the breast (even if the baby died very young). It does not matter whether or not the mother's milk had arrived at the time she gave the child the breast.

Q11: Initiation of breastfeeding

This question asks about when the child was first put to the breast. For this question, it also does not matter whether or not the mother's milk had arrived at the time of first putting the child to the breast.

If the respondent reports that she put the infant to the breast immediately after birth, circle "000."

Otherwise, record the time in completed hours or days. If less than 1 hour, circle "1" for hours and record "00" hours. If less than 24 hours, circle "1" and record the number of completed hours that passed between time of birth and first putting the child to the breast. Otherwise, circle "2" and record the number of completed days.

For example, if the woman said she began breastfeeding within 10 minutes of the birth, circle "1" for HOURS and record "00" hours.

How long after birth did you first put ***NAME*** to the breast? *IF RESPONDENT REPORTS SHE PUT THE INFANT TO THE BREAST IMMEDIATELY AFTER BIRTH, CIRCLE '000' FOR 'IMMEDIATELY'.* *IF LESS THAN 1 HOUR, CIRCLE '1' FOR HOURS AND RECORD '00' HOURS.* *IF LESS THAN 24 HOURS, CIRCLE '1' AND RECORD NUMBER OF COMPLETED HOURS, FROM 01 TO 23.* *OTHERWISE, CIRCLE '2' AND RECORD NUMBER OF COMPLETED DAYS.*	IMMEDIATELY .... 000 ***OR*** HOURS .... 1 |**0**|**0**| ***OR*** DAYS .... 2 |___|___|

For example, if the woman said she began breastfeeding about 3 hours after the birth, circle "1" for HOURS and record "03" hours.

How long after birth did you first put ***(NAME)*** to the breast? *IF RESPONDENT REPORTS SHE PUT THE INFANT TO THE BREAST IMMEDIATELY AFTER BIRTH, CIRCLE '000' FOR 'IMMEDIATELY'.* *IF LESS THAN 1 HOUR, CIRCLE '1' FOR HOURS AND RECORD '00' HOURS.* *IF LESS THAN 24 HOURS, CIRCLE '1' AND RECORD NUMBER OF COMPLETED HOURS, FROM 01 TO 23.* *OTHERWISE, CIRCLE '2' AND RECORD NUMBER OF COMPLETED DAYS.*	IMMEDIATELY .... 000 ***OR*** HOURS .... 1 |_0_|_3_| ***OR*** DAYS .... 2 |___|___|

For example, if the baby was first breastfed 30 hours after delivery, circle "2" for DAYS and record "01" days.

How long after birth did you first put ***(NAME)*** to the breast? *IF RESPONDENT REPORTS SHE PUT THE INFANT TO THE BREAST IMMEDIATELY AFTER BIRTH, CIRCLE '000' FOR 'IMMEDIATELY'.* *IF LESS THAN 1 HOUR, CIRCLE '1' FOR HOURS AND RECORD '00' HOURS.* *IF LESS THAN 24 HOURS, CIRCLE '1' AND RECORD NUMBER OF COMPLETED HOURS, FROM 01 TO 23.* *OTHERWISE, CIRCLE '2' AND RECORD NUMBER OF COMPLETED DAYS.*	IMMEDIATELY .... 000 ***OR*** HOURS .... 1 |___|___| ***OR*** DAYS .... 2 |_0_|_1_|

Interviewer instructions: administering the infant and young child feeding module

Selecting the respondent(s) for this module

The purpose of the IYCF module is to find out how and what the child is fed. Therefore, for the purpose of this module, the primary caregiver is the person who knows the most about how and what the child is fed. Usually (but not always) this will be the child's mother. The primary caregiver for each eligible child is identified on the Household Roster and the caregiver's line number and name are recorded at the top of this module.

Complete a separate IYCF module for each child in the Household Roster who is less than 3 years of age. If there are two or more eligible children in the household and these children have different caregivers (or mothers), ask the module of each caregiver (or mother).

First, verify that you are speaking with the correct respondent. The respondent should be the primary caregiver (which is usually the mother) of the child listed in the information panel. If the respondent is not the person identified in the information panel, you should ask to speak with the correct respondent.

Qs 1, 2 and 3: Date of birth and age of child

You will begin the interview with questions about the child's date of birth and age. These are very important questions in the interview, since analysis of the data depends on the child's exact age.

We need to obtain accurate information on the child's *age in months*. You will collect this information by learning the child's date of birth. Later, the child's age in months will be calculated by comparing the child's date of birth to the date of the interview.

The questions on age and date of birth must be asked independently from similar questions on the Household Roster and IBF Module. The person you interview for this module may be the same woman you interviewed for the IBF Module, and you may have obtained date of birth for the child in that questionnaire. Also, you may have obtained the child's age in the Household Roster. Even in such cases, you must ask these questions again.

For this module, we are only interested in collecting information about children less than two years of age. On the Household Roster, all children under 3 years were identified, and information panels were filled for each of these children. This is because often the household head is the respondent for the Household Roster. This person may not always know the exact age of children. The primary caregiver of the child (the respondent for this module) will usually be able to report the date of birth of the child with the most accuracy. That is why questions about age are asked again.

In Q1, the caregiver is asked the day, month, and year when the child was born.

- If the caregiver knows the exact birthdate, including the day, enter the day of birth.
- If she does not know the exact day of birth, you can enter "98", indicating "don't know" for day. You do not need to probe further for day of birth.
- Convert the month to a number (you can refer to instructions and examples above for Q1 on the IBF module).
- Note that you are **not** allowed to enter "don't know" for month or year of birth. *You have to obtain the month and year of the child's birth.*
- If the respondent is unable to provide the date of the child's birth, ask whether she has any documentation such as an identification card, health card, horoscope, or a birth or baptismal certificate that might give the date of her last birth. Confirm with the respondent that the date of birth recorded on such documents is indeed correct.
- You can also use a local events calendar to help determine the birthdate, if such a calendar has been developed for the survey. If one is available you will be taught how to use the calendar during your training.

Question 2 asks about the child's age in completed years and Q3 asks about the child's age in completed months.

Examples: A child who will soon turn 3 years (36 months) would be recorded as being 2 years of age in Q2 and 35 months in Q3.

A child who is 2 weeks old would be recorded as being 0 years of age in Q2 and 0 months of age in Q3.

If the caregiver does not know the current age of the child, try asking "How many years ago was ***(NAME)*** born?" You may help the respondent by relating the child's age to that of other children or to some important event or to the season of birth, by asking, for example, "How many wet seasons ago was ***(NAME)*** born?"; "In what season was ***(NAME)*** born?".

Qs 4 and 5: Interviewer check for age consistency and eligibility

After the respondent has answered Q1, Q2 and Q3, check that the age of the child in completed years (Q2) is correct based on the birthdate provided by the respondent (Q1). Also, check that the age of the child in completed months (Q3) is correct based on the birthdate provided by the respondent (Q1).

If the responses to Q1 and Q2 are inconsistent, or the responses to Q1 and Q3 are inconsistent, you will need to determine the source of the inconsistency, and correct the responses, accordingly.

If the birthdate was recorded from a health card or other documented source and the respondent confirms that the recorded information is accurate, this should generally be accepted as correct and the number of completed years (Q2) and number of completed months (Q3) should be adjusted accordingly.

Use the calendar tool in Annex 2 (page 60) to identify eligible children (those under two years of age). Follow the instructions on the top of the calendar. The calendar tool provides a visual method to determine if the child is eligible.

If the child is 24 months (2.0 years) of age or older, you need to end the interview. Do this tactfully by thanking the respondent and asking her if she can find the next person you need to interview.

Q6: Child ever breastfed

Question 6 asks if the child has ever been breastfed. For this question it does not matter how long the respondent breastfed the child, only whether or not she ever gave the child the breast. If the respondent answers “yes” to Q6, continue to Q7. If the respondent answers “no” or “don’t know” to Q6, skip to Q7a.

Q7: Child currently being breastfed

Question 7 asks if the child was breastfed in the day or night preceding the interview. If the respondent answers “no” or “don’t know”, continue to the next Q7a. If the respondent answers “yes” to Q7, skip to Q8.

Q7a: Alternative breast milk feeding question

Question 7a is only used if the respondent tells you either: 1) the child was never breastfed; 2) the child was not breastfed yesterday; or 3) the respondent does not know whether or not the child was breastfed.

Question 7a helps us find out if the child was given breast milk some other way, rather than being breastfed by the mother. Sometimes it is not possible for the mother herself to breastfeed her child and alternate feeding methods are used to provide breast milk to the child.

Question 7a asks whether the child received breast milk yesterday (day or night) in the following ways:

- Child was breastfed by someone other than the mother.
- Child was given breast milk expressed by the mother and fed by spoon, cup, or some other way.
- Child was given breast milk expressed by someone other than the mother (and fed by spoon, cup, etc.).

Qs 8–13: Medicines, liquids and foods given yesterday

The main purpose of Q8 through Q13 is to learn if the child is being exclusively breastfed and to obtain a better picture of the diversity (number of different food groups) and quality of the child’s diet.

Questions 8 and 9 ask about vitamin/mineral or medicine drops, and about oral rehydration solutions. You will ask if the child consumed any of these the previous day.

In Q10, you will ask the caregiver about different types of liquids the child may have consumed the day before the interview (yesterday during the day or at night). It is extremely important to ask about all the different kinds of liquids listed. This is because if a child consumed any of the liquids listed in Q10, that child was not exclusively breastfed.

Read the question slowly and then read through each item A-I in the list. Wait for the response after each item and record whether the child consumed the liquid or not. Although not always considered a liquid, yogurt is included in the list of liquids here because we want to ask about the frequency of feeding for certain milk-based liquids and foods in Q11.

After completing Q10, go to Q11 in the far right-hand column of the module. Question 11 asks about the number of times the child consumed milk-based liquids yesterday. Ask Q11 just as it is written.

Question 11 is asked separately for: infant formula; milk such as tinned, powdered, or fresh animal milk; and yogurt. Information about frequency is only collected for those items (B, C, and/or F) for which the caregiver replied “yes” in Q10. For Q11B, record the number of times the child drank infant formula. For Q11C, record the number of times the child drank any type of animal milk. For Q11F, record the number of times the child consumed any type of yogurt, whether liquid yogurt or a yogurt that is thicker in consistency.

You may need to use probes to help the caregiver remember all the times the child consumed each of the items yesterday. Probing methods for this question should be discussed during interviewer training.

Question 12 asks about the different types of foods the child ate the day before the interview. The approach used for collecting information about the child's diet is a 24-hour "free recall" by the respondent.[1] Help the respondent to recall what the child ate the day before, as follows:

1. Begin with asking about the first food eaten by the child the previous day. Use neutral questions, such as those provided in Q12, to help the respondent remember the child's activities on the previous day. Begin with the first events/activities in the morning and help the caregiver recall events in order through the day. This helps ensure that she remembers all of the foods the child ate at various times throughout the day and night.
2. You should **not** ask the respondent about specific meals (for example, do not ask – what did ***(NAME)*** eat for breakfast yesterday – or what did ***(NAME)*** eat yesterday morning) – as such questions assume that the child ate breakfast or ate in the morning. If you ask that way, the caregiver might feel like she should report something, even if the child did not eat. The series of neutral questions provided in Q12 guide you through a non-biased interview.
3. As the respondent recalls the foods, underline the corresponding food (if listed) in Q12 and circle "1" in the column to the right of the food group.
4. If foods are used in small amounts for seasoning or as a condiment, these should be included under the condiments food group. For example, if the respondent mentions that she used a few dried chilies to season a pot of stew fed to the child, the chilies would be included in the condiment food group, not the vegetables group.
5. If a food is not listed in any of the existing food groups, write the name of the food in the box labeled "other foods", located above item A. These foods should not be coded into a food group at the time of the interview. A supervisor will decide how to code these foods later.
6. Probe for added foods in mixed dishes such as porridges, stews and sauces. If the caregiver says the child ate a mixed dish, ask about and underline all the ingredients of the dish using the probe provided in Q12 ("What ingredients were in that ***(MIXED DISH)***?" *Probe:* "Anything else?" *until the respondent says* "nothing else"). Do not ask "leading questions" as this may result in biased results; for example, do **not** ask – "didn't you add any meat to your sauce?" This may lead the caregiver to report cooking with meat, even if she did not have any.
7. Once the recall is finished, ask the respondent about the food groups remaining in Q12 where no food has already been underlined. Circle "1" in the right hand column of the questionnaire if the respondent is reminded of a food in that group eaten by the child. Circle "2" in the right hand column of the questionnaire if she confirms that no foods in that group were eaten by the child yesterday. Circle "8" in the right hand column if the respondent does not know if the child ate any food in that group.

At the end of Q12 there is an "interviewer check". Before continuing, review responses for all food groups in Q12A–12Q. If there is at least one food group where "1" ("yes") is circled, skip to Q14. If "2" ("no") is circled for all food groups, continue with Q13.

Question 13 asks if the child ate any solid, semi-solid or soft food yesterday during the day or at night. This question is only asked if none of food groups A through Q are reported by the caregiver during the free recall. This question is used to verify that the child really had no such foods the previous day. If the caregiver responds "no" or "don't know", skip to Q15.

However, if the caregiver responds "yes" this means that one or more foods were missed during the free recall. If she says "yes", probe for the type of food and go back and correct Q12. Make a

[1] Instructions for administering question 12 using an alternative list-based method are provided in Annex 3.

note in the margin to explain to your supervisor that the food was missed during the recall. This situation is very unusual and will not happen often.

Q14: How many times the child ate yesterday

This question asks about how many times the child ate solid, semi-solid or soft foods yesterday. Ask the caregiver the question just as it is written. In many instances, the respondent will automatically indicate the number of times and you can record this directly in the questionnaire.

You may need to use probes to help the respondent remember all the times the child ate yesterday. Probing for this question will be discussed during interviewer training. Solid, semi-solid, or soft foods include family foods, and also many special dishes prepared for infants and young children. Thick soups and stews should be included. Thick paps and porridges are also included. Very thin, watery soups and gruels should not be included because infants and young children do not get enough energy (calories) from very thin soups and gruels. Liquids do not count for this question. Also, very small snacks, such as a bite or two of someone else's food, should not be counted.

Q15: Bottle use

Question 15 asks whether the child drank anything from a bottle with a nipple yesterday, including breast milk.

C. Suggestions for adapting the questionnaire to the survey context

This document provides an example questionnaire designed to be appropriate in a wide variety of countries and social contexts. Questions have been carefully formulated to ensure that responses are valid and that results from different surveys are comparable. Therefore, modifications to the questionnaire should be made with caution. Nonetheless, modification is always necessary to:

- Adapt certain questions to the country or regional context;
- Translate the questionnaire into local language(s).

In particular, questions that relate to foods or products must always be adapted to reflect foods/products available in the survey area(s). In order to ensure proper adaptation of the questionnaire, the general guidelines below should be considered.

Guidance on adapting the questionnaire is followed by a discussion of ways to simplify the questionnaire, for example when only a subset of the indicators will be calculated.

To adapt the questionnaire:

1) Involve local expertise

Working in partnership with in-country nutrition experts ensures that the questionnaire is appropriately adapted for the particular country/area where fieldwork will be conducted. Furthermore, this encourages broad acceptance and support of the survey.

There are a variety of ways to involve local expertise, including:

- Discussing the overall survey design and content at stakeholder meetings.
- Hosting a series of questionnaire adaptation working groups.
- Visiting local NGOs and academic/research institutions to get input.

2) Identify necessary changes

There are several very sensitive questions in the IBF module (IBF Qs 4–6). These questions include probes about infants who may have died. These questions may need to be adapted to maximize cultural acceptability of the wording.

Certain questions in the IYCF module must always be reviewed and modified:

- IYCF Q10 and Q12 on liquids and foods consumed in the previous 24 hours;
- IFF Qs 1–4 on iron-fortified products and products for home fortification of foods (if used).

In addition, during the adaptation process the survey manager should consult local experts and decide whether or not the question on feeding of expressed breast milk and on wet nursing is appropriate (IYCF Q7a); this question should be retained or dropped as indicated.

The question on feeding frequency (IYCF Q14) may also require adaptation. It will certainly require careful discussion during training to ensure that interviewers understand the intent of the question and to develop one or more standard, appropriate probing questions.

In the following pages, suggestions for adapting IYCF Q10/Q12 and IFF Qs 1–4 – which must always be adapted – are followed by suggestions for IYCF Q7a and IYCF Q14.

Depending on survey context, scale, and purposes, users may determine that other changes are also required, to the questionnaire and/or interviewer instructions.

3) Ensure that the original meaning of each question is maintained

The questionnaire adaptation process must ensure that the meaning of each question remains the same as originally intended. In order to preserve the original meaning, a number of steps should be followed:

- Carefully **review the interviewer instructions** that accompany the example questionnaire in this document. In many cases, the instructions include clarification of the purpose of the question.
- Conduct a **group review** of the questions that includes discussions of key concepts and local context, and consensus on any new language. Group review also provides an opportunity to discuss and agree on standard probes for questions.
- **Pretest** the adapted questionnaire, and follow-up with any further modifications as indicated.
- Ensure **careful translation** of the questions into the local language(s) using commonly understood words (vs. formal language or jargon). There are different translation approaches, such as group translation and back translation. In all cases, more than one person should be involved in the translation process. Furthermore, translators should have knowledge of nutrition and familiarity with how people commonly talk about food; professional translators will not necessarily have this expertise.

Adapting lists of liquids and foods (IYCF Q10 and Q12)

What people eat varies by geography, wealth and custom. Therefore, IYCF Q10 and Q12 must be reviewed and modified before each survey to reflect commonly consumed liquids and foods. These questions must be adapted with caution, to ensure that all commonly consumed liquids and foods are identified and categorized correctly into the liquid/food groups listed on the example questionnaire. If it is known that certain foods/groups are not eaten by anyone in the survey area, they can be deleted from the questionnaire.[1]

Survey managers should have good understanding of the food groups needed to calculate the indicators. For example, because of the nutrient density and nutritional importance of animal-source foods, dairy, eggs, and flesh foods each are counted as a separate point for Indicator #5, *Minimum dietary diversity*. Therefore, these food groups cannot be combined on the questionnaire, and should each be included separately even if they are rarely consumed.

Information from the liquid and food lists is used to construct two of the core indicators: Indicator #2, *Exclusive breastfeeding under 6 months* and Indicator #5, *Minimum dietary diversity. Minimum dietary diversity*, in turn, is one component of Indicator #7, *Minimum acceptable diet.*

When adapting the liquid and food lists, it is critical to include all special liquids and foods that may be given to infants under 6 months of age. Otherwise, estimates of prevalence of exclusive breastfeeding may be biased (inflated).

To gather data for the Indicator #5, *Minimum dietary diversity*, liquid and food items are grouped. Categorization of items into groups is not always straightforward. Therefore this document provides some guidance in this section and provides an extensive sample liquid and food group list in Annex 4.

[1] Note that the instructions for calculating indicators included with this document refer to question numbering in the example questionnaire. If any items added or dropped, or the ordering of items is modified, it will be necessary to adjust the calculations accordingly.

Some key steps for proper adaptation of the IYCF Q10 and Q12 include:

- **Consult nutrition experts**: Consult knowledgeable in-country partners, ideally nutritionists at the Ministry of Health, national nutritional institute, and/or university. As noted this can also increase the acceptance of results; good processes can also contribute to local capacity to undertake surveys.
- **Use the sample list of common foods** (Annex 4): The list provided with this document categorizes common foods and also offers the rationale for grouping foods. The sample list is a good starting point for work with local experts.
- **Consult existing adapted food lists:** In some countries various organizations may have already undergone an exercise of creating specific food lists for other surveys. For example, these can be found in DHS questionnaires. In some countries, WFP or FAO surveys have included dietary diversity modules. However, always double-check any existing list to ensure proper adaptation.
- **Include all common names for items:** Because beverage and food names can vary significantly, even in the same language, care should be taken during translation. If a popular food has more than one common name, consider including several names in the questionnaire. Note also that the same local name can signify different things – at times, foods called by the same name in two different places are very different, and can actually belong in different food groups. Therefore it is useful to discuss the liquid and food groups listed in IYCF Q10 and Q12 with individuals familiar with local names used throughout the survey area.
- **Adaptation of training/materials for interviewers**: During training, it will be important to discuss the complexities of asking about food in different parts of the country. This will include issues such as common regional dishes, foods that are specific to particular regions and variations in the names of common foods.
- **Include a copy of the modified sample food list** (retaining all foods that are available in the country) in the interviewer's manual.

Certain liquid and food groups pose challenges or need special consideration in consultations with local experts:

Liquids (IYCF Q10)

Q10D – Juice or juice drinks: Juice and juice drinks are listed together because it is usually very difficult to distinguish between them in the field. Juices and juice drinks are "allowed" under the definition of predominant breastfeeding. Vitamin A-rich juices are a special case. If consultations with local experts suggest that 1) vitamin A-rich juices such as mango juice or carrot juice are commonly consumed by infants/young children *and* 2) these can be distinguished by interviewers and mothers from non-nutritious juice drinks, these drinks could be added as a separate category, and the indicator calculation instructions adjusted accordingly. See also comments on vitamin A-rich foods below.

Q10E – Clear broth: Clear broths are also allowed under predominant breastfeeding as they are essentially water-based drinks. Soups that are thickened in any way or include solid pieces of food should not be included here.

Q10F – Yogurt: Yogurt is included as a separate food item under IYCF Q10 because it can be considered a "milk feed" and because thin, liquid yogurt is fed to infants and young children in some countries. However, the question is intended to capture all types of yogurt, not just thin, liquid yogurt. Be sure to use all common local names for yogurt, including specific types of yogurt that are given to infants and young children. Yogurt is also included under Q12 because it may be that information on yogurt eaten in mixed dishes will only emerge during the recall of foods. From the point of view of indicator calculation, there is no problem with having yogurt occur in two places (both Q10 and Q12; see instructions for calculating indicator values). Note that soy yogurt should not be included in this category, but rather grouped with legumes on Q12. Soy products do not provide the same nutrient profile as animal milk products.

In some countries, there are products which may be called yogurt, but actually are sweet drinks containing very little yogurt. These should not be listed under Q10F, but instead should be in an added item for sweet drinks (see below). If both types of products (100% yogurts, and highly sweetened drinks) are common in the survey area, survey managers will need to judge whether it will be possible to distinguish between them. If not, it may be necessary to decide where to categorize these drinks based on local knowledge of which are more commonly consumed by the sampled population.

Q10G – Thin porridge: Thin porridges or gruels are often the first semi-solid foods given to infants, including infants less than 6 months of age. They are included as a specific item under Q10. Any type of thin porridge should be counted here, regardless of main ingredient (for example, it may be grain-based, root/tuber based, etc.). In many countries, there are different terms for different consistencies of porridge. Use local terms for thin porridges that are usually fed to infants, remembering to include different local terms that may be used in different parts of the country. Thick porridge (for example, as usually eaten by older children and adults) should be included with the grain or root/tuber food groups in Q12, as appropriate.

As with yogurts, from the point of view of indicator calculation, there is no problem with having porridge occur in two places. Thin porridges are included under Q10 to ensure that these "first foods" are not missed; capturing these is critical to accurate assessment of exclusive breastfeeding. But thick, stiff porridge, given as family food, is more likely to be captured under Q12.

Q10H – Any other liquids such as [list other water-based liquids]: Water-based drinks are allowed under predominant breastfeeding. If there are other specific water-based liquids that are fed to infants and/or young children in particular, these should be specified here ("any other liquids, such as …"). Alternatively, they can be listed as separate line items under Q10.[1] For example, in some countries, infants and young children are given special herbal infusions or ritual fluids, which may or may not be consumed by older children or adults. Some of these may be given as prelacteal feeds. Other examples of water-based liquids include black coffee or tea with no milk.

Liquids, other prelacteals to add to list: If there are any other milk- or food-based liquids consumed by infants and young children, they should be added to the list as separate items, as they are not allowed under the definition of predominant breastfeeding. The plan for calculating indicator values should then be amended accordingly. For example, small amounts of probiotic products are advocated for infants in some countries, and should also be listed as separate items here. Similarly, any other foods given as prelacteals (for example, fats or oils) can be added to the list since they are not allowed under exclusive or predominant breastfeeding. Although fats are also listed under Q12, mothers very likely will not think of prelacteals as "food" and may not report them under Q12.

"Problem liquids": When coffee and tea are given to infants and young children, there can be confusion over where to classify the liquid. Although large amounts of coffee and tea would not be recommended for infants and young children, from the point of view of the questionnaire this is mainly an issue in regard to calculating the indicator for predominant breastfeeding. The definition of predominant breastfeeding allows water-based liquids, so a clear tea, for example, could be allowed.

However, non-human milks are not allowed, so tea with milk is not allowed under predominant breastfeeding. We advise that in cultures where the drink is given as clear coffee or tea, it should be added to the list as such ("clear tea, no milk"). It can be listed under item H as an "other water-based liquid" or it can be listed separately, if there is interest in the proportion of children consuming it.

[1] If items are added as new questions, separate from "any other liquids", the indicator calculation instructions should be adjusted accordingly.

Where milk is given in coffee and tea, it should be added as a separate item, and the instructions for calculating the predominant breastfeeding indicator should be adapted accordingly. When the quantity of milk added is typically small, this is the only indicator affected. However, in some situations tea or coffee are given with large amounts of milk or prepared entirely with milk, with the tea or coffee as the minor flavoring ingredient. In these situations tea (or coffee, or cocoa) should also be counted as milk feeds (i.e., IYCF Q11 should also be asked for this item). Instructions for calculating several indicators will need to be adapted.

Foods (IYCF Q12)

Vitamin A-rich foods: Several food groups are intended to include only vitamin A-rich plant foods. Note that these include foods naturally rich in vitamin A, and not fortified products such as vitamin A-fortified oil.[1] These groups are:

- B. pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside;
- D. any dark green leafy vegetables;
- E. ripe mangoes, ripe papayas (or any other locally available vitamin A-rich fruits);
- Q. foods made with red palm oil, red palm nut, red palm nut pulp sauce.

Experience with previous surveys has shown that classification into the vitamin A-rich fruit and vegetables groups can be challenging. The sample food list provided with this document (Annex 4) should be very helpful for this task.

For the first group above (IYCF Q12B), note that dark yellow or orange-fleshed sweet potatoes are extremely high in vitamin A, while white-fleshed sweet potatoes (commonly eaten, for example, in many parts of Africa) have little or no vitamin A.

For the second group (IYCF Q12D), note that most medium to dark green leafy vegetables are high in vitamin A. For many local greens and wild greens that are not on the sample list, nutrient content data may be unavailable or unreliable. In this case, greens can be included in this group if they are medium to dark in color. Light green leaves and most other green vegetables should **not** be included on this list and instead should be listed with “other fruits and vegetables” (see Annex 4).

For the third group above (vitamin A-rich fruits, IYCF Q12E) note that ripe papaya, and especially ripe mango, are rich in vitamin A, while “green” (unripe) mango and papaya are not. This should be emphasized in food lists and interviewer training wherever these fruits are sometimes eaten unripe. For local and wild fruits, as with greens, nutrient content data may be unavailable or unreliable. In this case, fruits should be classified with “other fruits and vegetables”.

For items not on the sample list: when reliable nutrient data is available on local greens and/or fruits, they can be classified as vitamin A-rich if they contain at least 120 retinol equivalents (RE) per 100 grams (equivalent to 60 retinol activity equivalents (RAE) for plant foods).[2]

[1] The IYCF indicators include an indicator for consumption of iron-rich or iron-fortified foods (#8), but do not include indicators related to consumption of other fortified foods or products (e.g., those singly-fortified with vitamin A, iodine, or other micronutrients). Some iron-fortified products (for example micronutrient powders and lipid-based nutrient supplements) may contain a range of micronutrients, in addition to iron. Many surveys that include questions on infant and young child feeding may also include questions on supplements, fortified products, and other nutrition-relevant topics. However, the example questionnaire provided here aims only to capture information needed to calculate the IYCF indicators.

[2] 120 RE per 100 g corresponds to 15% of the Nutrient Reference Value (NRV; 800 RE) established by the Codex Alimentarius. The Codex standard for identifying a food as a “source” of any nutrient states that the food should provide any of the following: 15% per 100 g solid food; 7.5% per 100 g liquids; 5% per 100 kcal; or 15% per serving. To be identified as a “high source” the food must provide twice this amount (e.g. 30% or 240 RE/100 g solids). The NRV are set at a level that should meet the needs of approximately 97% of individuals in the age/sex group with highest needs (excluding pregnant and lactating women). Needs of infants and young children are lower than those used to set the NRV; the standard of 120 RE corresponds to 30% of the WHO/FAO (2004) recommended safe intake for infants and young children. Currently, the Codex does not define NRV separately for different age and physiological groups. But the cut-off selected here follows the reasoning and identifies foods that can be considered “sources” for the general population, and “high sources” for infants and young children. For definition of “source”, see Codex Alimentarius Commission, Guidelines adopted 1997, revised 2004; for definition of Nutrient Reference Values, see Codex Alimentarius Commission, Guidelines adopted 1985, revised 1993.

As noted above, in particular situations vitamin A-rich juices may be added as a separate item. In considering whether to do so, the Codex standards (footnote 2, on previous page) indicate a criterion of 60 RE per 100 grams (30 RAE) for juices to qualify as vitamin A-rich.

Finally, certain vitamin A-rich plant foods are "emerging" – for example, in the United States, orange tomatoes (but not red or yellow tomatoes) meet the criterion stated above for vitamin A-rich foods, and have recently been added to the U.S. food composition table as a separate item. To the extent that these or other foods – which do not fit well in any of the four vitamin A-rich groups above – are commonly eaten in survey areas, the food list may need to be further adapted to reflect this.

Condiments: Condiments are foods eaten in very small quantities and usually added to mixed dishes to provide flavor. It is not possible to include all food items that might be considered to be condiments on the sample list in Annex 4, though examples are given. Therefore, survey teams should rely on local expertise to distinguish which foods should be listed under the "condiment" food group. These can include foods that are nutrient dense, but are not nutritionally meaningful because they are eaten in very small quantities. For example, some small hot chilies are very high in vitamins A and C, but when they are used as condiments they do not contribute to nutrient intake in any meaningful way. Similarly, small amounts of fish powder may be used for flavoring, and do not contribute substantially to nutrient intake. However, pounded fish may also be added in larger amounts to mixed dishes. Decisions on whether to include an item in the condiment group or another food group should be taken in consultation with local nutritionists. At the same time, if foods are very rarely eaten by young children (for example, hot chilies, in many locations) note that misclassification will not affect survey results.

"Problem" foods: Certain foods present particular problems for classification. Every effort has been made to include these on the sample list (Annex 4). For example, when plantains are eaten as a staple food they should be considered as a starchy staple, and the roots and tubers group should be expanded to include plantains. When sweet bananas are eaten as a secondary food (as other fruits) they should be listed with "other fruits and vegetables". Soy products often cause confusion (for example, soy milk, soy yogurt, etc.). For the purposes of this questionnaire and the indicator calculations, all soy products can be classified with legumes, and not with animal milk or yogurt. Optionally, soy milk can be added as a separate liquid category in Q10, if it is of interest. Other "problem" foods include coconut, avocado, and various processed foods or street foods. See Annex 4 for further discussion.

Foods distributed by government or non-governmental groups: There is no food group on the example questionnaire for distributed commodities or food supplements. However, these foods are often listed separately, so that coverage can be assessed.[1] If foods or supplements are iron-fortified to meet the needs of infants and young children, they should be listed twice: under IYCF Q12, so as to be categorized (for example, as grains and/or legumes) and counted in the *Minimum dietary diversity* indicator, and also in IFF Q1–4, as iron-fortified foods, when appropriate.

High-fat and high-sugar foods: The IYCF indicators do not include an indicator related to consumption of high-fat or highly sweetened foods or drinks. However, these are of public health interest in many countries, including developing countries undergoing rapid nutrition transitions. When consumption of specific high-fat or high-sugar foods or products is of interest, these can be added to Q10 and/or Q12 as separate groups. The level of disaggregation of these groups would depend on the survey objectives (for example, to document consumption of sugary carbonated beverages, or of all sweetened drinks; similarly, all highly sweetened foods can be grouped together, or candies/sweets can be separated from baked goods, etc.).

[1] If foods/groups are added to the questionnaire as separate items, the calculation instructions should be adjusted accordingly.

Adapting questions on iron-fortified products (IFF Qs1–4)

Products that are specially fortified to meet the needs of infants and young children can be extremely helpful in filling common nutrient gaps. Fortified products include iron-fortified foods specially formulated for infants and young children, ready-to-use therapeutic foods, lipid-based nutrient supplements (which may be mixed with porridges or other foods) and other home fortification products such as multiple micronutrient powders (or crushable tablets). Currently, both products and standards for products are evolving rapidly. This makes development of appropriate standard questionnaires challenging.

In the example questionnaire included with this document, general questions are shown which will require additional work at country level in order to provide useful information. In some countries, particularly those where few products are available, questionnaire adaptation may be easily accomplished in partnership with Ministry of Health colleagues or other nutrition experts. In other countries adaptation of these questions will be very difficult and/or result in long lists of products that may not be feasible for simple surveys.

Deciding on inclusion of question on expressed breast milk and wet nursing (IYCF Q7a)

IYCF Qs 6, 7, and 7a are intended to capture information about breastfeeding. For the purposes of the IYCF indicators, a child is considered to be breastfed if he or she receives breast milk from his/her mother – whether by nursing or by being fed expressed breast milk – and/or if the child receives breast milk from another source (for example, wet nurse, milk bank). Question 7a ensures that information about breast milk from all sources is gathered.

However, survey managers may choose to delete Q7a if the survey will be fielded entirely in areas where these practices do not occur, or are very rare. In such areas, the question may cause confusion and add to the time needed for the interview, without producing useful information. If this question is deleted, the skip pattern for Q6 and the instructions for calculating indicator values must be adapted accordingly.

Adapting question and probing on frequency of feeding (IYCF Q14)

Q14 is intended to capture information on frequency of feeding solid, semi-solid or soft foods. The data gathered in Q14 are used to calculate values for several indicators: Indicators #4, *Introduction of solid, semi-solid, or soft foods*; #6, *Minimum meal frequency*; #7, *Minimum acceptable diet*; and #11, *Age-appropriate breastfeeding* (see instructions for calculating indicator values in Section D).

The question does not distinguish between meals and snacks, for several reasons. First, infants and toddlers may receive a substantial proportion of their energy intake from snacks; secondly, depending on the cultural context, it can be difficult to consistently distinguish between meals and snacks for this age group. Further, frequency of "feeding episodes", with meals not distinguished from snacks, has been shown to correlate with energy intake. Further, frequency of feeding episodes, with meals not distinguished from snacks, has been shown to correlate with energy intake for non-breastfed children and with energy intake from complementary foods for breastfed infants (*5,6*).

However, the question aims to exclude from consideration very trivial snacks. The interviewer instructions aim to clarify the intent of the question. In order to capture full information and the intended information, it is ideal to devote some discussion to this question during interviewer training. Standard, culturally appropriate probes should be developed and added to the questionnaire if possible. Interviewer guidance can also be adapted as needed for the local context.

Simplifying the questionnaire

The example questionnaire and enumerator instructions provided here give guidance for surveys aiming to provide data for all core and optional indicators (with the exception of the Optional Indicator #13, *Duration of breastfeeding*, see Annex 1 and Annex 5).

Narrower age ranges for surveys or questionnaires

For some surveys, the focus will either be on an age sub-group (for example, 6–23 months) or the age range of interest will cover 0–23 months, but there is capacity to field different questionnaires for infants under 6 months and those 6–23 months. In either case, the questionnaire can be substantially simplified.

For example, much more detail is needed on different liquids when the aim is to estimate the prevalence of exclusive and predominant breastfeeding. For infants and young children 6–23 months of age, less detail on liquids is needed. For ages 6–23 months, it is important to estimate the number of milk feeds (items B, C, and F). All other items in the liquids list could be dropped, at the discretion of the survey manager and depending on other survey objectives.

Conversely, for infants under 6 months of age, the dietary diversity indicator is not calculated (they are not in the denominator for this indicator), so Q12 on solid foods can be shortened to ask only about any solid/semi-solid food, without specifying which. In this case it is very important to include a set of standard probes, to be used with all respondents, to ensure that interviewers get full information on semi-solid and solid food. The question on frequency of feeding of solids/semi-solids also does not need to be asked for infants under 6 months of age.

Fewer indicators

Certain items on the list of liquids are also included only to allow calculation of the indicator for predominant breastfeeding. If this indicator is not calculated, the list of liquids can be shortened. Survey managers can determine which questions and list items are needed for the indicators of interest by reviewing the instructions for calculating those specific indicators.

Fewer food groups

The list of food groups is intended to be very complete, to cover all foods that might be encountered. This minimizes the number of foods that interviewers will need to write in the Box at the top of Q12, and thus minimizes the amount of coding to be done later. The example questionnaire is also very complete because it is meant to provide an example for many different situations, where different types of food may be important.

However, there are a number of reasons why food groups may be dropped from the questionnaire, or combined. In areas where a particular food group is rarely eaten and/or considered of no nutritional importance, it may be dropped (most commonly group P, grubs, snails and insects, and/or group Q, foods made with red palm oil etc.). Groups M (fats) and N (sweets) are also not included in any indicator calculation and can be dropped if they are not of interest. They were included in the example questionnaire because they are often of interest for other reasons. In some situations, it is known that organ meats are not fed to infants and young children, and in these cases Group G can be dropped.

Where the variety of animal source foods consumed is very low, survey managers may also consider combining meats with fish. However, dairy, eggs and flesh foods should never be combined, because each of these three groups is "scored" separately in the *Minimum dietary diversity* indicator. Before dropping or combining food groups, survey managers should review the instructions for calculating indicators to ensure that all necessary information will be available.

Less disaggregation of results

The questionnaire and interviewer instructions go into detail and emphasize helping the respondent to estimate her age. This emphasis is not necessary for smaller surveys, where results will not be disaggregated by the age group of the mother; the guidance is based on the usual practice in large scale surveys such as the DHS, where disaggregation by maternal age group is standard.

D. Instructions for calculating indicator values

This section provides instructions for calculating indicators based on the presentation and numbering of survey questions in the example questionnaire. When sample size allows, it can be useful to disaggregate indicators by age, as suggested below for each indicator.

For each core and optional indicator below, the indicator definition is presented, followed by instructions for calculating the indicator value. The following abbreviations are used: IBF refers to the Initiation of breastfeeding module of the example questionnaire; IYCF refers to the Infant and young child feeding module; IFF refers to the additional questions provided for assessing consumption of iron-fortified foods and products. As noted in the example questionnaire, these last questions require further field testing and careful adaptation.

Child age

Box 1 presents steps for calculating the child's age.[1] An estimate of the child's age is needed for calculation of each indicator. There are two places where the child's date of birth is asked: on the IBF module Q6 (for most recent birth) and on the IYCF module Q1 (for the child who is the subject of that module). Note the two may be different, for example if there is more than one eligible child in the household, or if the most recently born child has died. In the instructions below, age is referred to as "IYCF age" (i.e. age derived from IYCF Q1) for current status indicators and as "IBF age" (i.e. age derived from IBF Q6) for indicators based on maternal recall of most recent birth in last 24 months, whether the child is living or deceased.

Box 1. Calculating and using estimates of child age

To calculate "IBF age in days": Date of interview – date of birth (IBF Q6)

If day of birth is missing, substitute "15" for day of month.

If IBF age in days is less than 730 (2 years) the observation can be included in calculating Indicator #1, *Early initiation of breastfeeding*, and Indicator #9, *Children ever breastfed*.

To calculate "IYCF age in days": Date of interview – date of birth (IYCF Q1)

If day of birth is missing, substitute "15" for day of month.

Use IYCF age in days to determine whether each observation belongs in each "current status" indicator calculation (all indicators except the two above).

Example: 6 months = 6 * (365/12) = 183 days. All children less than 183 days of (estimated) age can be included in numerators and denominators for exclusive breastfeeding 0–5 months.

Each current status indicator calculation below specifies age in (estimated) days.

[1] For larger household surveys, Century Month Code (CMC) is often used to obtain age of child which is subsequently used for calculating indicator values. See MICS and/or DHS manuals.

Missing information

When collecting data, "don't know" and missing values should be kept to a minimum as large proportions of "don't know" and missing values can bias indicator estimates. However, even with best efforts to collect good data, "don't know" responses and missing values can still occur.

There are different options for how to treat "don't know" responses and missing values for calculating indicator values. One approach is to recode all "don't know" responses as missing data and to not include the missing values in the numerator or denominator for any indicator. This is the approach used by many small-scale surveys. A second approach, used in the DHS, is to recode "don't know" and missing data to the null value – to take the value of "no" (if a yes/no question) or "0" (if a numeric response is required) – and to include the recoded data in the numerator and denominator of indicators.

The following questions in the IYCF module contain "don't know" responses that may need to be recoded using one of the above approaches: IYCF Q6, 7, 7a, 8, 9, 10 (items A–I), 11 (items B, C, and F), 12 (items A–Q), 13, 14, and 15. IFF Q1–4 also allow for "don't know" responses that may need to be recoded. There are no questions in the IBF module that would need to be recoded because of a "don't know" response. *If "don't know" responses are not recoded or defined as missing, the instructions for calculating indicators will yield incorrect results* (for example, the code "98" might be taken as a positive response which would cause an error in the calculation of Indicator #6, *Minimum meal frequency*).

1. Early initiation of breastfeeding

Definition: Proportion of children born in the last 24 months who were put to the breast within one hour of birth.

$$\frac{\text{Children born in the last 24 months who were put to the breast within one hour of birth}}{\text{Children born in the last 24 months}}$$

Calculation:

$$\frac{\text{(IBF Age in days <730) } \textbf{AND} \text{ (IBF11=000 OR IBF11=100)}}{\text{IBF Age in days <730}} \quad \text{X 100}$$

Notes:

- Either during data entry or initial processing, the information in IBF Q11 should be captured in a single 3-digit variable.
- The IBF Q11 variable is coded "000" when the respondent reports the baby was put to the breast "immediately".
- The IBF Q11 variable is coded "100" when the respondent reports the baby was put to the breast in less than one hour.
- Any code higher than 100 (i.e. 101 through 2XX) should not be counted in the numerator for this indicator as it indicates that the child was put to the breast more than 1 hour after birth.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for (i) live births occurring in the last 12 months; and (ii) live births occurring between the last 12 and 24 months, if sample size permits.

2. Exclusive breastfeeding under 6 months

Definition: Proportion of infants 0–5 months of age who are fed exclusively with breast milk.

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

Calculation:

$$\frac{\text{(IYCF Age in days <183) } \textbf{AND} \text{ (IYCF Q7=1 } \textbf{OR} \text{ Q7a=1) } \textbf{AND} \text{ (IYCF Q10A–Q10I all=2) } \textbf{AND} \text{ (IYCF Q12A–Q12Q all=2)}}{\text{IYCF Age in days <183}} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about feeding of breast milk yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- IYCF Q10 captures information about liquids the child had yesterday, and Q12 captures information about foods the child ate yesterday.
- The instructions above must be adapted if country-specific liquids or foods are added to IYCF Q10 or Q12 as separate items.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age-groups: 0–1 month, 2–3 months, 4–5 months and 0–3 months, if sample size permits.

3. Continued breastfeeding at 1 year

Definition: Proportion of children 12–15 months of age who are fed breast milk.

$$\frac{\text{Children 12–15 months of age who received breast milk during the previous day}}{\text{Children 12–15 months of age}}$$

Calculation:

$$\frac{\text{(IYCF Age in days } \geq \text{365) } \textbf{AND} \text{ (IYCF Age in days <487) } \textbf{AND} \text{ (IYCF Q7=1 OR Q7a=1)}}{\text{(IYCF Age in days } \geq \text{365) } \textbf{AND} \text{ (IYCF Age in days <487)}} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about feeding of breast milk yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- Because the indicator has a relatively narrow age range of 4 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.

Disaggregation:

- Further disaggregation of this indicator is not recommended because of the narrow age range.

4. Introduction of solid, semi-solid or soft foods

Definition: Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods.

$$\frac{\text{Infants 6–8 months of age who received solid, semi-solid or soft foods during the previous day}}{\text{Infants 6–8 months of age}}$$

Calculation:

$$\frac{(\text{IYCF Age in days} \geq 183)\ \textbf{AND}\ (\text{IYCF Age in days} < 274)\ \textbf{AND}\ (\text{IYCF Q14} > 0)}{(\text{IYCF Age in days} \geq 183)\ \textbf{AND}\ (\text{IYCF Age in days} < 274)} \text{ X 100}$$

Notes:

- IYCF Q14 asks about frequency of feeding of solid, semi-solid, and soft foods yesterday.
- Because the indicator has a relatively narrow age range of 3 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.

Disaggregation:

- Further disaggregation of this indicator is not recommended because of the narrow age range.

5. Minimum dietary diversity

Definition: Proportion of children 6–23 months of age who receive foods from 4 or more food groups.

$$\frac{\text{Children 6–23 months of age who received foods from} \geq 4 \text{ food groups during the previous day}}{\text{Children 6–23 months of age}}$$

Calculation:

To calculate a value for this indicator, a 7 food group score variable needs to be created. The instructions below show how to calculate the 7 food group score. This is followed by instructions to calculate the *Minimum dietary diversity* indicator.

Calculation of 7 food group score:

The 7 foods groups used for calculation of this indicator are:

1. grains, roots and tubers
2. legumes and nuts
3. dairy products (milk, yogurt, cheese)
4. flesh foods (meat, fish, poultry and liver/organ meats)
5. eggs
6. vitamin-A rich fruits and vegetables
7. other fruits and vegetables

Construct the 7 food group score as follows:

Begin with a score of 0.
For each of the 7 food groups, add a point if any food in the group was consumed.

Food group 1	Add 1 point if:	IYCF Q10G=1 OR Q12A=1 OR Q12C=1
Food group 2	Add 1 point if:	IYCF Q12K=1
Food group 3	Add 1 point if:	IYCF Q10B=1 OR Q10C=1 OR Q10F=1 OR Q12L=1
Food group 4	Add 1 point if:	IYCF Q12G=1 OR Q12H=1 OR Q12J=1
Food group 5	Add 1 point if:	IYCF Q12I=1

Food group 6	Add 1 point if:	IYCF Q12B=1 OR Q12D=1 OR Q12E=1 OR Q12Q=1
Food group 7	Add 1 point if:	IYCF Q12F=1

Calculation of Minimum dietary diversity indicator:

$$\frac{(\text{IYCF Age in days} \geq 183)\ \textbf{AND}\ (\text{IYCF Age in days} < 730)\ \textbf{AND}\ (\text{7 food group score} \geq 4)}{(\text{IYCF Age in days} \geq 183)\ \textbf{AND}\ (\text{IYCF Age in days} < 730)} \times 100$$

Notes:

- IYCF Q10 and Q12 ask about liquids and foods the child consumed the previous day. The instructions to calculate the 7 food group score may need to be adapted if country-specific liquids or foods are added to IYCF Q10 or Q12 as separate items.
- Some foods are included in IYCF Q12 for completeness, but do not appear in any of the food groups above. They are included in the question because if they were omitted from the list, interviewers might assign them to one of the other groups that count in the score by circling an existing option on the list. In addition, a complete list is also required for calculation of the exclusive breastfeeding indicator.

Disaggregation:

- Results may be reported separately for breastfed and non-breastfed children. However, diversity scores for breastfed and non-breastfed children should not be directly compared, because breast milk is not "counted" in any of the above food groups. Breast milk is not counted because the indicator is meant to reflect the quality of the complementary food diet. As a consequence, this indicator may show "better" results for children who are not breastfed than those who are breastfed in populations where formula and/or milk are commonly given to non-breastfed children.
- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months, if sample size permits.

6. Minimum meal frequency

Definition: Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

$$\frac{\text{Breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

and

$$\frac{\text{Non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

Calculation:

To calculate a value for this indicator, combine the two numerators shown above, and the two denominators. This indicator summarizes several practices and the calculation below appears cumbersome. However, most users will be processing data using computer software, which simplifies the calculation process.

$$\frac{\begin{array}{c}\text{((IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Age in days} \geq \text{183) } \textbf{AND} \text{ (IYCF Age in days} < \text{274) } \textbf{AND} \text{ (IYCF Q14} \geq \text{2)) } \textbf{OR} \\ \text{((IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Age in days} \geq \text{274) } \textbf{AND} \text{ (IYCF Age in days} < \text{730) } \textbf{AND} \text{ (IYCF Q14} \geq \text{3)) } \textbf{OR} \\ \text{((IYCF Q7=2 AND Q7a=2) } \textbf{AND} \text{ (IYCF Age in days} \geq \text{183) } \textbf{AND} \\ \text{(IYCF Age in days} < \text{730) } \textbf{AND} \text{ ((IYCF Q11B + Q11C + Q11F + Q14)} \geq \text{4))}\end{array}}{\text{(IYCF Age in days} \geq \text{183) } \textbf{AND} \text{ (IYCF Age in days} < \text{730)}} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about feeding of breast milk yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- IYCF Q14 asks about frequency of feeding of solid, semi-solid, and soft foods yesterday.
- For breastfed children, the minimum number of times varies with age (2 times if 6–8 months and 3 times if 9–23 months).
- IYCF Q11 asks about the number of times the child consumed infant formula, milk, or yogurt yesterday (see indicator #15). These "milk feeds" are counted in the numerator for non-breastfed children only.
- For non-breastfed children the minimum number of times does not vary by age (4 times for all children 6–23 months).

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age, if sample size permits. Results may also be reported separately for breastfed and non-breastfed children.

7. Minimum acceptable diet

Definition: Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk).

$$\frac{\begin{array}{c}\text{Breastfed children 6–23 months of age who had at least the minimum dietary diversity} \\ \text{and the minimum meal frequency during the previous day}\end{array}}{\text{Breastfed children 6–23 months of age}}$$

and

$$\frac{\begin{array}{c}\text{Non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not} \\ \text{including milk feeds and the minimum meal frequency during the previous day}\end{array}}{\text{Non-breastfed children 6–23 months of age}}$$

Calculation:

Like the previous indicator, calculation of a value for this indicator involves combining the two numerators shown above, and the two denominators.

This indicator summarizes several practices and the calculation below appears cumbersome. However, most users will be processing data using computer software, which simplifies the calculation process.

For breastfed children, users are likely to calculate indicators for each individual practice first, scoring each child positively or negatively for each practice included in this indicator (see indicators #5 and #6). Each breastfed child with a positive score for both component practices will score positively on the summary indicator.

For non-breastfed children, the dietary diversity component of this indicator is different than for Indicator #5, *Minimum dietary diversity*. A 6 food group score (instead of a 7 food group score) that excludes dairy products is used for non-breastfed children for this indicator. In addition, this indicator requires that non-breastfed children receive a minimum number of milk feeds (see Indicator #15). A non-breastfed child with a positive score on Indicators #5 and #6 will therefore not necessarily score positively on the *Minimum acceptable diet* indicator. This is further explained in the notes that follow the calculation, below.

The instructions below show how to calculate the 6 food group score for non-breastfed children. This is followed by instructions to calculate the *Minimum acceptable diet* indicator.

Calculation of 6 food group score:

The 6 foods groups used for calculation of the dietary diversity component of the indicator for non-breastfed children are:

1. grains, roots and tubers
2. legumes and nuts
3. flesh foods (meat, fish, poultry and liver/organ meats)
4. eggs
5. vitamin-A rich fruits and vegetables
6. other fruits and vegetables

Construct the 6 food group score as follows:

Begin with a score of 0.
For each of the 6 food groups, add a point if any food in the group was consumed.

Food group 1	Add 1 point if:	IYCF Q10G=1 OR Q12A=1 OR Q12C=1
Food group 2	Add 1 point if:	IYCF Q12K=1
Food group 3	Add 1 point if:	IYCF Q12G=1 OR Q12H=1 OR Q12J=1
Food group 4	Add 1 point if:	IYCF Q12I=1
Food group 5	Add 1 point if:	IYCF Q12B=1 OR Q12D=1 OR Q12E=1 OR Q12Q=1
Food group 6	Add 1 point if:	IYCF Q12F=1

Calculation of Minimum acceptable diet indicator:

$$\frac{\begin{array}{c}\text{((IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Age in days } \geq 183) \textbf{ AND} \text{ (IYCF Age in days } <274) \\ \textbf{AND} \text{ (7 food group score } \geq 4) \textbf{ AND} \text{ (IYCF Q14 } \geq 2)) \textbf{ OR} \\ \text{((IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Age in days } \geq 274) \textbf{ AND} \text{ (IYCF Age in days } <730) \\ \textbf{AND} \text{ (7 food group score } \geq 4) \textbf{ AND} \text{ (IYCF Q14 } \geq 3)) \textbf{ OR} \\ \text{((IYCF Q7=2 AND Q7a=2) } \textbf{AND} \text{ (IYCF Age in days } \geq 183) \textbf{ AND} \text{ (IYCF Age in days } <730) \textbf{ AND} \\ \text{((IYCF Q11B + Q11C +Q11F) } \geq 2) \textbf{ AND} \text{ (6 food group score } \geq 4) \textbf{ AND} \text{ ((IYCF Q11B + Q11C + Q11F +Q14) } \geq 4))\end{array}}{\text{(IYCF Age in days } \geq 183) \textbf{ AND} \text{ (IYCF Age in days } <730)} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about breastfeeding yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- Calculation of the food group scores are based on IYCF Q10 and Q12, which ask about liquids and foods the child consumed the previous day. The 7 food group score (see indicator #5) is used for breastfed children. The 6 food group score (see above), which excludes dairy products, is used for non-breastfed children when calculating this indicator. This is because milk feeds are considered a separate and required element for non-breastfed children in this multi-dimensional indicator. Exclusion of milk feeds from the diversity score here avoids "double-counting" of this food group and allows use of this indicator in comparisons – across space and time – between populations with different rates of continued breastfeeding.

- IYCF Q10 and Q12 ask about liquids and foods the child consumed the previous day. The instructions to calculate the 6 and 7 food group scores may need to be adapted if country-specific liquids or foods are added to IYCF Q10 or Q12 as separate items.
- IYCF Q11 asks about the number of times the child consumed infant formula, milk, or yogurt yesterday (see Indicator #15).
- IYCF Q14 asks about frequency of feeding of solid, semi-solid, and soft foods yesterday (see indicator #6).

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age, if sample size permits.

8. Consumption of iron-rich or iron-fortified foods

Definition: Proportion of children 6–23 months of age who receive an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the home.

$$\frac{\text{Children 6–23 months of age who received an iron-rich food or a food that was specially designed for infants and young children and was fortified with iron, or a food that was fortified in the home with a product that included iron during the previous day}}{\text{Children 6–23 months of age}}$$

Calculation:

$$\frac{\text{(IYCF Age in days} \geq 183\text{)} \textbf{ AND } \text{(IYCF Age in days} < 730\text{)} \textbf{ AND } \text{(IYCF Q12G=1} \textbf{ OR } \text{Q12H=1} \textbf{ OR } \text{Q12J=1} \textbf{ OR } \text{IFF Q1=1} \textbf{ OR } \text{IFF Q2=1} \textbf{ OR } \text{IFF Q3=1} \textbf{ OR } \text{IFF Q4=1)}}{\text{(IYCF Age in days} \geq 183\text{)} \textbf{ AND } \text{(IYCF Age in days} < 730\text{)}} \text{ X 100}$$

Notes:

- Suitable iron-rich or iron-fortified foods include flesh foods, commercially fortified foods specially designed for infants and young children which contain iron, or foods fortified in the home with a micronutrient powder containing iron or a lipid-based nutrient supplement containing iron. IYCF Q12 asks about foods consumed the previous day.
- Questions on iron-fortified foods and products (IFF Qs1–4) require careful adaptation. In some settings, only a subset of these questions may be used. The formula above shows how the calculation would be done if IFF Qs1–4 were all included in the questionnaire.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months of age, if sample size permits.

9. Children ever breastfed

Definition: Proportion of children born in the last 24 months who were ever breastfed.

$$\frac{\text{Children born in the last 24 months who were ever breastfed}}{\text{Children born in the last 24 months}}$$

Calculation:

$$\frac{\text{(IBF Age in days <730) } \textbf{AND} \text{ (IBF Q10=1)}}{\text{IBF Age in days <730}} \quad \text{X 100}$$

Notes:

- IBF Q10 asks if the child was ever breastfed.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for (i) live births occurring in the last 12 months; and (ii) live births occurring between the last 12 and 24 months, if sample size permits.

10. Continued breastfeeding at 2 years

Definition: Proportion of children 20–23 months of age who are fed breast milk.

$$\frac{\text{Children 20–23 months of age who received breast milk during the previous day}}{\text{Children 20–23 months of age}}$$

Calculation:

$$\frac{\text{(IYCF Age in days} \geq \text{608) } \textbf{AND} \text{ (IYCF Age in days <730) } \textbf{AND} \text{ (IYCF Q7=1 OR Q7a=1)}}{\text{(IYCF Age in days} \geq \text{608) } \textbf{AND} \text{ (IYCF Age in days <730)}} \quad \text{X 100}$$

Notes:

- IYCF Q7 and Q7a ask about breastfeeding yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- Because the indicator has a relatively narrow age range of 4 months, estimates from surveys with small sample sizes are likely to have wide confidence intervals.

Disaggregation:

- Further disaggregation of this indicator is not recommended because of the narrow age range.

11. Age-appropriate breastfeeding

Definition: Proportion of children 0–23 months of age who are appropriately breastfed.

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

and

$$\frac{\text{Children 6–23 months of age who received breast milk, as well as solid, semi-solid or soft foods, during the previous day}}{\text{Children 6–23 months of age}}$$

Calculation:

To calculate a value for this indicator, combine the two numerators shown above, and the two denominators.

$$\frac{\begin{array}{c}\text{((IYCF Age in days <183) } \textbf{AND} \text{ (IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Q10A–Q10I all=2) } \textbf{AND} \text{ (IYCF Q12A–Q12Q all=2)) } \textbf{OR} \\ \text{((IYCF Age in days} \geq \text{183) } \textbf{AND} \text{ (IYCF Age in days <730) } \textbf{AND} \text{ (IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Q14 >0))}\end{array}}{\text{All children with IYCF Age in days <730}} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about breastfeeding yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- IYCF Q10 captures information about liquids the child had yesterday, and IYCF Q12 captures information about foods the child ate yesterday.
- IYCF Q14 asks about frequency of feeding of solid, semi-solid, and soft foods yesterday.
- The instructions above must be adapted if country-specific liquids or foods are added to IYCF Q10 or Q12 as separate items.

12. Predominant breastfeeding under 6 months

Definition: Proportion of infants 0–5 months of age who are predominantly breastfed.

$$\frac{\begin{array}{c}\text{Infants 0–5 months of age who received breast milk} \\ \text{as the predominant source of nourishment during the previous day}\end{array}}{\text{Infants 0–5 months of age}}$$

Calculation:

$$\frac{\begin{array}{c}\text{(IYCF Age in days <183) } \textbf{AND} \text{ (IYCF Q7=1 OR Q7a=1) } \textbf{AND} \text{ (IYCF Q10B, 10C, 10F, 10G and 10I all=2)} \\ \textbf{AND} \text{ (IYCF Q12A – Q12Q all=2)}\end{array}}{\text{IYCF Age in days <183}} \text{ X 100}$$

Notes:

- IYCF Q7 and Q7a ask about breastfeeding yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- IYCF Q10 captures information about liquids the child had yesterday, and IYCF Q12 captures information about foods the child ate yesterday.

- Predominant breastfeeding "allows" ORS, vitamin and/or mineral supplements, ritual fluids, water and water-based drinks, and fruit juice. Other liquids, including non-human milks and food-based fluids, are not allowed, and no semi-solid or solid foods are allowed.
- The instructions above may need to be adapted if country-specific liquids or foods are added to IYCF Q10 or Q12 as separate items.

13. Duration of breastfeeding

Definition: Median duration of breastfeeding among children 0–35 months of age.

The age in months when 50% of children 0–35 months did not receive breast milk during the previous day.

Calculation:

This indicator is more complicated to calculate than other indicators in this document. See Annex 5 for detailed instructions for calculating the value of this indicator.

Notes:

- This is the only one of the 15 IYCF indicators that requires data on children over 24 months of age. Calculation of this indicator requires data from IYCF Qs6, 7, and 7a for children 0–35 months of age. Data on the age of the child must also be available (IYCF age). Because the example questionnaire in this guide is structured to collect data on children 0–23 months only, the example questionnaire would need to be adapted to collect data for this indicator. Refer to the description of sampling issues Annex 1 of this document, where this issue is discussed in more detail.

14. Bottle feeding

Definition: Proportion of children 0–23 months of age who are fed with a bottle.

$$\frac{\text{Children 0–23 months of age who were fed with a bottle during the previous day}}{\text{Children 0–23 months of age}}$$

Calculation:

$$\frac{\text{(IYCF Age in days <730) } \textbf{AND} \text{ (IYCF Q15=1)}}{\text{All children with IYCF Age in days <730}} \text{ X 100}$$

Notes:

- IYCF Q15 asks about bottle feeding.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age groups: 0–5 months, 6–11 months and 12–23 months, if sample size permits.

15. Milk feeding frequency for non-breastfed children

Definition: Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings.

$$\frac{\text{Non-breastfed children 6–23 months of age who received at least 2 milk feedings during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

Calculation:

$$\frac{\text{((IYCF Q7=2 AND Q7a=2) } \textbf{AND} \text{ (IYCF Age in days} \geq 183\text{) } \textbf{AND} \text{ (IYCF Age in days} <730\text{) } \textbf{AND} \text{ ((IYCF Q11B + Q11C + Q11F)} \geq 2\text{))}}{\text{(IYCF Q7=2 AND Q7a=2) } \textbf{AND} \text{ (IYCF Age in days} \geq 183\text{) } \textbf{AND} \text{ (IYCF Age in days} <730\text{)}} \times 100$$

Notes:

- IYCF Q7 and Q7a ask about breastfeeding yesterday. IYCF Q7a is an optional question for use when surveys are fielded in areas where wet nursing and/or feeding expressed breast milk may occur.
- IYCF Q11 asks about the number of times the child consumed infant formula, milk, or yogurt yesterday.

Disaggregation:

- It is recommended that the indicator be further disaggregated and reported for the following age groups: 6–11 months, 12–17 months and 18–23 months, if sample size permits.

Annexes

ANNEX 1
Sampling considerations

This Annex provides a short discussion of sampling issues related to the collection and analysis of data for IYCF indicators. Probability sampling, sampling universes, indicator denominators and sample size are addressed. The Annex does not, however, provide comprehensive information on these topics. More detailed guidance is available elsewhere (*7, 8*).

Probability sampling

The indicators for assessing IYCF practices are intended for use at the population-level. Probability sampling ensures that survey results are representative for the population of interest, allowing unbiased estimates of prevalence.

With probability sampling, every individual in the population of interest has a known, non-zero probability to be included in the sample. When the probabilities for inclusion in the sample are approximately equal, or unequal probabilities of selection are accounted for in analysis of the data, extrapolations about the value of the indicators can be made from the sub-set of the population on which data were collected (i.e. the survey sample) to the population represented by the survey.

A first step in planning a probability sample is to identify the indicators of interest. When planning to collect data on the indicators for assessing IYCF practices, it is important to consider 1) the sampling universe for the data to be collected and 2) the reference group, or denominator, for the indicators to be calculated. These considerations have implications for both sample design and sample size calculation.

Sampling universe

There are 8 core and 7 optional IYCF indicators. For the purpose of the guide on measurement, these indicators have been classified into one of two sampling universe categories: 1) all children born in the last 2 years (including those who are deceased); or 2) living children 0–23 months of age. This classification is shown in Table A1-1 (next page).

The classification is also reflected in the example questionnaire provided in this guide, where each indicator is associated not only with a sampling universe category, but also with a respondent type and data collection module (Table A1-2).

TABLE A1-1. SAMPLING UNIVERSE ASSOCIATED WITH INDICATORS FOR ASSESSING IYCF PRACTICES

No.	Indicator name	Sampling universe
Core indicators		
1	Early initiation of breastfeeding	All children born in the last 2 years
2	Exclusive breastfeeding under 6 months	Living children 0–23 months of age
3	Continued breastfeeding at 1 year	
4	Introduction of solid, semi-solid or soft foods	
5	Minimum dietary diversity	
6	Minimum meal frequency	
7	Minimum acceptable diet	
8	Consumption of iron-rich or iron-fortified foods	
Optional indicators		
9	Children ever breastfed	All children born in the last 2 years
10	Continued breastfeeding at 2 years	Living children 0–23 months of age
11	Age-appropriate breastfeeding	
12	Predominant breastfeeding under 6 months	
13	Duration of breastfeeding[a]	NA
14	Bottle feeding	Living children 0–23 months of age
15	Milk feeding frequency for non-breastfed children	

[a] Indicator #13, *Duration of breastfeeding*, cannot be collected with the example questionnaire provided in this guide but would generally be associated with a sampling universe of living children 0–35 months of age. This indicator can be collected by using a slightly modified questionnaire.

Having two different sampling universes associated with the indicators means that two different samples of data need to be collected: 1) a sample representative of all children born in the last two years and 2) a sample representative of living children 0–23 months. This increases the total number of households that need to be sampled for a survey.

When resources are limited, some survey managers may choose to collect data for Indicator #1, *Early initiation of breastfeeding*, and Indicator #9, *Children ever breastfed*, from a sampling universe of living children 0–23 months of age. These data would not be exactly comparable to data collected from a universe of all live births. This is because breastfeeding reduces the risk of mortality; therefore, it is possible that there could be a higher proportion of living children who were breastfed, and with early initiation, than there would be in a sample of all births. Despite this limitation, collecting the data from living children only can still be useful, to provide information about whether or not living children were breastfed within one hour of birth, or ever.

In the example questionnaire provided in this guide, the IBF module provides information for calculation of the indicators for the first sampling universe category, all children born in the last 2 years, and the IYCF module provides information for calculation of the indicators for the second sampling universe category, living children 0–23 months. When the sampling universe is all children born in the last two years, the respondent is the biological mother of the living or deceased child (regardless of whether or not she is the current caregiver of the child). When the sampling universe is living children 0–23 months, the respondent is the current caregiver of the child.

The example questionnaire also includes a Household Roster. This is the first component of the questionnaire that is administered at a sampled household. The Household Roster collects information from the head of the household about the sex and age of all household members. The purpose of the Household Roster is to identify all potentially eligible respondents for the IBF and IYCF modules. The Household Roster provides the first of several screening criteria for identifying eligible respondents for each module.

TABLE A1-2. RESPONDENT TYPE AND DATA COLLECTION MODULE ASSOCIATED WITH INDICATORS FOR ASSESSING IYCF PRACTICES

No.	Indicator name	Sampling universe	Respondent	Data collection module
Core indicators				
1	Early initiation of breastfeeding	All children born in the last 2 years	Female 15–49 years of age who gave birth to child	IBF
2	Exclusive breastfeeding under 6 months	Living children 0–23 months of age	Caregiver of child	IYCF
3	Continued breastfeeding at 1 year			
4	Introduction of solid, semi-solid or soft foods			
5	Minimum dietary diversity			
6	Minimum meal frequency			
7	Minimum acceptable diet			
8	Consumption of iron-rich or iron-fortified foods			
Optional indicators				
9	Children ever breastfed	All children born in the last 2 years	Female 15–49 years of age who gave birth to child	IBF
10	Continued breastfeeding at 2 years	Living children 0–23 months of age	Caregiver of child	IYCF
11	Age-appropriate breastfeeding			
12	Predominant breastfeeding under 6 months			
13	Duration of breastfeeding[a]	NA	NA	NA
14	Bottle feeding	Living children 0–23 months of age	Caregiver of child	IYCF
15	Milk feeding frequency for non-breastfed children			

[a] Indicator #13, *Duration of breastfeeding*, cannot be collected with the example questionnaire provided in this guide but would generally be associated with a sampling universe of living children 0–35 months of age. This indicator can be collected by using a slightly modified questionnaire.

For the IBF module, the Household Roster information is used to identify female household members 15–49 years of age.[1] Household members meeting this eligibility criterion are then asked additional screening questions in the IBF module. These include questions to identify the correct age of the respondent (from information provided by her as opposed to that provided by the head of the household) and if she has had a live birth in the last 2 years. A respondent who confirms that she is 15–49 years and has had a live birth in the last 2 years fulfills all screening criteria for the module and is then asked questions about breastfeeding practices related to her most recent live birth. Note that the IBF module is administered separately for each female 15–49 years of age in the household.

For the IYCF module, the Household Roster information is used to identify children under 3 years of age and the primary caregiver of each child under 3 years. In the IYCF module, the primary caregiver of each child is then asked the birthdate and age of the child in years and months. This information is used to determine if the child is in the age range of interest for the module.

In the IYCF module in this guide, we are only interested in obtaining information about children under 2 years of age (0–23 months). A broader age range is used in the Household Roster because the respondent providing the information for the Household Roster (often the household head) may not know the exact age of all household members. The primary caregiver of the child will usually be able to report the date of birth of the child with the most accuracy. The Household Roster in this way functions only as an initial screen. It helps to limit the number of respondents

[1] See Annex 2 for a discussion of age data.

that are asked the more time consuming age-related questions in the IYCF module and is designed to ensure that children are not excluded from the sample due to age misreporting by the head of the household. Note that the IYCF module is administered separately for each child under 3 years in the household.

The example questionnaire provided in this guide does not currently allow for calculation of the duration of breastfeeding indicator. This is because this indicator requires information on children up to 35 months. All other indicators described in this guide only require information on children 0–23 months, or on children who were born within the last two years. To collect data for the duration of breastfeeding indicator, the sample design and questionnaire would need to be adapted. Caregivers of living children 0–35 months would need to be included in the sample for the survey and the example questionnaire[1] would need to be adapted accordingly.

Denominator for indicators

The sampling universe categories outlined above define the population group on which data for the indicators are collected. Although the sampling universe covers a two-year age range for the children, most indicators are calculated for age sub-groups. For example, the exclusive breastfeeding indicator is calculated from questions included in the IYCF module that are asked of all caregivers of children 0–23 months. The calculation of the indicator, however, uses only the data collected for children 0–5 months. In this case, the reference group, or denominator, used for calculation of the indicator (children 0–5 months) is a subset of the age group defined for the sampling universe (children 0–23 months). This has implications for sample size determination (below).

Among the 15 indicators, there are 10 indicators for which the denominator used for calculation is a subset of the population group defined for the sampling universe category. The indicators for which this is the case are highlighted in blue in Table A1-3. All of these are indicators associated with the sampling universe of living children 0–23 months of age.

Sample size

Anytime a population-based survey will be carried out, it is important to consider if an adequate sample size will be available for calculation of the desired indicators. Sample size calculations should be made in advance of data collection, taking into account the objectives of the survey, the proposed sample design, and the desired level of precision (i.e. width of the confidence interval) with which each indicator should be reported. This is particularly important when collecting data for indicators associated with different sampling universes or within the same sampling universe but having different denominators.

When indicators will be collected from multiple sampling universes, the usual approach is to estimate sample size needs for each universe separately, and determine how the sample size associated with each universe can be met. When indicators classified within one sampling universe but with different denominators will be collected, it is not sufficient to estimate sample size needs only at the sampling universe level. This is because the total number of children included in the denominator of an indicator influences the precision of the estimate calculated for the indicator.

When planning a survey to collect any of the indicators highlighted in blue in Table A1-3, sample size calculations should be made taking into account both the level of precision desired for those indicators and the denominator (i.e. reduced sample size) used for calculation of the indicator. Similarly, if analysis of the data will include disaggregation of any indicator by breastfeeding status, age sub-group, or other household or maternal variable, this reduction in the denominator of the indicator should also be taken into account during sample size calculations, as the same considerations would apply.

[1] Specifically, the following components of the questionnaire would require modification: the Household Roster eligibility check for IYCF module, the IYCF module information panel, and IYCF Q2 and Q5.

TABLE A1-3. DENOMINATOR ASSOCIATED WITH INDICATORS FOR ASSESSING IYCF PRACTICES[a]

No.	Indicator name	Sampling universe	Denominator
Core indicators			
1	Early initiation of breastfeeding	All children born in the last 2 years	Children born in the last 24 months
2	Exclusive breastfeeding	Living children 0–23 months	Infants 0–5 months
3	Continued breastfeeding at 1 year		Children 12–15 months
4	Introduction of solid, semi-solid of soft foods		Infants 6–8 months
5	Minimum dietary diversity		Children 6–23 months
6	Minimum meal frequency		Children 6–23 months
7	Minimum acceptable diet		Children 6–23 months
8	Consumption of iron rich or iron fortified foods		Children 6–23 months
Optional indicators			
9	Children ever breastfed	All children born in the last 2 years	Children born in the last 24 months
10	Continued breastfeeding at 2 years	Living children 0–23 months	Children 20–23 months
11	Age-appropriate breastfeeding	Living children 0–23 months	Children 0–23 months
12	Predominant breastfeeding under 6 months	Living children 0–23 months	Infants 0–5 months
13	Duration of breastfeeding[b]	NA	NA
14	Bottle feeding	Living children 0–23 months	Children 0–23 months
15	Milk feeding frequency for non-breastfed children	Living children 0–23 months	Non-breastfed children 6–23 months

[a] The indicators highlighted in blue have a denominator that is a subset of the population group defined for the sampling universe.

[b] Indicator #13, *Duration of breastfeeding*, cannot be collected with the example questionnaire provided in this guide but would generally be associated with a sampling universe of living children 0–35 months of age, with data on children 0–35 months included in the denominator of the indicator. This indicator can be collected by using a slightly modified questionnaire.

The companion document to this guide, *Indicators for assessing infant and young child feeding practices: Part I Definitions* (*1*), provides some recommendations for disaggregation of the indicators. For ease of reference, these recommendations are also summarized in Table A1-4 below, along with the sampling universe and denominator associated with each indicator.

Tables A1-5 through 12 show how the width of the confidence interval for an indicator varies with:

1) the denominator of the indicator;
2) the sample size collected;
3) the design effect for an indicator; and
4) the estimated value of the indicator.

The tables show that the width of the confidence interval decreases with sample size and increases with design effect. The tables also show that, for a desired level of precision, larger sample sizes are required for indicator estimates closer to 50%, all other things being equal. The examples in these tables are for illustrative purposes only and should not be used for sample size calculation.

Detailed guidance on sample size calculation is outside the scope of this guide. For assistance with sample size calculation, users of this guide can consult with a biostatistician or refer to existing sampling manuals (*7, 8*) which treat sample size calculation issues in detail.

TABLE A1-4. RECOMMENDED DISAGGREGATION OF INDICATORS FOR ASSESSING IYCF PRACTICES

No.	Indicator name	Sampling universe	Denominator	Recommended disaggregation
Core indicators				
1	Early initiation of breastfeeding	All children born in the last 2 years	Children born in the last 24 months	a) Children born in the last 12 months b) Children born between the last 12 and 24 months
2	Exclusive breastfeeding under 6 months	Living children 0–23 months	Infants 0–5 months	a) Children 0–1 months b) Children 2–3 months c) Children 4–5 months d) Children 0–3 months
3	Continued breastfeeding at 1 year		Children 12–15 months	No further disaggregation recommended
4	Introduction of solid, semi-solid or soft foods		Children 6–8 months	No further disaggregation recommended
5	Minimum dietary diversity		Children 6–23 months	a) Children 6–11 months b) Children 12–17 months c) Children 18–23 months
6	Minimum meal frequency		Children 6–23 months	a) Children 6–11 months b) Children 12–17 months c) Children 18–23 months d) Breastfed children e) Non-breastfed children
7	Minimum acceptable diet		Children 6–23 months	a) Children 6–11 months b) Children 12–17 months c) Children 18–23 months
8	Consumption of iron-rich or iron-fortified foods		Children 6–23 months	a) Children 6–11 months b) Children 12–17 months c) Children 18–23 months
Optional indicators				
9	Children ever breastfed	All children born in the last 2 years	Children born in the last 24 months	a) Children born in the last 12 months b) Children born between the last 12 and 24 months
10	Continued breastfeeding at 2 years	Living children 0–23 months	Children 20–23 months	No further disaggregation is recommended
11	Age-appropriate breastfeeding		Children 0–23 months	No further disaggregation is recommended
12	Predominant breastfeeding		Children 0–5 months	No further disaggregation is recommended
13	Duration of breastfeeding[a]	NA	NA	
14	Bottle feeding	Living children 0–23 months	Children 0–23 months	a) Children 0–5 months b) Children 6–11 months c) Children 12–23 months
15	Milk feeding frequency for non-breastfed children		Non breastfed children 6–23 months	a) Children 6–11 months b) Children 12–17 months c) Children 18–23 months

[a] Indicator #13, *Duration of breastfeeding*, cannot be collected with the example questionnaire provided in this guide but would generally be associated with a sampling universe of living children 0–35 months of age. This indicator can be collected by using a slightly modified questionnaire.

SAMPLE SIZE AND PRECISION EXAMPLES, FOR INDICATOR ESTIMATES OF 50%

TABLE A1-5. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 50% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=300 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	75	+/-11.3	+/-15.9	+/-22.5
3	Continued breastfeeding at 1 year	Children 12–15 months	50	+/-13.9	+/-19.6	+/-27.2
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	38	+/-15.9	+/-22.5	+/-31.0
5	Minimum dietary diversity	Children 6–23 months	225	+/-6.5	+/-9.2	+/-13.1
6	Minimum meal frequency	Children 6–23 months	225	+/-6.5	+/- 9.2	+/-13.1
7	Minimum acceptable diet	Children 6–23 months	225	+/- 6.5	+/-9.2	+/-13.1
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	225	+/-6.5	+/-9.2	+/-13.1
10	Continued breastfeeding at 2 years	Children 20–23 months	50	+/-13.9	+/-19.6	+/-27.2
11	Age-appropriate breastfeeding	Children 0–23 months	300	+/-5.7	+/-8.0	+/-11.3
12	Predominant breastfeeding under 6 months	Infants 0–5 months	75	+/-11.3	+/-15.9	+/-22.5
14	Bottle feeding	Children 0–23 months	300	+/-5.7	+/-8.0	+/-11.3
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	113	+/-9.2	+/-13.0	+/-18.5

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-6. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 50% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=900 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	225	+/-6.5	+/-9.2	+/-13.1
3	Continued breastfeeding at 1 year	Children 12–15 months	150	+/-8.0	+/-11.3	+/-15.9
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	113	+/-9.2	+/-13.0	+/-18.5
5	Minimum dietary diversity	Children 6–23 months	675	+/-3.8	+/-5.3	+/-7.5
6	Minimum meal frequency	Children 6–23 months	675	+/-3.8	+/-5.3	+/-7.5
7	Minimum acceptable diet	Children 6–23 months	675	+/-3.8	+/-5.3	+/-7.5
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	675	+/-3.8	+/-5.3	+/-7.5
10	Continued breastfeeding at 2 years	Children 20–23 months	150	+/-8.0	+/-11.3	+/-15.9
11	Age-appropriate breastfeeding	Children 0–23 months	900	+/-3.3	+/-4.6	+/-6.5
12	Predominant breastfeeding under 6 months	Infants 0–5 months	225	+/-6.5	+/-9.2	+/-13.1
14	Bottle feeding	Children 0–23 months	900	+/-3.3	+/-4.6	+/-6.5
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	338	+/-5.3	+/-7.5	+/-10.6

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-7. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 50% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=1500 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	375	+/-5.1	+/-7.1	+/-10.1
3	Continued breastfeeding at 1 year	Children 12–15 months	250	+/-6.2	+/-8.8	+/-12.3
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	188	+/-7.1	+/-10.1	+/-14.3
5	Minimum dietary diversity	Children 6–23 months	1125	+/-2.9	+/-4.1	+/-5.8
6	Minimum meal frequency	Children 6–23 months	1125	+/-2.9	+/-4.1	+/-5.8
7	Minimum acceptable diet	Children 6–23 months	1125	+/-2.9	+/-4.1	+/-5.8
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	1125	+/-2.9	+/-4.1	+/-5.8
10	Continued breastfeeding at 2 years	Children 20–23 months	250	+/-6.2	+/-8.8	+/-12.3
11	Age-appropriate breastfeeding	Children 0–23 months	1500	+/-2.5	+/-3.6	+/-5.1
12	Predominant breastfeeding under 6 months	Infants 0–5 months	375	+/-5.1	+/-7.1	+/-10.1
14	Bottle feeding	Children 0–23 months	1500	+/-2.5	+/-3.6	+/-5.1
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	563	+/-4.1	+/-5.8	+/-8.3

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-8. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 50% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=3000 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	750	+/-3.6	+/-5.1	+/-7.1
3	Continued breastfeeding at 1 year	Children 12–15 months	500	+/-4.4	+/-6.2	+/-8.8
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	375	+/-5.1	+/-7.2	+/-10.1
5	Minimum dietary diversity	Children 6–23 months	2250	+/-2.1	+/-2.9	+/-4.1
6	Minimum meal frequency	Children 6–23 months	2250	+/-2.1	+/-2.9	+/-4.1
7	Minimum acceptable diet	Children 6–23 months	2250	+/-2.1	+/-2.9	+-4.1
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	2250	+/-2.1	+/-2.9	+/-4.1
10	Continued breastfeeding at 2 years	Children 20–23 months	500	+/-4.4	+/-6.2	+/-8.8
11	Age-appropriate breastfeeding	Children 0–23 months	3000	+/-1.8	+/-2.5	+/-3.6
12	Predominant breastfeeding under 6 months	Infants 0–5 months	750	+/-3.6	+/-5.1	+/-7.1
14	Bottle feeding	Children 0–23 months	3000	+/-1.8	+-2.5	+/-3.6
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	1125	+/-2.9	+/-4.1	+/-5.8

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

SAMPLE SIZE AND PRECISION EXAMPLES, FOR INDICATOR ESTIMATES OF 20%

TABLE A1-9. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 20% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=300 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	75	+/-9.1	+/-12.7	+/-18.0
3	Continued breastfeeding at 1 year	Children 12–15 months	50	+/11.1	+/-15.7	+/-21.7
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	38	+/-12.7	+/-18.0	+/-24.8
5	Minimum dietary diversity	Children 6–23 months	225	+/-5.2	+/-7.4	+/-10.5
6	Minimum meal frequency	Children 6–23 months	225	+/-5.2	+/-7.4	+/-10.5
7	Minimum acceptable diet	Children 6–23 months	225	+/-5.2	+/-7.4	+/-10.5
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	225	+/-5.2	+/-7.4	+/-10.5
10	Continued breastfeeding at 2 years	Children 20–23 months	50	+/-11.1	+/-15.7	+/-21.7
11	Age-appropriate breastfeeding	Children 0–23 months	300	+/-4.5	+/-6.4	+/-9.1
12	Predominant breastfeeding under 6 months	Infants 0–5 months	75	+/-9.1	+/-12.7	+/-18.0
14	Bottle feeding	Children 0–23 months	300	+-4.5	+/-6.4	+/-9.1
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	113	+/-7.4	+/-10.4	+/-14.8

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-10. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 20% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=900 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	225	+/-5.2	+/-7.4	+/-10.5
3	Continued breastfeeding at 1 year	Children 12–15 months	150	+/-6.4	+/-9.1	+/-12.7
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	113	+/-7.4	+/-10.4	+/-14.8
5	Minimum dietary diversity	Children 6–23 months	675	+/-3.0	+/-4.3	+/-6.0
6	Minimum meal frequency	Children 6–23 months	675	+/-3.0	+/-4.3	+/-6.0
7	Minimum acceptable diet	Children 6–23 months	675	+/-3.0	+/-4.3	+/-6.0
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	675	+/-3.0	+/-4.3	+/-6.0
10	Continued breastfeeding at 2 years	Children 20–23 months	150	+/-6.4	+/-9.1	+/-12.7
11	Age-appropriate breastfeeding	Children 0–23 months	900	+/-2.6	+/-3.7	+/-5.2
12	Predominant breastfeeding under 6 months	Infants 0–5 months	225	+/-5.2	+/-7.4	+/-10.5
14	Bottle feeding	Children 0–23 months	900	+/-2.6	+/-3.7	+/-5.2
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	338	+/-4.3	+/-6.0	+/-8.5

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-11. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 20% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=1500 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	375	+/-4.0	+/-5.7	+/-8.1
3	Continued breastfeeding at 1 year	Children 12–15 months	250	+/-5.0	+/-7.0	+/-9.9
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	188	+/-5.7	+/-8.1	+/-11.4
5	Minimum dietary diversity	Children 6–23 months	1125	+/-2.3	+/-3.3	+/-4.7
6	Minimum meal frequency	Children 6–23 months	1125	+/-2.3	+/-3.3	+/-4.7
7	Minimum acceptable diet	Children 6–23 months	1125	+/-2.3	+/-3.3	+/-4.7
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	1125	+/-2.3	+/-3.3	+/-4.7
10	Continued breastfeeding at 2 years	Children 20–23 months	250	+/-5.0	+/-7.0	+/-9.9
11	Age-appropriate breastfeeding	Children 0–23 months	1500	+/-2.0	+/-2.9	+/-4.0
12	Predominant breastfeeding under 6 months	Infants 0–5 months	375	+/-4.0	+/-5.7	+/-8.1
14	Bottle feeding	Children 0–23 months	1500	+/-2.0	+/-2.9	+/-4.0
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months[d]	563	+/-3.3	+/-4.7	+/-6.6

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

TABLE A1-12. ESTIMATED PRECISION FOR INDICATORS, ASSUMING AN ESTIMATE OF 20% FOR ALL INDICATORS AND A SAMPLE SIZE OF N=3000 LIVING CHILDREN 0–23 MONTHS[a,b]

				Percentage point width of 95% confidence interval		
				Design effect		
No.	Indicator name	Denominator	n[c]	1.0	2.0	4.0
2	Exclusive breastfeeding	Infants 0–5 months	750	+/-2.9	+/-4.0	+/-5.7
3	Continued breastfeeding at 1 year	Children 12–15 months	500	+/-3.5	+/-5.0	+/-7.0
4	Introduction of solid, semi-solid of soft foods	Infants 6–8 months	375	+/-4.0	+/-5.7	+/-8.1
5	Minimum dietary diversity	Children 6–23 months	2250	+/-1.7	+/-2.3	+/-3.3
6	Minimum meal frequency	Children 6–23 months	2250	+/-1.7	+/-2.3	+/-3.3
7	Minimum acceptable diet	Children 6–23 months	2250	+/-1.7	+/-2.3	+/-3.3
8	Consumption of iron rich or iron fortified foods	Children 6–23 months	2250	+/-1.7	+/-2.3	+/-3.3
10	Continued breastfeeding at 2 years	Children 20–23 months	500	+/-3.5	+/-5.0	+/-7.0
11	Age-appropriate breastfeeding	Children 0–23 months	3000	+/-1.4	+/-2.0	+/-2.9
12	Predominant breastfeeding under 6 months	Infants 0–5 months	750	+/-2.9	+/-4.0	+/-5.7
14	Bottle feeding	Children 0–23 months	3000	+/-1.4	+/-2.0	+/-2.9
15	Milk feeding frequency for non-breastfed children	Non-breastfed children 6–23 months	1125	+/-2.3	+/-3.3	+/-4.7

[a] Only indicators associated with the sampling universe of currently living children 0–23 months are included in this table.
[b] For all calculations, an equal distribution of age across the sample is assumed.
[c] n is the sub-sample size available for calculation of the specific indicator.
[d] For indicator #15, 50% of the sample is assumed to not be breastfed.

ANNEX 2
A review of issues related to age data

Because gathering information on age can be challenging, survey managers may wish to devote a session of interviewer training to discussions about how age will be determined, cross-checked, and used during survey data collection. This annex provides guidance on some of these issues.

The annex reviews the concept of "completed age"; the methods used to determine age in each module; and how the age data are used, both for determining respondent eligibility and for calculation of the IYCF indicators. Issues related to discrepant age reporting both within and across modules are also addressed.

The information provided in this annex is not intended to be comprehensive. For detailed guidance on age estimation, including how to develop and use a local events calendar, see the FAO document, *Guidelines for estimating the month and year of birth of young children* (*9*).

Defining the concept of completed age

Throughout this guide, the concept of completed age is used. This means that interviewers should record all age-related data as the completed age of the individual. Completed age refers to the number of days, months or years that have been lived in entirety by an individual. Partial days, months or years that have been lived should not be counted in a completed age estimate. For example:

- On the day of birth, a child has not yet completed the first day of life and therefore has a completed age of 0 days.
- A child who celebrated his/her first birthday two days prior to the time of the interview has a completed age of 1 year, or 12 months. The child has completed one full year of life (12 months) but has not yet completed the 13th month of life.

Age ranges for the IYCF indicators

The concept of completed age is also employed in Section D, on calculating indicator values; the concept is used in all denominators.

For example, the denominator for Indicator #3, *Continued breastfeeding at 1 year*, is children 12–15 months of age. This means that the indicator reflects data for children who have a completed age of 12–15 months (or, 12.0 to 15.9 months, a 4-month age range).

When calculating indicators, it is important to note that the indicator denominators are inclusive of the upper age indicated. Therefore, children who have a completed age of 15 months should be included in the calculation of IYCF indicator #3. Children with a completed age less than 12 months or with a completed age of 16 months or more should be excluded from calculation of this indicator.

How age is determined, by module

Information about an individual's completed age is collected by different methods and reported with varying levels of precision across modules. This is due to the varied objectives of each module and how the age data collected in each module is used.

The purpose of the Household Roster is to determine if there are individuals in the household who potentially meet the eligibility criteria for the IBF or IYCF modules. In the Household Roster, the ages recorded for individuals do not need to be exact. This is both for time efficiency and because the information is usually reported by the head of the household, who may or may not know the exact age of all household members. In the Household Roster, the age for each household member is recorded only as the number of completed years, i.e. the age at the individual's last birthday. Information about an individual's month or day of birth is not collected here.

The age data collected in the IBF and IYCF modules should be recorded with greater precision and accuracy. The age-related questions in these modules serve as the final filter to determine whether or not the respondent meets the eligibility criteria for the module. In addition, the age data recorded here are used in indicator calculation. These data therefore have the potential to affect both the integrity of the sample collected and the validity of the indicators.

Because of the importance of the age data recorded in these modules, the data here are collected using a series of questions, some of which are intended to solicit redundant information from the respondent. There are two reasons for this:

1. Age data are notoriously difficult to collect and prone to recall error. Some respondents may remember age-related data better in a particular format – for example, as a date of birth rather than as the age of the child in number of months. Asking the age-related questions in multiple ways provides the respondent different opportunities for reporting the most accurate age-related data possible.
2. Collecting the age-related data in different ways allows the interviewer to check the consistency of the data reported across questions, to use all information available to identify the best estimate of age with the help of the respondent.

The series of age-related questions that are asked of the respondent and the data that should be checked for consistency by the interviewer are described below, by module. Related information is also available in the interviewer instructions for each respective module.

Initiation of breastfeeding module

In the IBF module, information about the respondent's age is asked in two ways:

1. First, in IBF Q1, the respondent is asked to report the month and year of her birth.
2. Then, in IBF Q2, the respondent is asked to report her age at her last birthday, i.e. her age in completed years.

The responses to IBF Q1 and IBF Q2 are used to verify whether or not the respondent meets the age-eligibility criterion for the module, i.e. completed age of 15–49 years. If there is an inconsistency between IBF Q1 and IBF Q2, the discrepant age reporting should be reconciled, with the help of the respondent.

Infant and young child feeding module

In the IYCF module, information about the child's age is asked in several ways.

1. First, in IYCF Q1, the respondent is asked the day, month and year of the child's birth. If the respondent does not recall the exact date of the birth, a "don't know" response can be recorded for the day of birth; however, information on the month and the year of the birth are required.
2. If the respondent cannot recall the month and year of birth of the child, the interviewer should work closely with the caregiver to try to identify the best estimate for the child's date of birth, based on other known information. For detailed instruction on how to estimate the month and year of birth of young children, as well as instructions on how to develop and use a local events calendar, refer to the FAO document, *Guidelines for estimating the month and year of birth of young children* (*9*).

3. In IYCF Q2, the respondent is asked to report the child's age at his/her last birthday, i.e. his/her age in completed years.
4. Finally, in IYCF Q3, the respondent is asked to report the child's age in completed months.

IYCF Q4 leads the interviewer through a series of checks to assess the consistency of the age information reported in IYCF Q1, IYCF Q2 and IYCF Q3. It is important that any observed inconsistencies across these 3 questions be resolved at the time of data collection.

If inconsistencies are observed and the child's date of birth was recorded on a health card, this information can be used as the correct data source. If the date of birth was not recorded on a health card, the interviewer should review the information recorded with the respondent to identify how the inconsistencies across IYCF Q1, IYCF Q2 and IYCF Q3 should be reconciled.

Once the child's date of birth is established, the calendar tool at the end of this annex can be used to assess if the date of birth meets the age eligibility criterion for the IYCF module.

Discrepant age reporting across modules

Apart from the discrepant reporting that may occur across the age-related questions within a module, there is also potential for discrepant age-related data to be recorded across modules. It is possible, for example, for the same child to have a different date of birth reported in the IBF module (IBF Q6) than in the IYCF module (IYCF Q1).

Despite the apparent redundancy of age-information across modules, the age-related data does need to be collected uniquely in each module. Not all live births sampled for the IBF module will meet the eligibility criteria for the IYCF module. Some births will be for children who are no longer living, or for children who are no longer living with their biological mother. Similarly, not all children sampled for the IYCF module will meet the eligibility criteria for the IBF module. Some children will not be the most recent birth.

If the potential for discrepant age reporting between modules is a concern, interviewers can be trained to resolve these age inconsistencies during data collection. Note this task in not addressed in the example interviewer instructions in Section B. Efforts to resolve age inconsistencies can also be made at the time of data cleaning, though this is often less effective because the primary source of data (the respondent) can no longer be accessed.

Age data used in indicator calculation

Information on child age is required for calculation of each IYCF indicator presented in this guide. For the purpose of indicator calculation, the recorded date of birth should be used. This allows for the age of the child to be converted into an estimated number of completed days, which improves the precision of the denominators used in the indicator calculations.

Information about a child's date of birth is asked both in the IBF module (IBF Q6 for most recent birth) and in the IYCF module (IYCF Q1 for the child who is the subject of that module). The two dates of birth recorded may be different – even in the absence of age misreporting. This is because the date of births may be for different children.

Box 1 (see page 32) shows how to calculate a child's age from the date of birth information recorded in each module. These calculations should be made with a computer. In the instructions, age is referred to as "IYCF age" (i.e. age derived from IYCF Q1) for current status indicators and as "IBF age" (i.e. age derived from IBF Q6) for indicators based on maternal recall of most recent birth in last 24 months, whether the child is living or deceased.

Calendar tool for determining eligibility for the IBF and IYCF module (illustrative example)

Date of Interview: 19 August 2010; Date of Birth: 12 August 2008; Age (in months): ≥24 months (not eligible)

1. Circle date of interview at the bottom of calendar (2010)
2. Next, circle the same month and day at the top of the calendar (2008)
3. Mark with an “X” the child’s date of birth in the calendar
4. If the “X” does not fall between the marked circles (top and bottom), the child is not eligible (≥ 24 months of age)
5. In the rare case that the interview is on the same day as the child’s birthday, the child would still be eligible.
6. If the exact day of birth is unknown, assume the 15th of the month as day of birth.

2008

JANUARY

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

MARCH

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

APRIL

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

MAY

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JUNE

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

JULY

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

AUGUST

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

OCTOBER

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

NOVEMBER

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

DECEMBER

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

2009

JANUARY

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

FEBRUARY

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

MARCH

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

APRIL

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

MAY

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JUNE

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

JULY

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

AUGUST

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

OCTOBER

M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

NOVEMBER

M	T	W	T	F	S	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

DECEMBER

M	T	W	T	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

2010

JANUARY

M	T	W	T	F	S	S
				1	2	3
4	5	6	7	8	9	10
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FEBRUARY

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MARCH

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APRIL

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MAY

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JUNE

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JULY

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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ANNEX 3
Alternate method for collecting information on food groups consumed

This Annex describes an alternate method for gathering information about food groups consumed by the child less than two years of age. An alternate version of IYCF Q12, as well as alternate interviewer instructions, are provided below.

The example questionnaire in Section A elicits information about food groups by guiding the caregiver through a "free recall" of foods consumed by the child the previous day. The alternate version provided below substitutes a "list-based" approach in place of the free recall.

The main advantage of a list-based approach is that it requires less of the interviewer. The free recall requires the interviewer to probe repeatedly to help the caregiver recall each feeding/eating episode for the child the previous day. Probing must also be flexible, depending on the caregiver's responses. For example, when the caregiver mentions a mixed dish the interviewer must probe to determine the ingredients. The list-based approach appears more straightforward with respect to demands on interviewers. It is also usually faster, though this difference is less marked for infants and young children than for adults. This is because infants and young children have relatively simple diets.

The disadvantage of the list-based approach is that it is less intuitive, particularly for the respondent. It requires the respondent caregiver to think abstractly, and in ways that may not be familiar. Foods on the list are divided into groups based on nutritional considerations, but these categories may not correspond to the categories caregivers themselves employ in thinking about foods. Also, consumption of mixed dishes may be very common. In order to respond correctly and provide full information, the caregiver must "break apart" mixed dishes and report each ingredient when the interviewer lists the examples that comprise a food group. The list-based approach may also be more susceptible to misuse through rushing, on the part of the interviewer. This potential disadvantage can be addressed through strong training, supervision, and other standard data quality control procedures.

The alternative for IYCF Q12 (next page) is followed by the interviewer check and Q13–Q15, just as on the IYCF module (see interviewer check and Q13–15 in Section A and instructions for Q13–15 in Section B).

If the list-based method is used, an additional food group "R" is also added ("any other solid or semi-solid food"). Calculations of values for Indicator # 2, *Exclusive breastfeeding under 6 months*, and Indicator # 12, *Predominant breastfeeding under 6 months*, need to be adjusted to ensure exclusion of food group "R".

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES			
	OTHER FOODS: PLEASE WRITE DOWN OTHER FOODS IN THIS BOX THAT RESPONDENT MENTIONED BUT ARE NOT IN THE LIST BELOW:				
A12	Now I would like to ask you about (other) liquids or foods that ***(NAME)*** ate yesterday during the day or at night. I am interested in whether your child had the item even if it was combined with other foods. For example, if ***(NAME)*** ate a millet porridge made with a mixed vegetable sauce, you should reply yes to any food I ask about that was an ingredient in the porridge or sauce. Please do not include any food used in a small amount for seasoning or condiments (like chilies, spices, herbs, or fish powder), I will ask you about those foods separately. Yesterday during the day or at night, did ***(NAME)*** drink/eat:		YES	NO	DK
A	Bread, rice, noodles, or other foods made from grains, including thick grain-based porridge?	A..........	1	2	8
B	Pumpkin, carrots, squash, or sweet potatoes that are yellow, or orange inside?	B..........	1	2	8
C	White potatoes, white yams, manioc, cassava, or any other foods made from roots?	C..........	1	2	8
D	Any dark green leafy vegetables?	D..........	1	2	8
E	Ripe mangoes, ripe papayas, or (**insert other local vitamin-A rich fruits**)?	E..........	1	2	8
F	Any other fruits, or vegetables?	F..........	1	2	8
G	Liver, kidney, heart, or other organ meats?	G..........	1	2	8
H	Any meat, such as beef, pork, lamb, goat, chicken, or duck?	H..........	1	2	8
I	Eggs?	I..........	1	2	8
J	Fresh or dried fish, shellfish, or seafood?	J..........	1	2	8
K	Any foods made from beans, peas, lentils, or nuts?	K..........	1	2	8
L	Cheese, yogurt, or other milk products?	L..........	1	2	8
M	Any oil, fats, or butter, or foods made with any of these?	M..........	1	2	8
N	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits?	N..........	1	2	8
O	Condiments for flavor, such as chilies, spices, herbs, or fish powder?	O..........	1	2	8
P	Grubs, snails, or insects?	P..........	1	2	8
Q	Foods made with red palm oil, red palm nut, red palm nut pulp sauce	Q..........	1	2	8
R	Any other solid or semi-solid food	R..........	1	2	8

Interviewer Instructions: Q12 foods given yesterday

Q12 asks about different foods the child may have eaten yesterday (during the day or night). Similar foods are grouped together. It is important to ask about all the different groups of foods.

Begin by reading the introductory portion of the question slowly, emphasizing that the question concerns what the child ate on the day preceding the interview (yesterday during the day or at night). Then ask about each of the items in the order they appear in the question. For categories that have more than one item of food, circle “1” for “yes” if any item in that category was eaten.

If a food mentioned by the respondent is not listed in any of the existing food groups, write the name of the food in the box labeled “other foods”, located above item A. These foods should not be coded into a food group at the time of the interview. A supervisor will decide how to code these foods later. However, typically respondents will not offer this additional information.

Sometimes the caregiver may tell you that the child had “soup” or “stew”. For example, when you ask if the child ate “any other solid or semi-solid food”, the respondent may mention a soup or stew. Since these typically include a variety of food items, it is important that you probe to find out the food items included in the soup or stew and circle “1” for each appropriate food/group.

When foods are added in very small amounts, or for seasoning, indicate this by circling “1” for item “0”. For example, if a spoon of fish powder is added to a pot of stew, record it as a “condiment” and do not record that the child has eaten fish. If one or a few chili peppers are included in the family pot, record this as a “condiment” and do not record it as an “other fruit or vegetable.”

However, again, typically respondents will not offer this additional information (tell you about a mixed dish that is not on the list).

As you are asking about the initial food items, the caregiver may interrupt and list the foods and liquids that the child consumed. If this happens, begin with the foods or liquids she mentions that the child received and circle a “1” for each item in the right column. You may need to ask the respondent to repeat the items to make sure that you have recorded all the food types correctly.

Once you have gone through items A through Q, you must go back and ask about any categories that the respondent did not mention. As you begin asking specifically about other food items/groups, the respondent may tell you that the child was given only the items she has already mentioned (for example, rice and mango). In this case, confirm that the child was not given anything else by asking “Was ***(NAME)*** given any other solid or semi-solid food?” (item “R” on this list). If the caregiver confirms that the child was not given any other liquid or food, mark “no” for all the other items in the list.

ANNEX 4
Sample liquid and food group list

The sample liquid and food group list aims to help guide the in-country adaptation of IYCF Q10 and IYCF Q12. IYCF Q10 lists various liquids given to infants and IYCF Q12 lists different food groups. For in-country adaptation of IYCF Q10 and Q12, you will need to modify the liquid and food list to include the most commonly consumed liquids and food items in the area(s) where you will implement the survey. This Annex provides explanation of the liquids that should (and should not) be included in IYCF Q10 and illustrative examples of foods (and food products) that can go under each food group in IYCF Q12.

This list is not exhaustive, but the group descriptions and extensive examples should provide sufficient basis for decisions about adaptation of IYCF Q10 and Q12 around country-specific liquids and foods.

Liquids

The list of liquids is quite detailed. This is because many infants under six months are given a variety of liquids and semi-solids (for example thin porridge) well before they are given other foods. The detailed list of liquids is intended to help ensure that complete information is available in order to classify the infant as exclusively breastfed, or not.

If the survey will not cover infants less than 6 months of age, the list of liquids can be considerably simplified. In this case, the main objective of Q10 is to capture information about milk feeds, and especially for non-breastfed infants and children.

Yogurt and thin porridge/gruel are included in the list although they may be eaten and not drunk as liquid. If the recommended method is used for data collection for Q12 (mother's free recall, assisted by interviewer probing) these foods are likely to also be captured under Q12. If they are captured in two places this does not create any problems for indicator calculation. These thin foods are included with the liquids because this guide also presents an alternate, list-based approach to Q12 (see Annex 3). When a list-based approach is used there is more risk that foods will be missed, especially because the list may group many foods, including some (for example thin porridge for infants, thick porridge eaten by older children and adults) that may belong in different categories in the mind of the respondent. Therefore, considering that some users may adopt a list-based approach, and because of the critical importance of estimating exclusive breastfeeding as accurately as possible, these foods are included on the list of liquids.

Sample list of liquids for IYCF Q10[1]

List of liquids on example questionnaire	Remarks
Plain water	
Infant formula	Include both fortified and non-fortified dairy-based infant formula. List examples of formulas available in the survey area(s). If soy-based formula is commonly given, add as a separate category (to distinguish from milk-based formula), and adapt calculation of indicators accordingly.
Milk	Include tinned/canned, powdered, or fresh animal milk. Do not include soy milk. If soy milk is common, add as a separate category and adapt calculation of indicators accordingly. "Milks" made from nuts/seeds/fruits (groundnut milk, cashew milk, sunflower milk, coconut milk) are more commonly used as ingredients and should be captured under Q12. If drunk as liquids, add a separate category to Q10.
Juice or juice drinks	Include home squeezed juice, 100% fruit juice or juice made from concentrate. Juice drinks (less than 100% juice) are also included. Juice and juice drinks are grouped together because distinguishing between juice and juice drinks is often difficult in recall surveys.
Clear broth	Include only clear water-based broths. Soups should not be included in this category. The rationale for including clear broths in the list of liquids is that they may not be considered as "foods" and might not be captured under Q12. If not captured and given to young infants, estimates of prevalence of exclusive breastfeeding could be inflated.
Yogurt	List local names for yogurt and yogurt drinks. The rationale for including yogurt in the list of liquids is the same as for clear broth. In some countries, there are products which may be called yogurt, but actually are sweet drinks containing very little yogurt. These should not be listed under Q10F, but instead should be in an added item for sweet drinks. If both types of products (100% yogurts, and highly sweetened drinks) are common in the survey area, survey managers will need to judge whether it will be possible to distinguish between them. If not, it may be necessary to decide where to categorize these drinks based on local knowledge of which are more commonly consumed by the sampled population.
Thin porridge	List local names for thin porridges or gruels that are usually prepared for infants and young children and can be poured easily off a spoon. Often, local names for thin porridge are different from thick porridge eaten by older children and adults. Thin porridges are included with the liquids because they may not be reported under Q12, especially when the alternate list-based approach (page 61) is used.
Other water-based liquids	Any other water-based liquids not listed above should be listed here. Herbal infusions (*example; gripe water*) or ritual fluids should be included in this category and specified.
Any other liquids	This final category is designed to ensure that no liquids are missed. It should be asked as written, without any specific examples. See also additional suggestions on the next page for country-specific liquids that might be added and that would precede this final category on the questionnaire. If the list is well designed there should be very few positive responses to this final category.

[1] Also refer to the Section C, on adapting the questionnaire.

Other liquids to be added to Q10 as needed	**Remarks: If any items in this table are added to the list of liquids, indicator calculations will need to be adapted accordingly**
Soy formula	As noted above under "infant formula"
Soy milk	As noted above under "milk"
Other non-dairy "milks" if taken as liquids	As noted above under "milk"
Probiotic products	If probiotic products are given to infants and young children in the survey area(s), they should be listed as a separate item. In some countries these products are currently being promoted.
Tea, coffee, or cocoa prepared only with water	Tea, coffee, and/or cocoa prepared with water can be listed either under "other water-based liquids" or separately, depending on advice from local nutritionists, and on whether there is any interest in capturing prevalence of intake among young children.
Tea, coffee, or cocoa prepared with milk	When tea, coffee, or cocoa prepared with milk are commonly given to infants and young children, they should be added to the list of liquids. Survey managers should consult with local nutritionists and decide whether or not to count these as "milk feeds" and ask Q11 (number of times consumed yesterday). The decision depends on the usual preparation. In some places, when prepared for infants, these drinks are typically prepared with milk and very little or no water. If so, they can be counted as milk feeds. In other places, only trivial amounts of milk are added and they should not be counted as milk feeds. In other situations the amount may vary and survey managers will need to make a difficult judgment. Consultation with local nutritionists should inform the judgment.
Sodas, other sweet drinks	Sodas/carbonated beverages and/or other sweet drinks can be listed either under "other water-based liquids" or separately, depending on advice from local nutritionists, and on whether there is any interest in capturing prevalence of intake among infants and young children.
Any other non-water based liquids	Other water-based liquids are already listed in Q10, as the penultimate item on the list on the example questionnaire. If there are other *non-water based liquids* they should be added to the list. Any other food-based prelacteals can also be added here, if survey managers judge this is the best way to ensure data on prelacteals is captured. As with several other items above, the rationale for including other prelacteals on a list of liquids is to ensure that estimates of exclusive breastfeeding are as accurate as possible.

Foods groups and examples for IYCF Q12

A. Foods made from grains

Include products and foods derived from cereal crops. Any staple dishes or products like breads (*for example bagels, rolls, scones, chapatti, roti, tortillas*), savory biscuits (*buttermilk biscuits, cheese biscuits*), porridge (*ugali, nsima/nshima, posho, sadza, mealies, dalia, muesli, papilla, grain fufu*), and noodles (*pasta, soba, spaghetti, vermicelli*) made from the grains listed below, and from flours of these grains, should be included in this category. Local names should be used (see Box A4-1). Sweet biscuits and cakes should not be included.

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Amaranth (*kiwicha*)	*Amaranthus*	Amaranthaceae	Seeds
Barley	*Hordeum vulgare*	Poaceae	Seeds
Buckwheat	*Fagopyrum esculentum*	Polygonaceae	Seeds
Corn (maize)	*Zea mays*	Poaceae	Seeds
Fonio	*Digitaria exilis*	Poaceae	Seeds
Kamut	*Triticum turanicum*	Poaceae	Wheat-like seeds
Kañiwa, (*cañihua, cañiwa*)	*Chenopodium pallidicaule*	Amaranthaceae	Seeds
Millet	*Pennisetum typhoides*	Poaceae	Seeds
Oats	*Avena sativa*	Poaceae	Seeds
Palmer grass	*Distichlis palmeri*	Poaceae	Wheat-like seeds
Quinoa (*quinua*)	*Chenopodium quinoa*	Amaranthaceae	Seeds
Rice	*Oryza sativa*	Poaceae	Seeds
Rye	*Secale cereale*	Poaceae	Seeds
Sorghum	*Sorghum bicolor*	Poaceae	Seeds
Spelt	*Triticum spelta*	Poaceae	Wheat-like seeds
Teff	*Eragrastris albysinnica*	Poaceae	Seeds
Triticale (cross between wheat and rye)	*Triticosecale*	Poaceae	Seeds

Box A4-1. Use local names for foods

Use local names of the food items commonly consumed in the country to illustrate food groups. Some examples are given below for group A.

Example:

- Corn/Maize (ugali, nsima/nshima, posho, sadza, mealies, tortilla, when made from maize)
- Teff (injera)
- Wheat (chapatti, roti, tortilla, noodle, pasta, seitan)

Local names for staple foods can refer to foods with different main ingredients (for example, tortilla can be maize or wheat tortilla, noodle can be wheat or rice noodle) and yet belong in the same food group. In other cases, the item can belong in a different group, depending on the ingredient.

Example 1
Nsima (stiff porridge) can be made from maize (grain group) or from cassava (roots/tubers group). In this case, the grains group can include "nsima made from maize" and the roots/tubers group can include "nsima made from cassava".

Example 2
Clear/glass/cellophane noodles can be made of mung bean, rice or potato tuber starch.

"Noodles made from mung bean" would be included in group K (beans, peas, lentils, nuts, seeds); "rice noodles" would be included in the grains group, and "noodles made from potato starch" would be included in group C (roots, tubers, and plantains).

See Section C, on adapting the questionnaire, for suggestions on how to ensure that appropriate local names for foods are identified and included.

B. Dark yellow or orange-fleshed roots, tubers, and others

Include only roots, tubers, and other red/yellow/oranges vegetables that are sources[1] of vitamin A (see Box A4-2). Several items that are botanically fruits but are typically used as vegetables for culinary purposes are also included here.

Common name	Binomial Name OR Genus	Family	Edible part of the plant
Carrot	*Daucus carota*	Umbelliferae	Tuberous root
Pumpkin	*Cucurbita pepo*	Cucurbitaceae	Fruit, flowers
Red pepper (sweet)	*Capsicum annuum*	Solanaceae	Fruit
Squash (orange or dark yellow-fleshed only)	*Cucurbita*	Cucurbitaceae	Fruit
Sweet potato (orange or dark yellow-fleshed only)	*Ipomoea batatas*	Convolvulaceae	Tuberous root

Box A4-2. Cut-offs for defining foods and liquids as "sources" of vitamin A

For plant foods: Foods providing 120 retinol equivalents (RE) per 100 g are considered sources. This is roughly equivalent to 60 retinol activity equivalents (RAE); food composition tables may report vitamin A content of foods using RE or RAE.

For liquids (for example, juices): Liquids providing 60 RE or 30 RAE per 100 g are considered to be sources of vitamin A.

See Section C on adapting the questionnaire for further discussion of the rationale for these cut-offs.

C. Roots, tubers and plantains

Include non-colored items mainly providing carbohydrate. This group includes all non-grain-based starchy staples. Any staple dishes/casseroles and pastes made from roots, tubers, and plantains should also be included in this category.

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Ahipa (*ajipa*)	*Pachyrhizus ahipa*	Fabaceae	Tuberous root
Arracacha (*racacha, white carrot*)	*Arracia xanthorhiza*	Apiaceae	Tuberous root
Arrowroot	*Maranta arundinacea*	Marantaceae	Rhizomes
Breadfruit	*Artocarpus*	Moraceae	Starchy fruit
Burdock root	*Arctium lappa*	Asteraceae	Taproot
Canna lily (*achira*)	*Canna lily*	Cannaceae	Starchy rhizome
Cassava (*yuca, manioc, mandioca*)	*Manihot esculenta*	Euphorbiaceae	Tuberous root
Chicory root	*Cichorium intybus*	Asteraceae	Tuberous root
Elephant foot yam (white)	*Amorhophallus paeoniifoleus*	Araceae	Starchy corm
Green bananas	*Musa*	Musaceae	Starchy fruit
Jicama/Yambean	*Pachyorhizuserosus*	Fabaceae	Tuberous roots
Lotus root	*Nelumbo nucifera*	Nelumbonaceae	Spongy roots
Maca	*Lepidium meyenii*	Brassicaceae	Tuberous root
Mashwa (*mashua*)	*Tropaeolum tuberosum*	Tropaeolaceae	Stem tuber
Mauka	*Mirabilis longiflora*	Nyctaginaceae	Tuberous root
Nopal	*Opuntia*	Cactaceae	Succulent stem
Oca	*Oxalis tuberosa*	Oxalidaceae	Tuberous root
Parsnip	*Pastinacea sativa*	Apicaceae	Tuberous root
Plantains (ripe and green)	*Musa*	Musaceae	Starchy fruit

[1] For definition of "source" refer to: Codex Alimentarius Commission, Guidelines adopted 1997, revised 2004; for definition of Nutrient Reference Values: Codex Alimentarius Commission, Guidelines adopted 1985, revised 1993.

Roots, tubers and plantains (continued)

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Potatoes (purple/blue/pink/yellow)	*Solanum tuberosum*	Solanaceae	Stem tuber
Rutabaga	*Brassica napobrassica*	Brassicaceae	Tuberous root
Sweet potato (white/pale yellow-fleshed)	*Ipomoea batatas*	Convolvulaceae	Tuberous root
Tannia (yautia)	*Xanthosoma sagittifolium*	Araceae	Starchy corm
Taro root (*cocoyam, dasheen, eddo, tannia, colocasia, arbi/arvi*)	*Colocasia esculenta*	Araceae	Starchy corm
Turnip	*Brassica rapa*	Brassicaceae	Tuberous root
Ulloco (*melloco*)	*Ullucus tuberosus*	Basellaceae	Stem tuber
Water chestnut	*Eleocharis dulcis*	Cyperaceae	Starchy corms
Yam	*Dioscorea*	Dioscoreaceae	Tuberous root

D. Dark green leafy vegetables

Only include medium to dark green leafy vegetable that are a source of vitamin A in this category. Vitamin A values for leafy vegetables vary widely across various food composition tables. In general medium to dark leafy green vegetables will meet the criterion to be considered sources of vitamin A (see Box A4-2).

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Alfalfa greens	*Medicago sativa*	Fabaceae	Leaves
Amaranth greens (*bugga, kiwicha, dodo*)	*Amaranthus*	Amaranthaceae	Leaves
Arugula (*rocket, rúcula, oruga*)	*Eruca sativa*	Brassicaceae	Leaves
Balsam-pear (*bitter gourd*)	*Momordica charantia*	Cucurbitaceae	Leaves (leafy tips)
Baobab greens	*Adansonia*	Malvaceae	Leaves
Bean greens	*Phaseolus*	Fabaceae	Leaves
Beet greens (*swiss chard, silverbeet, perpetual spinach, crab beet, mangold*)	*Beta vulgaris*	Amaranthaceae	Leaves
Bitter leaf (*ewuro, ndole, onugbu*)	*Vernonia calvoana*	Asteraceae	Leaves
Broccoli	*Brassica oleracea*	Brassicaceae	Leaves, head (thalamus, flower buds)
Broccoli rabe (*rappi, broccoletti, turnip greens*)	*Brassica rapa*	Brassicaceae	Leaves
Carrot greens	*Daucus carota*	Umbelliferae	Leaves
Cassava greens	*Manihot esculenta*	Euphotbiaceae	Leaves
Chicory greens	*Cichorium intybus*	Asteraceae	Leaves
Chili greens	*Capsicum frutescens*	Solanaceae	Leaves
Chinese cabbage (*bok choy, pak choy, snow cabbage*)	*Brassica rapa*	Brassicaceae	Leaves
Chinese kale (*Chinese broccoli, kai-lan, gai-lan*)	*Brassica oleracea*	Brassicaceae	Leaves
Collard greens (*spring greens*)	*Brassica oleracea*	Brassicaceae	Leaves
Cow pea greens	*Vigna unguiculata*	Papilionaceae	Leaves
Dandelion greens	*Taravacum*	Asteraceae	Leaves

Dark green leafy vegetables (continued)

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Drumstick greens	*Moringa oleifera*	Moringaceae	Leaves
Fenugreek greens (*methi*)	*Trigonella foenum*	Fabaceae	Leaves
Fiddle head fern (*dod*)	*Pteridium aquilinum*	Dennstaedtiaceae	Leaves
Garden cress (*pepper grass*)	*Lepidium sativum*	Brassicaceae	Leaves
Kale	*Brassica oleracea*	Brassicaceae	Leaves
Lamb's quarters (*bathua*)	*Chenopodium album*	Amaranthaceae	Leaves
Lettuce (*bib, romaine*)	*Lactuca sativa*	Asteraceae	Leaves
Malva greens (*mallow*)	*Malva vertcillata*	Malvaceae	Leaves
Mustard greens	*Sinapsis alba*	Brassicaceae	Leaves
Okra (lady's finger, gumbo)	*Abelmoschus esculentus*	Malvaceae	Leaves
Pumpkin greens	*Cucurbeta pepo*	Cucurbitaceae	Leaves
Purslane	*Portulaca oleracea*	Portlacaceae	Leaves
Quinoa greens (*quinua*)	*Chenopodium quinoa*	Amaranthaceae	Leaves
Sea weed	*Caulerpa prolifera*	Caulerpaceae	Algae
Spinach	*Spinacia oleracea*	Amaranthaceae	Leaves
Sweet potato leaves	*Ipomoea batatas*	Convolvulaceae	Leaves
Tannia greens	*Xanthosoma*	Araceae	Leaves
Taro greens	*Colocasia esculenta*	Araceae	Leaves
Turnip greens	*Brassica rapa*	Brassicaceae	Leaves
Water cress	*Nasturtium officinale*	Brassicaceae	Leaves
Water spinach (*swamp cabbage, water morning-glory, kangkung, kang kung*)	*Ipoemoea aquatica*	Convolvulaceae	Leaves
Yau choy	*Brassica napus*	Brassicaceae	Leaves

E. Fruits (dark yellow or orange)

Include locally available dark yellow or orange fruits that are sources of vitamin A (see Box A4-2).

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Apricots (fresh and dried)	*Prunus armeniaca*	Rosaceae	Fruit
Cantaloupe melon (ripe)	*Cucumis melo*	Cucurbitaceae	Fruit
Hog plum (*yellow mombin, cajà*)	*Spondias mombin, Spondias lutea*	Anacardiaceae	Fruit
Loquat	*Eriobotrya japonica*	Rosaceae	Fruit
Mango (ripe, fresh and dried)	*Mangifera indica*	Anacardiaceae	Fruit
Musk melon (ripe)	*Cucumis melo*	Cucurbitaceae	Fruit
Papaya (ripe, fresh and dried)	*Carica papaya*	Caricaceae	Fruit
Passion fruit (ripe)	*Passiflora edulis*	Passifloracceae	Fruit
Peaches (dried raw only)	*Prunus persica*	Rosaceae	Fruit
Persimmon (ripe)	*Diospyros kaki*	Ebenaceae	Fruit
Pitanga (*Surinam cherry, Brazilian cherry*)	*Eugenia uniflora*	Myrtaceae	Fruit
Tree tomato (*tamarillo*)	*Solanum betaceum*	Solanaceae	Fruit

F. Any other fruits and vegetables

This group includes various parts of a plant; leaves, stem, fruit and flowers.

Other fruits

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Acerola (*West Indian cherry*)	*Malpighia glabra*	Malpighiaceae	Fruit
Apple	*Malus domestica*	Rosaceae	Fruit
Avocado	*Persea americana*	Lauraceae	Fruit
Banana	*Musa indica*	Musaceae	Fruit
Baobab pulp	*Adansonia*	Malvaceae	Fruit
Blackberry	*Rubus fruticosus*	Rosaceae	Fruit
Black current	*Ribes nigrum*	Grassulariaceae	Fruit
Blueberry	*Vaccinium*	Ericaceae	Fruit
Cactus pear	*Opuntia*	Cactaceae	Succulent stem
Cape gooseberry	*Physalis peruviana*	Solanaceae	Fruit
Cashew nut fruit (*cashew apple, tupi*)	*Anacardium occidentale*	Anacardiaceae	Fruit
Cherries (cornelian)	*Corneus*	Cornaceae	Fruit
Coconut flesh	*Cocos nucifera*	Arecaceae	Fruit
Cranberry	*Vaccinium*	Ericaceae	Fruit
Custard-apple (*bullock's heart, bull's heart*)	*Annona reticulata*	Annonaceae	Fruit
Dates (fresh and dried)	*Phoenix dactyfera*	Arecaceae	Fruit
Durian	*Durio*	Malvaceae	Fruit
Elderberry	*Sambucus*	Adoxaceae	Fruit and flowers
Figs (*sycamore*)	*Ficus*	Moraceae	Fruit
Goose berries	*Ribes species*	Grassulariaceae	Fruit
Grape fruit	*Citrus paradisi*	Rutaceae	Fruit
Grapes	*Vites Vinifera*	Vitaceae	Fruit
Groundcherry (*Cape-gooseberries, poha*)	*Physalis*	Solanaceae	Fruit
Guava	*Psidum*	Myrtaceae	Fruit
Guinep (*chenette, genip*)	*Mamoncillo/Mellicoccus*	Sapindaceae	Fruit
Huckleberry	*Vaccinium*	Ericaceae	Fruit
Indian Goose berry (*amla*)	*Ribes crispa*	Saxifragales	Fruit
Jackfruit (*kathal*)	*Artocarpus heterophyllus*	Moraceae	Fruit
June plum (*Jew plum, golden apple*)	*Spondias dulcis*	Anacardiaceae	Fruit
Kiwi	*Actinidia deliciosa*	Actinidiaceae	Fruit
Lemon	*Citrus limon*	Rutaceae	Fruit
Lime	*Citrus aurantifolia*	Rutaceae	Fruit
Litchi	*Litchi chinensis*	Sapindaceae	Fruit
Honeydew melon	*Cucunis melo*	Cucurbitaceae	Fruit
Mulberry	*Morus nigra*	Moraceae	Fruit
Nectarine	*Prunus persica*	Rosaceae	Fruit
Olive	*Olea europea*	Olecaceae	Fruit
Peach	*Prunus persica*	Rosaceae	Fruit
Pear	*Pyrus communis*	Rosaceae	Fruit
Pineapple	*Ananas*	Bomeliaceae	Fruit

Other fruits (continued)

Common name (*regional common names*)	**Binomial Name OR Genus**	**Family**	**Edible part of the plant**
Plum	*Prunus*	Rosaceae	Fruit
Pomegranate (*anar*)	*Punica granatum*	Luthraceae	Fruit
Pomerac (*Malay apple*)	*Syzigium malaccense*	Myrtaceae	Fruit
Prune	*Prunus domesticus*	Rosaceae	Fruit
Quince	*Cydonia oblongata*	Rosaceae	Fruit
Raisin	*Vites*	Vitaceae	Dried grapes
Rambutan	*Nephelium lappaceum*	Sapindaceae	Fruit
Raspberry	*Rubus*	Rosaceae	Fruit
Sapodella (*naseberry*)	*Manikara zapota*	Sapotaceae	Fruit
Soursop (*guanábana, graviola*)	*Annona muricata*	Annonaceae	Fruit
Star fruit (*kamrakh*)	*Averrhoa*	Oxalidaceae	Fruit
Strawberry	*Prunus*	Rosaceae	Fruit
Sweetsop (*sugar apple, custard apple*)	*Annona squamosa*	Annonaceae	Fruit
Tamarind	*Tamarindus indica*	Caesalpinioideae	Fruit
Tangerine	*Citrus tangerina*	Rutaceae	Fruit
Watermelon	*Citrullus lanatus*	Cucurbitaceae	Fruit
Yacon	*Smallanthus sonchifolius*	Asteraceae	Fruit
Zuzuba	*Ziziphus zuzuba*	Rhamnaceae	Fruit

Other vegetables

Common name (*regional common names*)	**Binomial Name OR Genus**	**Family**	**Edible part of the plant**
Artichoke	*Cynara cardumculus*	Asteraceae	Fleshy bracts
Asparagus	*Asparagus officinalis*	Asparagaceae	Young shoots
Bamboo shoot	*Bambusavulgaris*	Poaceae	Young stem
Beans (various) when eaten as fresh pods[a]	*Phaseolus*	Fabaceae	Young pod
Beets	*Beta vulgaris*	Amaranthaceae	Leafy stems
Bitter melon	*Momordica charantia*	Cucurbitaceae	Fruit
Brussels sprouts	*Brassica oleracea*	Brassicaceae	Fleshy bracts
Cabbage (common and red varieties)	*Brassica oleracea*	Brassicaceae	Leaves
Caigua (*caihua, slipper gourd*)	*Cyclanthera pedata*	Cucurbitaceae	Fruit
Cattail	*Typha*	Typhaceae	Rhizome
Cauliflower	*Brassica oleracea*	Brassicaceae	Head (thalamus, flower buds)
Celery	*Apium graveolens*	Apiaceae	Leaf stalk
Ceylon spinach	*Basella alba*	Basellaceae	Succulent leaves
Chayote (*sayote, tayota, choko, chocho, chow-chow, christophine*)	*Sechium edule*	Cucurbitaceae	Fruit
Corn (fresh, not dried/flour/meal) (*green maize*)	*Zea mays*	Poaceae	Corn cobs, kernels
Cucumbers	*Cucurbita Species*	Cucurbitaceae	Fruit
Eggplant (*aubergine, brinjal*)	*Solanum melongena*	Solanaceae	Fleshy fruit
Endive	*Cichorium endivia*	Asteraceae	Leaves
Fennel	*Foeniculum Vulgare*	Apiaceae	Bulb, stem, leaves, seeds

Other vegetables (continued)

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Garlic	*Allium sativum*	Alliaceae	Bulb
Green pepper	*Capsicum annum*	Solanaceae	Fruit
Jicama (*yam bean*)	*Pachyrhizus erosus*	Fabaceae	Tuberous root
Kohlrabi (*German turnip*)	*Brassica oleracea*	Brassicaceae	Stem
Leek	*Allium ampeloprasum*	Alliaceae	Stem/leaf sheaths
Lettuce (light green)	*Lactuca sativa*	Asteraceae	Leaves
Luffa (*rigged gourd*)	*Luffa acutangula*	Cucurbitaceae	Fruit
Mushroom	*Agaricus bisporus*	Agaricaceae	Stem and cap
Nakati (*mock tomato*)	*Solanum aethiopicum*	Solanaceae	Leaves
Okra	*Abelmoschus esculentus*	Malvaceae	Green fruit
Onion	*Allium cepa*	Alliaceae	Bulb
Palm hearts (*palmito, chonta, swamp cabbage*)	*Bactris gasipaes*	Arecaceae	Inner core of the stem
Parwal (*pointed gourd*)	*Trichosanthes dioica*	Cucurbitaceae	Fruit
Peas, green, when eaten as fresh pod	*Pisum sativum*	Fabaceae	Young pod
Radish	*Raphanus sativus*	Brassicaceae	Tuberous root
Rutabaga greens	*Brassica napobrassica*	Brassicaceae	Leaves
Shallot (*eschallot, eeschalotte*)	*Allium oschaninii*	Alliaceae	Bulb
Snake gourd (*serpent gourd, chichinga, and padwal*)	*Trichosanthes cucumerina*	Cucurbitaceae	Fruit
Squash (Summer and other light colored squash)	*Cucurbita maxima*	Cucurbitaceae	Fruit
Tomato (red, yellow, green, not orange)	*Solanum lycopersicum*	Solanaceae	Fruit
Winter melon (*white gourd, ash gourd*)	*Benincasa hispida*	Cucurbitaceae	Fruit
Zucchini	*Cucurbita pepo*	Cucurbitaceae	Fruit

[a] Various varieties of young bean pods are eaten as vegetables; please refer to group K (beans, peas, lentils, nuts and seeds) section for a list of many varieties. All the varieties of bean consumed as a young pod should be included in this category. When seeds only are eaten (fresh or dried) they should be listed under group K.

G. Organ meats

This group includes different types of red organ meats that are usually rich in iron. Any processed/cured products made from these organ meats should also be included in this group.

- gizzard, heart, kidney and liver

H. Any meat

This group includes flesh foods. Any processed/cured products made from the meats listed below (sausages, salamis, etc.) should also be included in this group.

- beef, goat, lamb, mutton, pork, rabbit, yak, deer, antelope, buffalo, or other large wild (bush meat) or domesticated mammals
- chicken, duck, goose, guinea fowl, turkey, pigeon, or other wild or domesticated birds
- cane rat, guinea pig, rat, agouti, opossum, cat, dog, anteater, or other small wild (bush meat) or domesticated mammals
- frogs, other amphibians
- snakes, other reptiles

I. Eggs

This group includes all kinds of bird eggs.

- chicken eggs
- duck eggs
- guinea fowl eggs
- quail eggs

J. Fish and seafood

This group includes all types of fish and seafood. Any processed food made from these should also be included in this category.

- canned fish (anchovies, tuna, sardines)
- fresh or dried fish
- roe/fish eggs
- shark
- clam, crab, lobster, crayfish, mussels, oysters, shrimp, or other shellfish
- snails
- octopus, squid
- whale

K. Beans, peas, lentils, nuts and seeds

Include beans, peas, lentils, nuts, or seeds, and also products made from these. Seeds should not be included on the list if they are used in very small quantities or if chewed as a digestive; in these cases seeds should be listed as condiments. Include seeds here if they may be a substantial ingredient in mixed dishes, or if they are eaten as a substantial snack or side dish.

Tree nuts

Common name	Binomial Name OR Genus	Family	Edible part of the plant
Almonds	*Prunus dulcis*	Rosaceae	Nut
Cashews	*Anacardium occidentale*	Anacardiaceae	Nut
Chestnuts	*Castanea*	Fagaceae	Nut
Filberts	*Corylus maxima*	Betulaceae	Nut
Hazelnuts	*Corylus avellana*	Betulaceae	Nut
Macadamia nuts	*Macadamia*	Proteaceae	Nut
Pecans	*Carya illinoinensis*	Juglandaceae	Nut
Pistachios	*Pistacia vera*	Anacardiaceae	Nut
Walnut family	*Juglans*	Juglandaceae	Nut

Pulses, legumes and beans

Common name (*regional common names*)	Binomial Name OR Genus	Family	Edible part of the plant
Adzuki bean	*Vigna angularis*	Fabaceae	Seeds
Bambara groundnut (*jugo bean*)	*Vigna subterranea*	Fabaceae	Seeds
Broad bean (*fava bean, faba bean, horse bean, field bean, tic bean*)	*Vicia faba*	Fabaceae	Seeds
Chickpea (*chana dal*)	*Cicer arietinum*	Fabaceae	Seeds
Cluster bean (*guar*)	*Cyamopsis tetragonoloba*	Fabaceae	Seeds
Common bean (*black bean, kidney bean, blackberry bean, pinto bean, others*)	*Phaseolus vulgaris*	Fabaceae	Seeds
Coral bean (*Cherokee bean*)	*Erythrina herbacea*	Fabaceae	Seeds
Cowpea (*black-eyed pea, catjang, yardlong bean, southern pea, zombi pea*)	*Vigna unguiculata*	Fabaceae	Seeds
Horse gram	*Macrotyloma uniflorum*	Fabaceae	Seeds
Hyacinth bean	*Lablab purpureus*	Fabaceae	Seeds
Jack-beans	*Canavalia*	Fabaceae	Seeds
Lentil (*dal, pulses*)	*Lens culinaris*	Fabaceae	Seeds
Lima beans	*Phaseolus limensis*	Fabaceae	Seeds
Lupin (*tarwi, tarhui, chocho*)	*Lupinus mutabilis*	Fabaceae	Seeds
Moth bean	*Vigna aconitifolia*	Fabaceae	Seeds
Mung bean (*green gram*)	*Vigna radiata*	Fabaceae	Seeds
Pea	*Pisum sativum*	Fabaceae	Seeds
Peanut (*groundnut*)	*Arachis hypogaea*	Fabaceae	Seeds
Pencil yam	*Vigna lanceolata*	Fabaceae	Seeds
Pigeon pea	*Cajanus*	Fabaceae	Seeds
Rice bean	*Vigna umbellata*	Fabaceae	Seeds
Soybean (*soya bean*)	*Glycine max*	Fabaceae	Seeds
Sweet pea	*Lathyrus odoratus*	Fabaceae	Seeds
Urad bean (*black gram*)	*Vigna mungo*	Fabaceae	Seeds
Velvet bean (*cowitch*)	*Mucuna pruriens*	Fabaceae	Seeds
Winged bean (*Goa bean*)	*Psophocarpus tetragonolobus*	Fabaceae	Seeds

In addition to the tree nuts, pulses/legumes/beans in the tables above, this group also includes:

- sprouted pulses
- seeds and kernels (sesame, sunflower, pumpkin, pine nut)
- soy products (edamame, tofu, tempeh, soy paste, soy milk, texturized vegetable protein (TVP), soy cheese, soy yogurt, frozen soy yogurt)
- other pulse products (humus)
- nut and seed products (peanut butter, tahini paste, "milks" made from nuts and seeds)

L. Milk-based products

Include all food items in this group that are made from dairy, with the exception of butter and sour cream. Due to their high fat content and most typical culinary uses, these are classified with fats and oils.

- custard (milk based)
- hard cheese (cheddar, swiss, parmesan)
- ice-cream (dairy-based)
- kiefer
- processed cheese
- soft cheese (cottage, mozzarella, paneer, ricotta)
- yogurt/curd

M. Fats, oils and butter

Include all food items in this group that have visible fat. Do not include vitamin A-rich red palm oil (see Group Q below).

- butter
- ghee
- lard, suet, tallow (animal fats)
- margarine
- mayonnaise
- palm oil (not red palm oil)
- shortening
- sour cream
- vegetable/fruit/nut/seed oils (made from almond, avocado, canola, coconut, cotton-seed, flaxseed, groundnut, hazelnut, maize, olive, rapeseed, safflower, sesame, soybean, sunflower)

N. High-sugar foods

Include food items with a high content of different sweetening agents (for example, sugar, corn syrup, other syrup, honey, molasses, or jaggery).

- baklava
- biscuits (sweet)
- cakes
- candies
- chocolates
- cookies
- halwa
- hard candies
- honey
- jam
- marmalade

- pastries
- pie
- any other sweets

O. Condiments

Include items commonly used in small quantities and mainly used to enhance the flavor of the dish. This list may include many additional items, including various flavoring pastes and seeds, depending on local knowledge of their uses. Some examples of condiments:

- chilies
- fish powder, fish sauce
- herbs
- stock cubes
- soya sauce
- spices

P. Insects

Include commonly consumed insects:

- insect larvae: grubs
- insect eggs: termite eggs, etc.
- insects: ants, crickets, flies, grasshoppers, locust, termites, etc.

Q. Foods made from red palm oil, red palm nut and red palm nut pulp sauce

Include this group in countries where any of these red palm products are commonly consumed. See also Section C on adapting the questionnaire for discussion of vitamin A-fortified oil.

Box A4-3. Additional notes for "problem" foods

• Processed foods and street foods

Commonly consumed processed foods and street foods present challenges for classification. Sometimes, the best that can be done is to classify the food based on the main ingredient (e.g. bread with grains, even though there may be dairy, fat, other ingredients). If using the recommended method for administering Q12 (free recall with probing), the interviewer can probe for more than one main ingredient in street food or processed food and underline more than one ingredient on the questionnaire, as appropriate. If using the list-based approach (Annex 3), common mixed dishes should be placed in food groups and read to the respondent, or, if the survey manager prefers, listed as separate items and coded into food groups later.

• Fortified foods

In most cases, fortified foods should also be listed in their "home" food groups based on main ingredient. However, in some cases there will be an interest in knowing the proportion of children consuming a particular fortified product. If the product is specially fortified for infants and young children, this will also be captured by IFF Q1-Q4. If it is of interest to know the proportion of children consuming foods fortified for the general population, these can also be listed as a separate item in Q12. If this is done, the food should be re-grouped in its "home group" for calculation Indicator #5, *Minimum dietary diversity*.

• Coconut milk

Coconut milk is sometimes used as a condiment, and sometimes as one of the main ingredients in a prepared dish. Also, depending on how it is prepared, coconut milk can be either very thin, with high water content, or very rich and high in fat. Consult with local nutritionists, and group coconut milk either as a condiment or with the fats and oils, as indicated.

ANNEX 5
Instructions for calculating duration of breastfeeding

The Duration of breastfeeding indicator requires that data on IYCF age and IYCF Q6, 7, and 7a be available for children 0–35 months of age. Calculation of the indicator is a multi-step process described below.

Step 1. Calculate the proportion of children who received breast milk during the previous day separately for each successive two-month age group of children (for example children 0–1 month, children 2–3 months, children 4–5 months,…children 34-35 months). A total of eighteen proportions are calculated. The numerator for each proportion is IYCF Q7=1 OR IYCF Q7a=1. The denominator for each proportion is one of the two-month age groups of children. Note that to calculate a reliable estimate of the median duration of breastfeeding there should be at least 25 children, and preferably at least 50 children, in the denominator of each proportion calculated.

Step 2. Because the proportions calculated in Step 1 are based on relatively small sample sizes, a smooth, gradual decline in the proportion of children breastfed may not be observed from the youngest to oldest 2-month age group. To address this, the proportions calculated in Step 1 should be "smoothed."This is done by combining the numerator and denominator of each proportion with the numerator and denominator of the proportions for the preceding and subsequent two-month age groups of children. For example, the "smoothed" proportion for children 4–5 months old is the weighted average of the proportions for the following three age groups of children: 2–3 months, 4–5 months, and 6–7 months. The proportions for the youngest (0–1 month) and oldest (34–35 months) age groups of children are exceptions. The proportions calculated for these groups of children are not "smoothed."

Step 3. Identify the youngest age group of children for which the proportion who received breast milk is less than 0.50. Examine each "smoothed" proportion calculated in Step 2 to see whether the proportion is less than 50 percent. Because the proportions for the youngest and oldest age groups of children were not "smoothed", for these children the proportion calculated in Step 1 is used.

Step 4. Calculate the value of the median duration of breastfeeding. The formula to use to calculate the median value is:

$$\mathbf{median = m_{i-1} + [(p_{i-1} - 0.5)/((p_{i-1} - p_i) \times (w_i))]}$$

where:

$\mathbf{p_i}$ is the proportion for the youngest age group of children with a proportion less than 0.50. This is the proportion identified in Step 3 above.

$\mathbf{p_{i-1}}$ is the proportion for the two-month age group that precedes the youngest age group with a proportion less than 0.50. If p_i is the proportion for children 22–23 months, p_{i-1} is the proportion for children 20–21 months.

$\mathbf{m_{i-1}}$ is the midpoint of the age range of children represented in the proportion, p_{i-1}. If p_{i-1} is the proportion for children 20–21 months, the midpoint of the age range, m_{i-1}, is (20+21)/2 = 20.5. There is one exception. If p_{i-1} is the proportion for children 0–1 month, m_{i-1} = 0.75.

$\mathbf{w_i}$ is the difference in the midpoint of the age range of children represented by the proportions p_i and p_{i-1}. If p_i is the proportion for children 2–3 months, p_{i-1} is the proportion for children 0–1 months. W_i is then calculated as the difference between the midpoint for children 2–3 months (2.5) and children 0–1 month (0.75): w_i = 2.5 – 0.75 = 1.75.

Table A5-1 provides the standard values for m_i and w_i[1] for each age group of children. These values are not sample dependent so do not need to be recalculated each time the duration of breastfeeding indicator is calculated.

TABLE A5-1. STANDARD MIDPOINT (M_i) AND WIDTH (W_i) VALUE BY AGE GROUP OF CHILDREN

Age group of children	Midpoint value (m_i)	Width value (w_i)
0–1 month	0.75	0.75
2–3 months	2.50	1.75
4–5 months	4.50	2.00
6–7 months	6.50	2.00
8–9 months	8.50	2.00
10–11 months	10.50	2.00
12–13 months	12.50	2.00
14–15 months	14.50	2.00
16–17 months	16.50	2.00
18–19 months	18.50	2.00
20–21 months	20.50	2.00
22–23 months	22.50	2.00
24–25 months	24.50	2.00
26–27 months	26.50	2.00
28–29 months	28.50	2.00
30–31 months	30.50	2.00
32–33 months	32.50	2.00
34–35 months	34.50	2.00

An example demonstrating how to carry out the steps to calculate the duration of breastfeeding indicator is provided below.

Step 1. Assume the following proportions were calculated for each two-month age group.

TABLE A5-2. PROPORTION WHO RECEIVED BREAST MILK THE PREVIOUS DAY BY TWO-MONTH AGE GROUP

Age group	Sample size for age group (n)	Proportion receiving breast milk the previous day
0–1 month	80	0.90
2–3 months	100	0.80
4–5 months	110	0.95
6–7 months	90	0.70
8–9 months	70	0.75
10–11 months	100	0.60
12–13 months	120	0.65
14–15 months	85	0.55
16–17 months	80	0.50
18–19 months	95	0.40
20–21 months	60	0.45
22–23 months	70	0.30
24–25 months	90	0.25
26–27 months	80	0.20
28–29 months	75	0.25
30–31 months	60	0.15
32–33 months	80	0.10
34–35 months	90	0.10

[1] For additional details about how the values for m_i and w_i are determined, refer to the Guide to DHS Statistics, available at http://www.measuredhs.com/pubs/pub_details.cfm?ID=718.

Step 2. Using the above proportions and sample sizes available for each age group, the "smoothed" proportions are calculated.

TABLE A5-3. "SMOOTHED" PROPORTIONS WHO RECEIVED BREAST MILK THE PREVIOUS DAY BY 2-MONTH AGE GROUP

Age group	Weighted sample size for "smoothed" proportion	"Smoothed" proportion receiving breast milk the previous day
0–1 month	80.0	0.90
2–3 months	96.7	0.88
4–5 months	100.0	0.83
6–7 months	90.0	0.81
8–9 months	86.7	0.68
10–11 months	96.7	0.66
12–13 months	101.7	0.61
14–15 months	95.0	0.58
16–17 months	86.7	0.48
18–19 months	78.3	0.45
20–21 months	75.0	0.38
22–23 months	73.3	0.32
24–25 months	80.0	0.25
26–27 months	81.7	0.23
28–29 months	71.7	0.20
30–31 months	71.7	0.17
32–33 months	76.7	0.11
34–35 months	90.0	0.10

Step 3. The youngest age group identified with a "smoothed" proportion <0.50 is 16–17 months.

Step 4. The median value is calculated using the below formula,

$$\textbf{median} = m_{i-1} + [(p_{i-1} - 0.50)/((p_{i-1} - p_i) \times (w_i))]$$

where:

p_i is 0.48 (see "smoothed proportion" for 16–17 month age group, Table A5-3 column 3)

p_{i-1} is 0.58 (see smoothed proportion for 14–15 month age group, Table A5-3 column 3)

m_{i-1} is 14.50 (see midpoint for 14–15 month age group in Table A5-1 column 2)

w_i is 2.00 (see width for 16–17 month age group in Table A5-1 column 3)

median = 14.50 + [(0.58 – 0.50)/((0.58 – 0.48) x 2)] = 14.90 months.

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ANNEX F3

Indicators for assessing infant and young child feeding practices 3

World Health Organization

Indicators for assessing infant and young child feeding practices

PART 3
COUNTRY PROFILES

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FOOD AND NUTRITION TECHNICAL ASSISTANCE

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Indicators for assessing infant and young child feeding practices

PART 3
COUNTRY PROFILES

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Introduction

Adequate nutrition is essential for children's health and development. Globally it is estimated that undernutrition is responsible, directly or indirectly, for at least 35% of deaths in children less than five years of age. Undernutrition is also a major cause of disability preventing children who survive from reaching their full development potential. An estimated 32%, or 186 million, children below five years of age in developing countries are stunted and about 10%, or 55 million, are wasted (*1*). Unless massive improvements in child nutrition are made, it will be difficult to achieve Millennium Development Goals 1: *Eradicate extreme poverty and hunger* and 4: *Reduce child mortality* by 2015.

Simple, valid, and reliable indicators are essential to track progress and guide investment to improve nutrition and health during the first two years of life. This document gives details on indicators for assessing breastfeeding and complementary feeding that were agreed by WHO, UNICEF and partners in 2007 (*2*). It presents information on infant and young child feeding practices for 46 countries for which data were available in Demographic and Health Surveys (DHS) conducted between 2002 and 2008. Several of the values have not been calculated or published before. In particular, the document includes new data on the duration of exclusive breastfeeding and the quality of complementary feeding practices. This information is crucial for programme managers to understand the constraints associated with local infant and young child feeding practices and to target appropriate programme actions.

In 1991, WHO and UNICEF published indicators for assessing breastfeeding practices that have since been widely measured and used to guide programmes (*3*). However, until recently, indicators to assess feeding practices in children 6–23 months of age have not been very informative. Limited knowledge about the type, scale and distribution of inadequate complementary feeding practices has hampered action to improve child feeding (*4*).

Child feeding practices are multidimensional and they change rapidly within short age-intervals in the first years of life. Unlike exclusive breastfeeding, which can be summarized in a single indicator, the measurement of feeding practices in children aged 6 months and older involves assessing various dimensions of feeding simultaneously. These dimensions include continued breastfeeding, appropriate timing of introduction of complementary foods, and optimum quantity and quality of the foods consumed.

In 2008, WHO published the document *Indicators for assessing infant and young child feeding practices. Part 1: Definitions* which presented fifteen indicators for assessing infant and young child feeding practices (*2*). The updated set of indicators includes eight core and seven optional indicators (for details, see Box 1 and the Annex). The core list includes new indicators for dietary diversity (a proxy for adequate micronutrient-density of foods and liquids other than breast milk), feeding frequency (a proxy for adequate energy intake from non-breast milk sources), and minimum acceptable diet among breastfed and non-breastfed children aged 6–23 months. The list also includes previously used breastfeeding indicators, updated indicators for exclusive breastfeeding in infants aged less than 6 months and appropriate breastfeeding in children aged less than 24 months. Other dimensions of optimum feeding, such as responsive feeding and adequate texture of food, are not yet included as they require more complex measurement approaches.

Box 1. Summary list of infant and young child feeding indicators

Core indicators

Early initiation of breastfeeding
Exclusive breastfeeding under 6 months
Continued breastfeeding at 1 year
Introduction of solid, semi-solid or soft foods
Minimum dietary diversity
Minimum meal frequency
Minimum acceptable diet
Consumption of iron-rich or iron-fortified foods

Optional indicators

Children ever breastfed
Continued breastfeeding at 2 years
Age-appropriate breastfeeding
Predominant breastfeeding under 6 months
Duration of breastfeeding
Bottle feeding
Milk feeding frequency of non-breastfed children

In this document, thirteen of the above indicators are presented by country. The indicator 'Exclusive breastfeeding under 6 months' is further disaggregated for infants 4 to 6 months of age. The indicators 'Minimum meal frequency' and 'Minimum acceptable diet' are only reported for breastfed children, because the necessary information for calculating these indicators for non-breastfed children was not available. The indicators 'Consumption of iron-rich or iron-fortified foods' and 'Milk feeding frequency of non-breastfed children' are not reported, because relevant data were not collected.

The data are presented in country profiles that include graphs with breastfeeding and complementary feeding indicators, as well as an area graph to illustrate the progression of infant and young child feeding practices over time. Data on mortality and nutritional status of children under five years of age are also presented for each country. In addition, the document includes summary tables by indicator to allow for a rapid overview and comparison between countries. The median duration of breastfeeding by country is reported in the summary tables only.

The proposed indicators can be derived from questions already incorporated in widely implemented population-based surveys, such as the Demographic and Health Surveys. The document *Indicators for assessing infant and young child feeding practices. Part II: Measurement* provides sample questionnaires and operational guidance to facilitate the inclusion and standard measurement of the indicators in other surveys (*5*).

The new indicator values can be considered as baseline data. It is expected that in the future, surveys will generate similar data that can then be used for tracking progress.

Changes in indicator definitions compared to previously used indicators

The indicators presented in this document intend to preserve the continuity with the indicators to assess breastfeeding practices that have been measured since 1991 (*3*). However, in 2007, modifications were made to the definitions of two indicators as follows (*2*):

- *Exclusive breastfeeding*: the new definition of exclusive breastfeeding allows a child to receive Oral Rehydration Salts (ORS), in addition to drops and syrups (vitamins, minerals, medicines) as stipulated in the earlier definition. It is also recommended to report age-disaggregated data for this indicator.

The inclusion of ORS in the new definition of exclusive breastfeeding is based on the consideration that ORS is medicine to prevent and treat dehydration.

Presentation of age-disaggregated data, in particular exclusive breastfeeding among infants 4–5 months of age, provides valuable information about the actual duration of exclusive breastfeeding. The indicator 'Exclusive breastfeeding (infants 4–5 months)' is an approximation of the proportion of infants who are exclusively breastfed for the full 6 months. This indicator responds to the global recommendation on the optimal duration of exclusive breastfeeding that was changed in 2001 (*6*).

- *Introduction of solid, semi-solid or soft foods*: this indicator replaces the *Timely complementary feeding rate*. Continued breastfeeding is no longer a criterion included in the definition of the new indicator and the age range of children for which the indicator is assessed has been reduced to 6–8 months (previously 6–9 months).

The previously used indicator 'Timely complementary feeding rate' was a combination of two key practices, i.e. continued breastfeeding and consumption of solid, semi-solid or soft foods. It was therefore difficult to interpret. In the current set of indicators, 'Introduction of solid, semi-solid or soft foods' and 'Continued breastfeeding at 1 year' and 'Continued breastfeeding at 2 years' are reported as separate indicators. The combined practice of continued breastfeeding and consumption of solid, semi-solid or soft foods is reflected in the area graph that can be constructed for each setting based on the data gathered to calculate the indicators.

Table 1 summarizes the criteria that define selected infant and young child feeding practices captured by the indicators.

TABLE 1. CRITERIA THAT DEFINE SELECTED INFANT FEEDING PRACTICES

Feeding practice	Requires that the infant receive	Allows the infant to receive	Does not allow the infant to receive
Exclusive breastfeeding	Breast milk (including milk expressed or from a wet nurse)	ORS, drops, syrups (vitamins, minerals, medicines)	Anything else
Predominant breastfeeding	Breast milk (including milk expressed or from a wet nurse) as the predominant source of nourishment	Certain liquids (water and water-based drinks, fruit juice), ritual fluids and ORS, drops or syrups (vitamins, minerals, medicines)	Anything else (in particular, non-human milk, food-based fluids)
Complementary feeding	Breast milk (including milk expressed or from a wetnurse) and solid or semi-solid foods	Anything else: any food or liquid including non-human milk and formula	NA
Breastfeeding	Breast milk (including milk expressed or from a wet nurse)	Anything else: any food or liquid including non-human milk and formula	NA
Bottle-feeding	Any liquid (including breast milk) or semi-solid food from a bottle with nipple/teat	Anything else: any food or liquid including non-human milk and formula	NA

Methodological issues in measurement

In all the DHS surveys that provided data for this publication, questions on breastfeeding and consumption of solid and semi-solid foods were the same. However, the questions asked on the dietary diversity of food were modified. In DHS surveys conducted between 2006 and 2008, questions about dietary diversity were asked using an expanded list of food items compared to DHS surveys conducted between 2002 and 2005. Also, the question on consumption of eggs was asked separately as an item in DHS surveys between years 2006 and 2008 (except Bangladesh 2007 and Indonesia 2007), while between years 2002 and 2005 (except Cambodia 2005), eggs were included in the meat and poultry group. The group of children who were included in the sample used for assessing the various indicators (i.e., the sample universe), and specific notes related to the measurement of individual indicators are summarized in the section below.

In some area graphs of feeding practices presented in this document, the practice of exclusive breastfeeding appears to extend far beyond 6 months. This phenomenon is due to the way in which the indicator is calculated. The indicator 'Exclusive breastfeeding' is calculated as a residue of children whose caregiver responded "No" to all questions related to dietary intake other than breast milk, i.e. they did not consume any liquids or solid foods during the day or night preceding the interview. If for any reason an interviewer or a caregiver did not report a "Yes" for at least one of the food items (e.g., the interviewer forgot to ask about a food category, or the caregiver forgot to report on a food actually consumed), the child is counted in the exclusive breastfeeding category. Therefore, it is possible that some children who are much beyond 6 months of age appear to be exclusively breastfed when, in fact, they are not. This is a methodological artefact that is difficult to correct.

Indicators, indicator definitions, rationale, and notes on methods of analysis

CORE INDICATORS

1. **Early initiation of breastfeeding:** Proportion of children born in the last 24 months who were put to the breast within one hour of birth.

$$\frac{\text{Children born in the last 24 months who were put to the breast within one hour of birth}}{\text{Children born in the last 24 months}}$$

Rationale:

Early initiation of breastfeeding, within one hour of birth, protects the newborn from acquiring infection and reduces newborn mortality (*7*, *8*). It facilitates emotional bonding of the mother and the baby (*9*) and has a positive impact on duration of exclusive breastfeeding (*10*). When a mother initiates breastfeeding within one hour after birth, production of breast milk is stimulated. The yellow or golden first milk produced in the first days, also called colostrum, is an important source of nutrition and immune protection for the newborn.

Notes on measurement:

- This indicator is based on historic recall. The denominator and numerator include living children and deceased children who were born within the past 24 months.

2. **Exclusive breastfeeding under 6 months:** Proportion of infants 0–5 months of age who are fed exclusively with breast milk.[1]

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

Rationale:

Exclusive breastfeeding for 6 months confers many benefits to the infant and the mother. Chief among these is the protective effect against gastrointestinal infections, which is observed not only in developing but also in industrialized countries (*11*). The risk of mortality due to diarrhoea and other infections can increase many-fold in infants who are either partially breastfed or not breastfed at all (*12*). In the context of HIV, introducing other milks, foods or liquids significantly increases the risk of HIV transmission through breast milk, and reduces infant's chances of HIV-free survival (*13*). For the mother, exclusive breastfeeding can delay return of fertility (*14*).

Notes on measurement:

- The sample universe for this indicator is last born children 0–5 months of age living with their mother.
- Any child who was given ORS and vitamin and/or mineral supplements was not excluded from the exclusive breastfeeding category.

2a. **Exclusive breastfeeding (infants 4–5 months):** Proportion of infants 4–5 months of age who are fed exclusively with breast milk.

$$\frac{\text{Infants 4–5 months of age who received only breast milk during the previous day}}{\text{Infants 4–5 months of age}}$$

Rationale:

As infants grow during the first six months, the likelihood that they are exclusively breastfed becomes less in many settings. Assessing exclusive breastfeeding in infants aged 4–5 months gives additional information on the duration of exclusive breastfeeding, and is an approximation of the proportion of infants who are exclusively breastfed for the full 6 months.

Notes on measurement:

- The sample universe for this indicator is last born children 4–5 months of age living with their mother.
- Any child who was given ORS and vitamin and/or mineral supplements was not excluded from the exclusive breastfeeding category.

3. **Continued breastfeeding at 1 year:** Proportion of children 12–15 months of age who are fed breast milk.

$$\frac{\text{Children 12–15 months of age who received breast milk during the previous day}}{\text{Children 12–15 months of age}}$$

[1] Age groups are described in intervals of months completed. For example, infants 0–5 months of age have completed 5 months but are less than 6 months (or 183 days) old.

Rationale:

Breast milk is an important source of energy and nutrients in children 6–23 months of age. Breast milk can provide one half or more of a child's energy needs between 6 and 12 months of age, and one third of energy needs between 12 and 24 months (*15*). Breast milk is also a critical source of energy and nutrients during illness and reduces mortality among children who are malnourished (*16*, *17*, *18*). Breast milk reduces the risk of a number of acute and chronic diseases in early childhood and has long-term benefits for cardio-vascular health (*19*). In the context of HIV, early cessation of breastfeeding after 6 months is associated with increased serious morbidity, growth faltering and increased mortality (*13*).

Notes on measurement:

- The sample universe for this indicator is last born children 12–15 months of age living with their mothers.

4. **Introduction of solid, semi-solid or soft foods:** Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods.

$$\frac{\text{Infants 6–8 months of age who received solid, semi-solid or soft foods during the previous day}}{\text{Infants 6–8 months of age}}$$

Rationale:

Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk and complementary foods are necessary to meet energy and nutrient requirements. At about 6 months of age, an infant is also developmentally ready for other foods. If complementary foods are not introduced when a child has completed 6 months of age, or if they are given inappropriately, an infant's growth may falter (*20*).

Notes on measurement:

- The sample universe for this indicator is last born children 6–8 months of age living with their mothers.
- Information about the consumption of solid, semi-solid and soft foods was not collected in a few of the DHS surveys and this has been indicated in the graphs and tables accordingly.

5. **Minimum dietary diversity:** Proportion of children 6–23 months of age who receive foods from 4 or more food groups.

$$\frac{\text{Children 6–23 months of age who received foods from} \geq \text{4 food groups during the previous day}}{\text{Children 6–23 months of age}}$$

Rationale:

Dietary diversity is a proxy for adequate micronutrient-density of foods. Dietary data from children 6–23 months of age in 10 developing country sites have shown that consumption of foods from at least 4 food groups on the previous day would mean that in most populations, the child had a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food (*21*, *22*).

Notes on measurement:

- The sample universe for this indicator is last born children 6–23 months of age living with their mothers.
- The 7 foods groups used for calculation of this indicator are:
  - — grains, roots and tubers
  - — legumes and nuts
  - — dairy products (milk, yogurt, cheese)
  - — flesh foods (meat, fish, poultry and liver/organ meats)
  - — eggs
  - — vitamin-A rich fruits and vegetables
  - — other fruits and vegetables.

The construction of the 7 food group score was done as follows: for each of the 7 food groups, a point was added if any food in the group was consumed. Children who consumed items like "Papilla" (distributed in Peru) or "Bienestarina" (distributed in Colombia) received a point for two food groups (dairy products and grains, roots and tubers) because "Papilla" and "Bienestarina" include both milk powder and grains. Eggs were included in the poultry food group in Bangladesh 2007 DHS, Indonesia 2007 DHS, and the DHS surveys conducted between 2002 and 2005. Therefore, children who were reported to have eaten poultry also received a point for eggs in these surveys.

6. **Minimum meal frequency:** Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

This indicator is calculated from the following two fractions:

$$\frac{\text{Breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

and

$$\frac{\text{Non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

Rationale:

The number of meals that an infant or young child needs in a day depends on how much energy the child needs (and, if the child is breastfed, the amount of energy needs not met by breast milk), the amount that a child can eat at each meal, and the energy density of the food offered. When energy density of the meals is between 0.8–1 kcal/g, breastfed infants 6–8 months old need 2–3 meals per day, while breastfed children 9–23 months needs 3–4 meals per day, with 1–2 additional snacks as desired (*15*). Children who are not breastfed should be given 1–2 cups of milk[1] and 1–2 extra meals per day (*23*).

[1] Acceptable milk sources include full cream animal milk, Ultra High Temperature milk, reconstituted evaporated (but not condensed) milk, fermented milk or yogurt.

Notes on measurement:

- The sample universe for this indicator is last born children 6–23 months of age living with their mothers.
- For breastfed children, minimum is defined as 2 times for infants 6–8 months and 3 times for children 9–23 months.
- For non-breastfed children, minimum is defined as 4 times for children 6–23 months.
- Values for this indicator could not be calculated for non-breastfed children because the DHS questionnaires did not include a question about the frequency of milk feeds.

7. **Minimum acceptable diet:** Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). The indicator is calculated from the following two fractions:

$$\frac{\text{Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

and

$$\frac{\text{Non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

Rationale:

Because appropriate feeding of children 6–23 months is multidimensional, it is important to have a composite indicator that tracks the extent to which multiple dimensions of adequate child feeding are being met. The minimum acceptable diet indicator combines standards of dietary diversity and feeding frequency by breastfeeding status. The numerator includes only those children who have received both the minimum dietary diversity and the minimum meal frequency for the child's breastfeeding status. The indicator thus provides a useful way to track progress at simultaneously improving the key quality and quantity dimensions of children's diets.

Notes on measurement:

- The sample universe for this indicator is last born children 6–23 months of age living with their mothers.
- Values for this indicator could not be calculated for non-breastfed children because the DHS questionnaires did not include a question about the frequency of milk feeds.

OPTIONAL INDICATORS

8. **Children ever breastfed:** Proportion of children born in the last 24 months who were ever breastfed.

$$\frac{\text{Children born in the last 24 months who were ever breastfed}}{\text{Children born in the last 24 months}}$$

Rationale:

The proportion of children ever breastfed is a reflection of the 'culture' of breastfeeding and of care practices around childbirth.

Notes on measurement:

- This indicator is based on historic recall. The denominator and numerator include living and deceased children who were born within the past 24 months.

9. **Continued breastfeeding at 2 years:** Proportion of children 20–23 months of age who are fed breast milk.

$$\frac{\text{Children 20–23 months of age who received breast milk during the previous day}}{\text{Children 20–23 months of age}}$$

Rationale:

WHO and UNICEF recommend breastfeeding up to 2 years or beyond (*24*). Assessing breastfeeding among children 20–23 months provides a more accurate measure of those receiving the full benefit of breastfeeding for two years than measures taken for younger age intervals.

Notes on measurement:

- The sample universe for this indicator includes last born children 20–23 months of age living with their mothers.

10. **Age-appropriate breastfeeding:** Proportion of children 0–23 months of age who are appropriately breastfed.

$$\frac{\text{Infants 0–5 months of age who received only breast milk during the previous day}}{\text{Infants 0–5 months of age}}$$

and

$$\frac{\text{Children 6–23 months of age who received breast milk, as well as solid, semi-solid or soft foods, during the previous day}}{\text{Children 6–23 months of age}}$$

Rationale:

Age appropriate breastfeeding is a summary measure of the proportion of children less than 2 years of age who are appropriately breastfed and who receive complementary foods when needed.

Notes on measurement:

- The sample universe for this indicator is last born children 0–23 months of age living with their mothers.
- This indicator captures information about exclusive breastfeeding for children 0–5 months; and about the dual practice of breastfeeding and complementary feeding for children 6–23

11. **Predominant breastfeeding under 6 months:** Proportion of infants 0–5 months of age who are predominantly breastfed.

$$\frac{\text{Infants 0–5 months of age who received breast milk as the predominant source of nourishment during the previous day}}{\text{Infants 0–5 months of age}}$$

Rationale:

Two studies comparing mortality during infancy showed that predominant breastfeeding is associated with substantially lower risk of deaths compared with partial or no breastfeeding (*25, 26*). Although these studies did not find any significant difference on mortality between exclusive and predominant breastfeeding, there are other reasons to recommend exclusive breastfeeding as the preferred option. Predominant breastfeeding has been associated with an increase risk of diarrhoea (*27, 28*). Avoidance of any liquids other than breast milk is key to ensure appropriate feeding of infants less than 6 months of age, unless there is a medical reason to do otherwise (*29*).

Notes on measurement:

- The sample universe for this indicator is last born children 0–5 months of age living with the mother.
- Predominant breastfeeding 'allows' ORS, vitamin and/or mineral supplements, ritual fluids, water and water-based drinks, and fruit juice. Other liquids, including non-human milks and food-based fluids, are not allowed, and no semi-solid or solid foods are allowed.

12. **Bottle feeding:** Proportion of children 0–23 months of age who are fed with a bottle.

$$\frac{\text{Children 0–23 months of age who were fed with a bottle during the previous day}}{\text{Children 0–23 months of age}}$$

Rationale:

When bottle feeding is associated with unhygienic conditions and poor preparation of infant formula, it puts the infant at a great risk of illness, resulting in increased risk of mortality. Feeding an infant from a bottle with an artificial teat may also make it more difficult for the baby to learn to attach well at the breast and has been associated with earlier cessation of breastfeeding (*30*). If an infant can not feed directly from the breast, then the safest alternative is to feed expressed breast milk from a cup (*31*).

Notes on measurement:

- The sample universe of this indicator is last born children 0–23 months of age living with their mothers.

13. **Duration of breastfeeding:** Median duration of breastfeeding among children less than 36 months of age.

The age in months when 50% of children 0–35 months did not receive breast milk during the previous day.

Rationale:

This indicator is a proxy measure of the average number of months that children are breastfed and it adds to the understanding of when mothers may decide to discontinue breastfeeding.

Notes on measurement:

- The sample universe for this indicator includes all living and deceased children 0–35

ADDITIONAL INDICATORS

Mortality indicators

- **Infant mortality rate:** probability of dying between birth and age 1 per 1000 live births.
- **Under-5 mortality rate:** probability of dying by age 5 per thousand live births.

Nutritional status indicators

Children under five years of age who are suffering from:

- **underweight:** proportion of children less than 5 years of age with weight for age < -2 z-scores of the median WHO child growth standards.
- **stunting:** proportion of children less than 5 years of age with length or height for age < -2 z-scores of the median WHO child growth standards.
- **overweight:** proportion of children less than 5 years of age with weight for length or height > +2 z-scores of the median WHO child growth standards.

Values of all additional indicators were derived from the World Health Statistics (WHS), 2010 (*1*).

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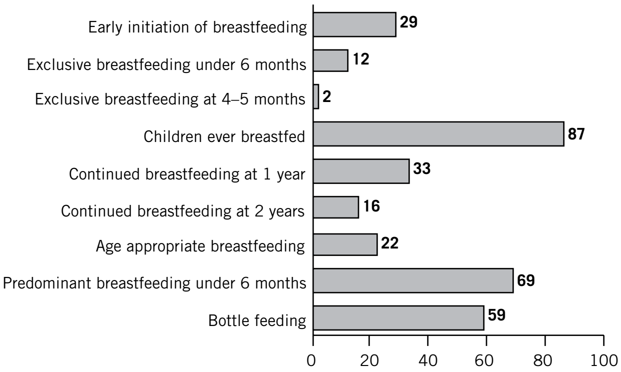
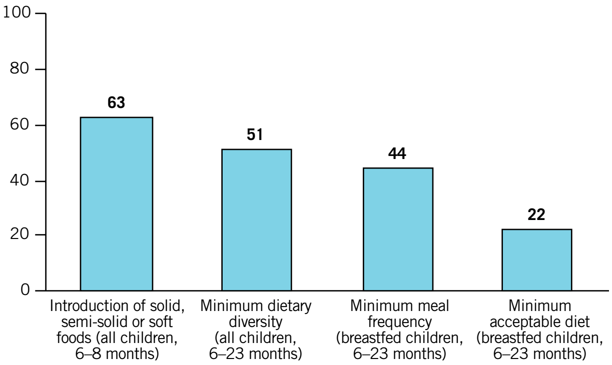
Country profiles

AZERBAIJAN

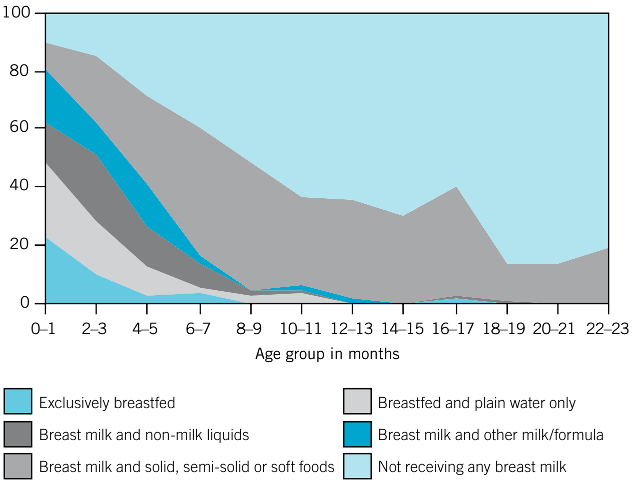
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



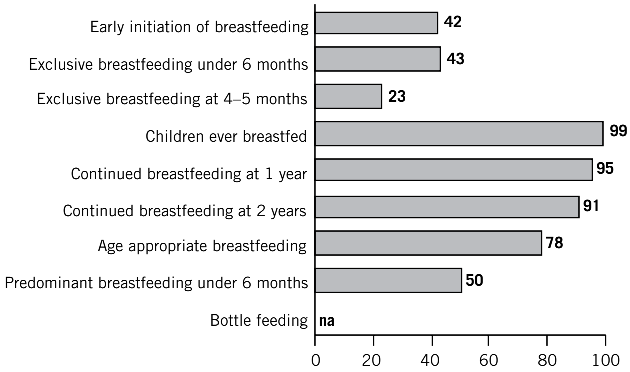
Additional indicators

Infant mortality (rate per thousand live births)	32
Under-5 mortality (rate per thousand live births)	36
% of children under five years of age who are suffering from:	
Underweight	8
Stunting	27
Overweight	14

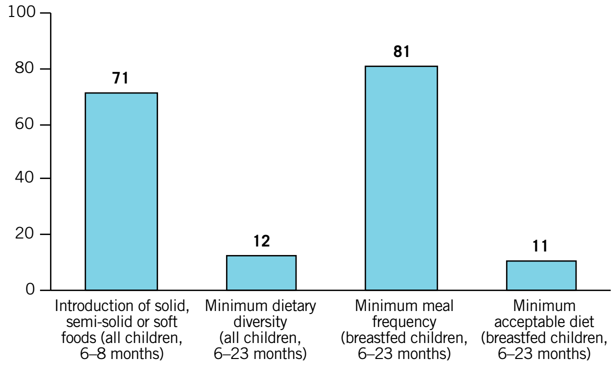
Source: DHS (2006), WHS (2010).

BANGLADESH

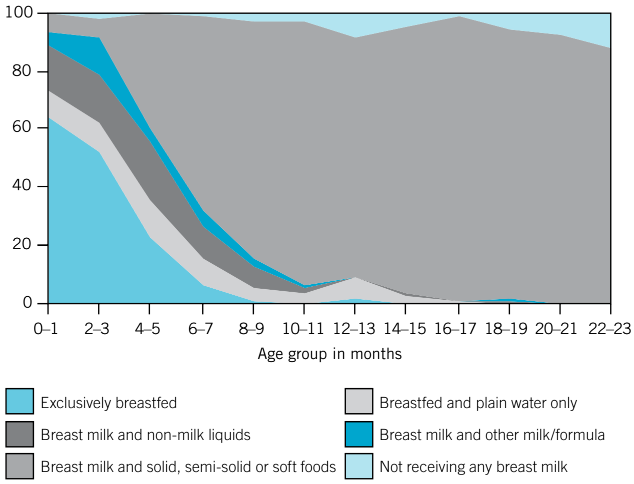
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



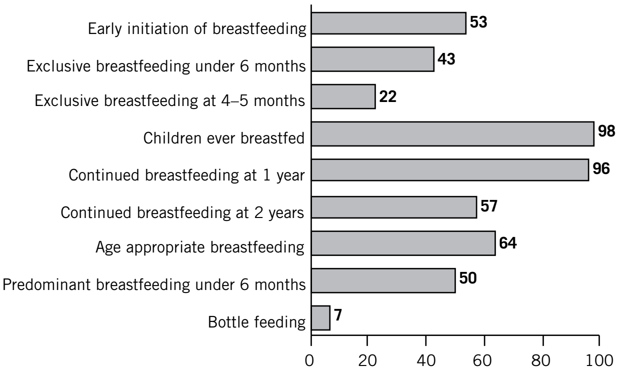
Additional indicators

Infant mortality (rate per thousand live births)	43
Under-5 mortality (rate per thousand live births)	54
% of children under five years of age who are suffering from:	
Underweight	41
Stunting	43
Overweight	1

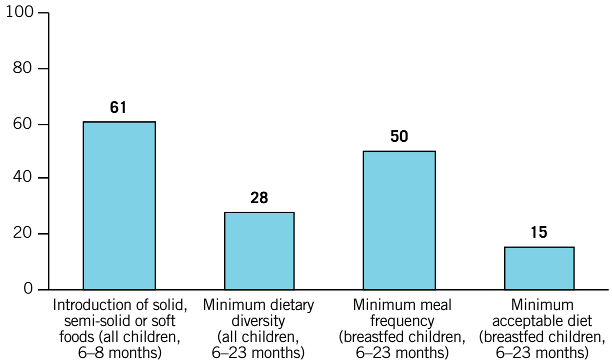
Source: DHS (2007), WHS (2010).

BENIN

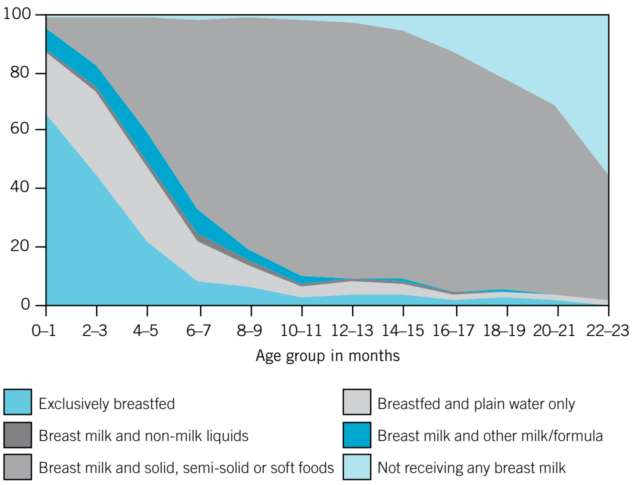
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



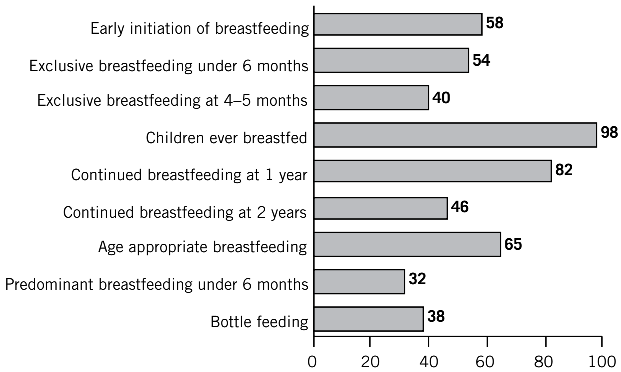
Additional indicators

Infant mortality (rate per thousand live births)	76
Under-5 mortality (rate per thousand live births)	121
% of children under five years of age who are suffering from:	
Underweight	20
Stunting	45
Overweight	11

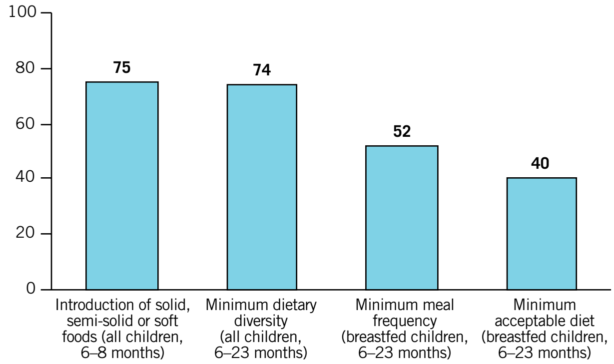
Source: DHS (2006), WHS (2010).

BOLIVIA

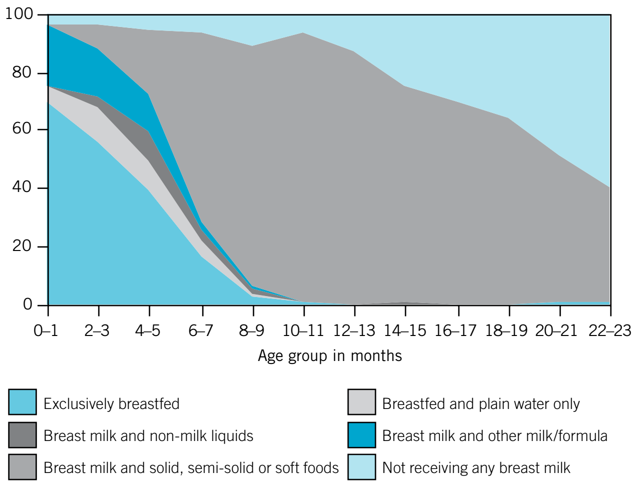
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



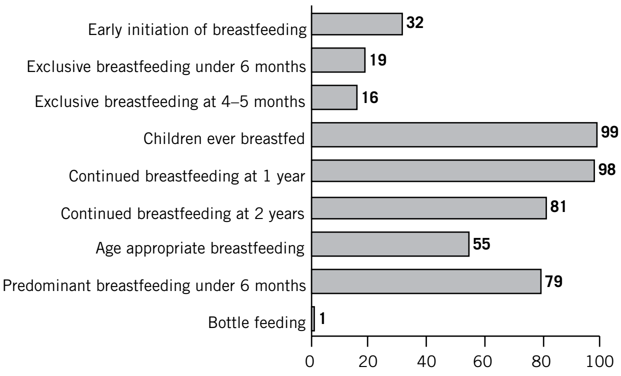
Additional indicators

Infant mortality (rate per thousand live births)	46
Under-5 mortality (rate per thousand live births)	54
% of children under five years of age who are suffering from:	
Underweight	4
Stunting	27
Overweight	9

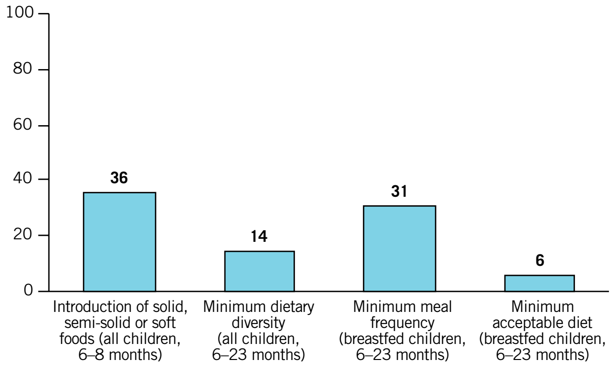
Source: DHS (2003), WHS (2010).

BURKINA FASO

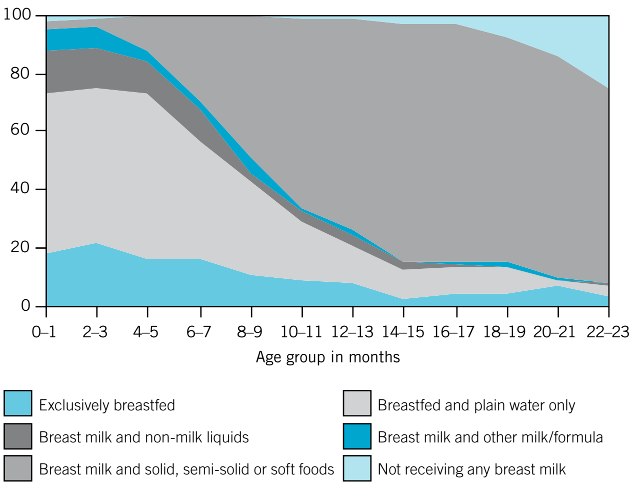
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



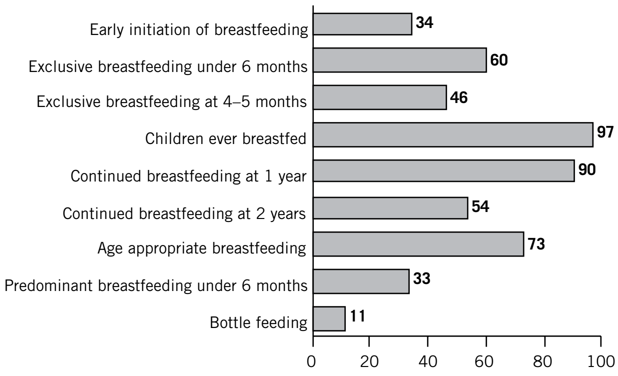
Additional indicators

Infant mortality (rate per thousand live births)	92
Under-5 mortality (rate per thousand live births)	169
% of children under five years of age who are suffering from:	
Underweight	37
Stunting	45
Overweight	8

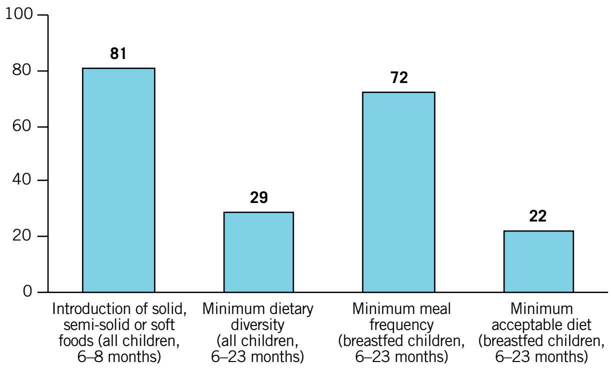
Source: DHS (2003), WHS (2010).

CAMBODIA

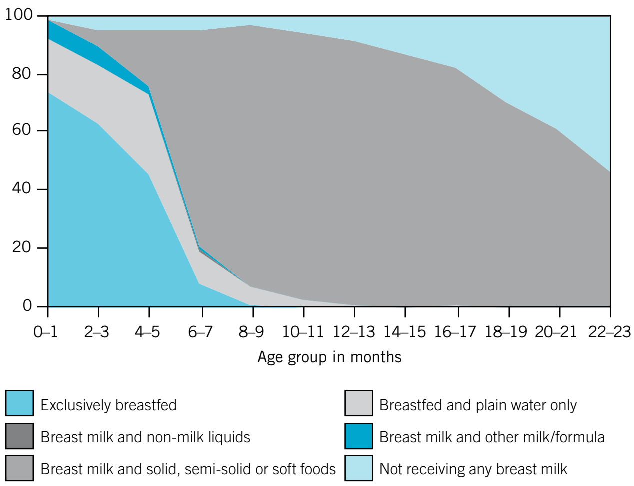
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



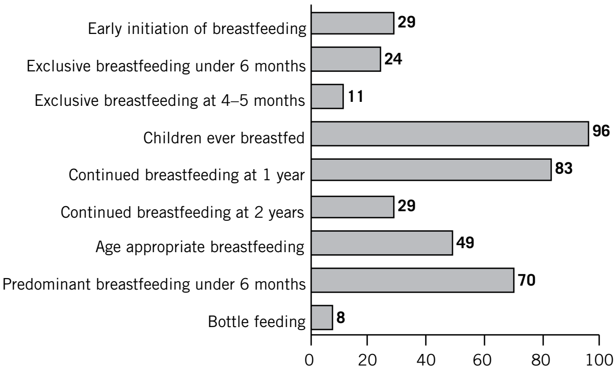
Additional indicators

Infant mortality (rate per thousand live births)	69
Under-5 mortality (rate per thousand live births)	89
% of children under five years of age who are suffering from:	
Underweight	29
Stunting	40
Overweight	2

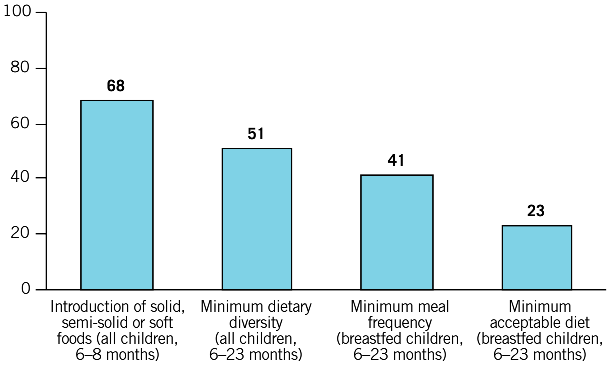
Source: DHS (2005), WHS (2010).

CAMEROON

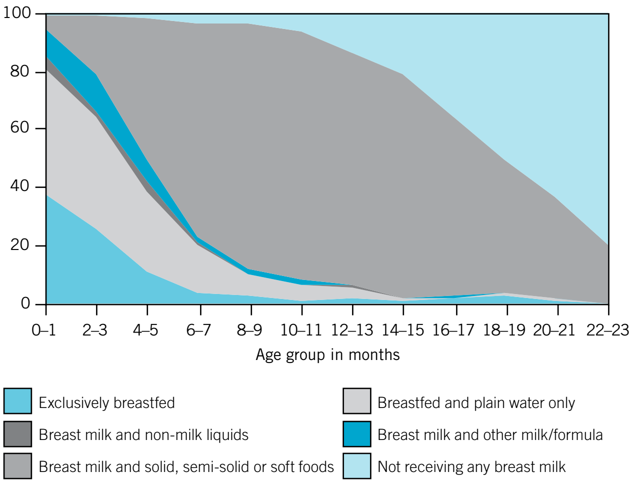
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



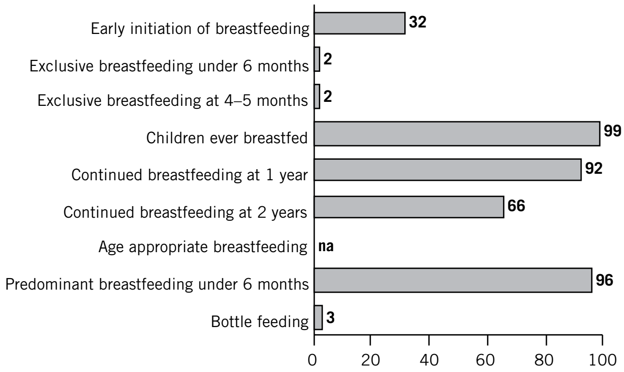
Additional indicators

Infant mortality (rate per thousand live births)	82
Under-5 mortality (rate per thousand live births)	131
% of children under five years of age who are suffering from:	
Underweight	17
Stunting	36
Overweight	10

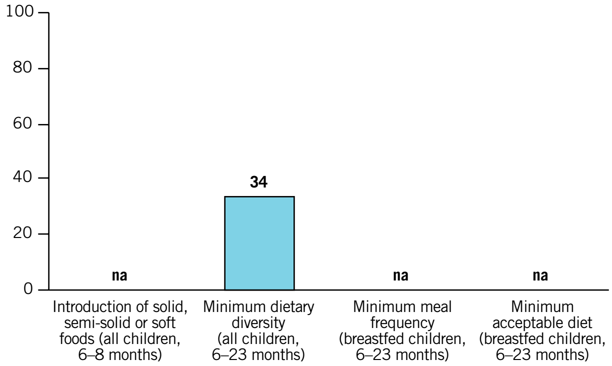
Source: DHS (2004), WHS (2010).

CHAD

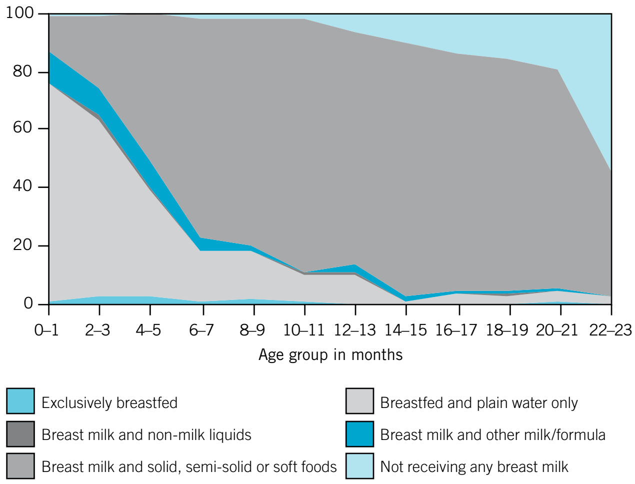
Breastfeeding indicators (%)



Complementary feeding indicators (%)



Infant and young child feeding practices by age (%)



Additional indicators

Infant mortality (rate per thousand live births)	124
Under-5 mortality (rate per thousand live births)	209
% of children under five years of age who are suffering from:	
Underweight	34
Stunting	45
Overweight	4

Source: DHS (2004), WHS (2010).

ANNEX G

Minimum dietary diversity for women

Food and Agriculture Organization
and FANTA III

Food and Agriculture Organization of the United Nations

USAID
FROM THE AMERICAN PEOPLE

FANTA III
FOOD AND NUTRITION TECHNICAL ASSISTANCE

Minimum Dietary Diversity for Women

A Guide to Measurement

UCDAVIS
UNIVERSITY OF CALIFORNIA

Minimum Dietary Diversity for Women

A Guide to Measurement

Published by
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and
USAID's Food and Nutrition Technical Assistance III Project (FANTA), managed by FHI 360

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Contents

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Abbreviations and acronyms

CAPI	Computer-Assisted Personal Interviewing
FAO	Food and Agriculture Organization of the United Nations
FBDG	Food-based dietary guidelines
FCS	Food Consumption Score
HDDS	Household Dietary Diversity Score
IYCF	Infant and young child feeding
MDD	Minimum Dietary Diversity
MDD-W	Minimum Dietary Diversity for Women of Reproductive Age
MSG	Monosodium glutamate
NRV	Nutrient Reference Value
RE	Retinol equivalents
RAE	Retinol activity equivalents
UHT	Ultra-high temperature
USAID	U.S. Agency for International Development
WDDS	Women's Dietary Diversity Score
WFP	World Food Programme
WHO	World Health Organization
WRA	Women of reproductive age

Section 1. Introduction

Background

Women of reproductive age (WRA)[1] are often nutritionally vulnerable because of the physiological demands of pregnancy and lactation. Requirements for most nutrients are higher for pregnant and lactating women than for adult men (National Research Council, 2006; World Health Organization [WHO]/Food and Agriculture Organization of the United Nations [FAO], 2004). Outside of pregnancy and lactation, other than for iron, requirements for WRA may be similar to or lower than those of adult men, but because women may be smaller and eat less (fewer calories), they require a more nutrient-dense diet (Torheim and Arimond, 2013)[2]. Insufficient nutrient intakes before and during pregnancy and lactation can affect both women and their infants. Yet in many resource-poor environments, diet quality for WRA is very poor, and there are gaps between intakes and requirements for a range of micronutrients (Arimond et al., 2010; Lee et al. 2013).

These vulnerabilities and gaps in diet quality have been recognised for a long time. However, despite decades of appeals to improve women's diet quality and nutrition, there has been little programmatic action. Historically, one major impediment has been a lack of effective platforms and programmes reaching adolescent girls and WRA outside of prenatal care. A lack of indicators to allow for assessment, advocacy and accountability has been another constraint.

The Minimum Dietary Diversity for WRA (MDD-W)[3] indicator defined and described in this document is a food group diversity indicator that has been shown to reflect one key dimension of diet quality: micronutrient adequacy, summarised across 11 micronutrients (Martin-Prével et al., 2015)[4]. The indicator constitutes an important step towards filling the need for indicators for use in national and subnational assessments. Such indicators must be relatively simple to collect and suitable for large surveys[5].

Promotion of diverse diets is one of several approaches to improving micronutrient nutrition for WRA; additional diet quality indicators would be needed in settings where other strategies, including fortification, biofortification and/or supplementation, are used. Furthermore, diet quality is multidimensional. In addition to micronutrient adequacy, high-quality diets are characterised by balance in intake of protein, carbohydrates and fat (Institute of Medicine, 2005) and moderation in consumption of certain foods – those low in nutrient density and those associated with increased risks for chronic disease (George et al., 2014). In the context of rapid nutrition transitions in many

1 For the purposes of this document and indicator, WRA are defined as those 15–49 years of age.

2 "Nutrient density" refers to the ratio of nutrients (such as vitamins and minerals) to the energy content of foods.

3 Additional background on the indicator is available at: http://www.fantaproject.org/monitoring-and-evaluation/minimum-dietary-diversity-women-indicator-mddw.

4 The 11 micronutrients were vitamin A, thiamine, riboflavin, niacin, vitamin B6, folate, vitamin B12, vitamin C, calcium, iron and zinc. See Arimond et al., 2010, and Martin-Prével et al., 2015, for the rationale for selection of micronutrients and for methods and results of a multistage research process assessing and comparing candidate indicators. See http://www.fantaproject.org/monitoring-and-evaluation/minimum-dietary-diversity-women-indicator-mddw for a description of a 2014 consensus meeting where stakeholders reviewed results and finalised indicator selection.

5 Many other indicators of diet quality can be generated from more detailed dietary surveys (e.g. those employing repeat quantitative 24-hour recalls or weighed food records), but at present detailed quantitative surveys are not feasible and affordable for repeated implementation in most low-income countries.

low- and middle-income countries, additional simple and feasible indicators are needed to reflect these dimensions of balance and moderation.

It is beyond the scope of this guide to describe or operationalise a full set of indicators for diet quality or nutrition for WRA. But consumption of food items from diverse food groups is universally recommended, whether or not other strategies for improving nutrition are in place[6], and similarly, an indicator of food group diversity is relevant globally.

Indicator definition

The MDD-W is so named to harmonise with a similar Minimum Dietary Diversity (MDD) indicator for infants and young children (WHO, 2008) (see p. 4 for a comparison of several food group diversity indicators currently in use).

MDD-W is a dichotomous indicator of whether or not women 15–49 years of age[7] have consumed at least five out of ten defined food groups the previous day or night. The proportion of women 15–49 years of age who reach this minimum in a population can be used as a proxy indicator for higher micronutrient adequacy, one important dimension of diet quality.

The ten food groups are:

1. Grains, white roots and tubers, and plantains
2. Pulses (beans, peas and lentils)
3. Nuts and seeds
4. Dairy
5. Meat, poultry and fish
6. Eggs
7. Dark green leafy vegetables
8. Other vitamin A-rich fruits and vegetables
9. Other vegetables
10. Other fruits

The food groups are described and defined in **Section 2**, and **Appendix 2** provides a comprehensive list of specific food items comprising each of the ten groups.

Appropriate uses of the indicator

The MDD-W was developed as a proxy indicator to reflect the micronutrient adequacy of women's diets. The main use of the MDD-W is for assessment at national and subnational levels. It is a **population-level indicator** based on a recall period of a single day and night, so although data are collected from individual women, the indicator cannot be used to describe diet quality for an individual woman. This is because of normal day-to-day variability in individual intakes.

Groups of WRA where a higher proportion consume food items from at least five of the ten food groups are likely to have higher micronutrient adequacy than other groups that have a lower proportion of women achieving the threshold of food items from at least five food groups. Put another way, a higher prevalence of MDD-W is a proxy for better micronutrient adequacy among WRA in the population. Groups of WRA who consume food items from five or more of the ten groups are also highly likely to consume at least one animal-source food and either pulses or nuts/seeds and food items from two or more of the fruit/vegetable food groups (Martin-Prével et al., 2015).

6 See, for example, the WHO Healthy Diet Fact Sheet (http://www.who.int/mediacentre/factsheets/fs394/en/), which summarises several WHO and FAO reports and advises that a healthy diet contains fruits, vegetables, pulses, nuts and whole grains.

7 That is, women who have reached their 15th birthday but who have not yet reached their 50th birthday. This is sometimes expressed as aged 15.0 to 49.9 years.

The MDD-W can be used:

- As a proxy to describe one important dimension of women's diet quality (micronutrient adequacy) in national and subnational assessments;
- To compare with previous assessments, so long as survey timing accounts for seasonality[8].

The indicator should not be used to:

- Screen individuals for selection for interventions, nor to identify individuals at risk for poor intakes.

In the context of programmes, this indicator may be useful when the programme design, activities and impact pathway indicate a potential to increase food group diversity. Note that many agricultural and health sector projects may improve nutrition, but only some will do so by increasing food group diversity.

In many contexts, it will also be important to increase the **quantity** of nutrient-dense food groups that are accessible and consumed by target groups. Programme users should note that consumption of food items from five or more food groups, while useful as a population-level benchmark, does not ensure micronutrient adequacy for the population, particularly if quantities of micronutrient-dense foods consumed are too small.

Distinction between food group diversity indicators and food-based dietary guidelines

Indicators and guidelines are often confused with each other. In the case of dietary diversity indicators, this may be because many countries have developed food-based dietary guidelines (FBDG) and graphics (pyramids, plates, etc.) that provide guidance to populations about consumption of diverse diets and/or of food items from specific sets of food groups[9]. National FBDG are developed through a structured process and are meant to shape policy and national programmes (Albert, 2007).

There is no global harmonisation of FBDG[10], and the MDD-W threshold of at least five of ten food groups may not align exactly with national recommendations. The indicator should not be confused with a dietary guideline, nor should it be used as a basis to inform the development of guidelines or programmatic behaviour change communication or counselling messages.

However, although the MDD-W food groups may not align perfectly with those recommended for consumption in national FBDG, all such guidelines do advocate consumption of diverse food groups. Thus, measurement of this dimension of diet quality, with an aim to assess and advocate for improvement, is consistent with the principles behind dietary guidance given at country level. Also, in many cases, the food groups on the MDD-W questionnaire could be aggregated during analysis to reflect food groups in national FBDG and could provide information on consumption of these groups in addition to the prevalence of meeting the MDD-W threshold.

8 Seasonality is important because the relationship between food group diversity and micronutrient intakes and adequacy can vary by season. See Appendix 1 for a discussion of seasonality and of other considerations for survey design and sampling.

9 FAO compiles national FBDG, which are available at http://www.fao.org/nutrition/nutrition-education/food-dietary-guidelines/en/.

10 However, development of global guidance has been recommended in the Conference Outcome Document: *Framework for Action of the Second International Conference on Nutrition Rome 19–21 November 2014.* ("Recommendation 13: Develop, adopt and adapt, where appropriate, international guidelines on healthy diets", p. 3).

The advantage of using an indicator such as MDD-W rather than a measure tailored to an individual country's FBDG is the ability to compare across time and location, and even in the event that national FBDG change.

Comparison with other food group diversity indicators

Dietary diversity has been measured in many different ways, in both research and programmatic contexts. However, only a few simple food group diversity indicators have been promoted for wide population-level use in resource-poor settings. These include the Household Dietary Diversity Score (HDDS), the MDD and the Women's Dietary Diversity Score (WDDS), which are compared with the MDD-W in **Table 1**.

The WDDS resulted from a preliminary step in the process of developing the dichotomous MDD-W. Earlier research resulted in a suggestion of several scores that reflected micronutrient adequacy; however, no single score was proposed for global use (Arimond et al., 2010). One of these scores, a WDDS based on nine food groups, was described by FAO (2011) and selected for use by the U.S. Agency for International Development (USAID) Feed the Future and Food for Peace development food assistance programmes, and others. However, demand for a dichotomous indicator grew, particularly for use in policy and advocacy contexts. Another round of research with more data sets replicated and extended the earlier study and resulted in the proposal of the MDD-W, a dichotomous indicator based on a set of ten food groups (Martin-Prével et al., 2015).

In addition to the simple food group indicators in Table 1, a variety of more complex indicators and indices have been used in specific countries or contexts. For example, the World Food Programme (WFP) uses a more complex food group diversity indicator (the Food Consumption Score [FCS]) in the context of food security analyses. The FCS is a weighted household-level food group score that also incorporates frequency of consumption over 7 days (WFP, 2008).

Table 1. Simple food group diversity indicators currently in use or advocated for use at population level

	HDDS[a]	IYCF MDD[b]	WDDS[c]	MDD-W[d]
Population sampled/unit of analysis	Households	Infants and young children aged 6–23 months	Women aged 15–49 years	Women aged 15–49 years
Validated against	Kilocalorie availability as assessed in household-level consumption surveys	Micronutrient density compared with desirable density for complementary foods, assessed by 24-hour recall or weighed food records	Micronutrient adequacy assessed by multiple 24-hour recalls	Micronutrient adequacy assessed by multiple 24-hour recalls
Meaning	Proxy for household-level access to kilocalories (dietary energy), which is one dimension of household food security Reflects economic access to a diet with higher kilocalories per capita	Proxy for the adequacy of the micronutrient density of infant and young child diets Reflects one of several favourable infant and young child feeding practices	Proxy for the probability of micronutrient adequacy of women's diets Reflects micronutrient adequacy, which is one critical dimension of diet quality	Proxy for the probability of micronutrient adequacy of women's diets Reflects micronutrient adequacy, which is one critical dimension of diet quality
Number of food groups	12	7	9	10[e]
Threshold for dichotomous indicator	No dichotomous indicator	4 or more of the 7 food groups	No dichotomous indicator	5 or more of the 10 food groups
Indicator tabulation includes fats/ oils, sweets, and all beverages, including alcohol	Yes	No	No	No
Foods consumed outside the home	Not included	Included	Included	Included

[a] HDDS = Household Dietary Diversity Score; see http://www.fantaproject.org/monitoring-and-evaluation/household-dietary-diversity-score and Food and Agriculture Organization of the United Nations (FAO) (2011).

[b] IYCF MDD = Minimum Dietary Diversity indicator, as an indicator of infant and young child feeding practices; see http://www.who.int/maternal_child_adolescent/documents/9789241596664/en/.

[c] WDDS = Women's Dietary Diversity Score; see FAO (2011).

[d] MDD-W = Minimum Dietary Diversity for Women of Reproductive Age

[e] During analytic work comparing candidate indicators to micronutrient adequacy for women, the 7-group IYCF MDD and dichotomous indicators based on the 9 groups in the WDDS were explored but did not perform as well as the 10-group MDD-W (Martin-Prével et al., 2015).

Methodological approaches to measurement of food group diversity

While food group diversity indicators can be derived from detailed quantitative dietary intake surveys, this guide is intended for users who are not in a position to conduct such surveys. When relatively simple data collection approaches are required, as in a number of large-scale and multi-module surveys, food group diversity indicators can be measured using two main methods: open recall and list-based.

OPEN RECALL METHOD

In a qualitative open 24-hour recall (henceforth, "open recall"), the enumerator asks a series of standard probing questions to help the respondent recall all foods and beverages consumed the previous day and night and also probes for main ingredients in mixed dishes. Specifically, the recall period covers from when the respondent awoke the previous day, through the day and night for a 24-hour period.

The recall is "open" because **the enumerator does not read predefined foods/groups to the respondent**. Each food or beverage that the respondent mentions can be circled, underlined or ticked on a predefined list. Foods not already included on the predefined list can be either classified by the enumerator into an existing predefined food group or recorded in a separate place on the questionnaire and coded later into one of the predefined food groups.

This method is recommended and is detailed in **Section 3** (model questionnaire).

LIST-BASED METHOD

In the list-based method, **the enumerator does read a list of foods and beverages to the respondent**. The enumerator informs respondents that they should respond "yes" for each food or beverage consumed during the specified recall period of the previous day and night. The enumerator continues by reading a list of foods organized in groups, giving multiple examples for each food group.

There is anecdotal evidence that data collected with this method are less complete. An example questionnaire and more details are given in **Appendix 3**.

COMPARISON OF METHODS

There are advantages and disadvantages to each method; these are detailed in **Table 2**. This guide describes and recommends the open recall because it may lead to more accurate and complete recall of all foods and beverages consumed.

Of key concern are the linked issues of respondent burden and the time needed (and thus cost) to implement the recall. There is no universal answer regarding which method is quicker, because it depends on the simplicity or complexity of the woman's diet, on the length of the food group list[11] and on the number of examples needed for each food group on a list-based questionnaire. When diets are simple, the open recall is likely to be the quicker of the two.

[11] See Section 2 for an explanation of required and optional food and beverages categories (rows) for the MDD-W questionnaire.

Table 2. Advantages and disadvantages of two recall methods

	Open recall method	List-based method
Advantages	• Intuitive for both the enumerator and the respondent • Structured probing • Enumerator (rather than respondent) has the task of matching foods consumed with food groups and examples listed in questionnaire, leading to more correct classification of foods • May lead to more complete recall of foods	• Possibly lower capacity requirements for enumerators • Shorter training time for enumerators • Easier to programme in Computer-Assisted Personal Interviewing (CAPI) applications[a]
Disadvantages	• Longer training time required • Requires enumerators to have a good understanding of the objectives of the questionnaire and reasonable knowledge of foods as acquired, prepared and consumed in the survey area(s) • More difficult to programme in Computer-Assisted Personal Interviewing (CAPI) applications[a]	• Requires the respondent to correctly identify foods she consumed as belonging to food groups with examples as read from the list, which may result in misclassification of foods into food groups • Requires the respondent to mentally “take apart” mixed dishes and to remember to respond for each main ingredient • Requires the respondent to mentally move back and forth in time as foods are mentioned • May be more likely to elicit biased responses, for example, if respondents aim to please the enumerator (by saying “yes”) or give untrue positive responses for high-status foods, such as meat • May be more likely to lead to omission of foods consumed, because there is no probing at the level of the eating episode • May lead to different results when the number of food groups/food examples in the list differs (e.g. from previous surveys or surveys in other areas) • Anecdotally reported to be more tedious for respondents and enumerators, particularly when food group lists are long

[a] CAPI applications allow direct data entry (no paper forms).

Section 2. Description of food groups

As noted in Section 1, MDD-W is a dichotomous indicator of whether or not women 15–49 years of age have consumed at least five out of ten defined food groups the previous day or night. This section provides a description of each of the ten MDD-W food groups:

1. Grains, white roots and tubers, and plantains
2. Pulses (beans, peas and lentils)
3. Nuts and seeds
4. Dairy
5. Meat, poultry and fish
6. Eggs
7. Dark green leafy vegetables
8. Other vitamin A-rich fruits and vegetables
9. Other vegetables
10. Other fruits

The food groups that make up the MDD-W are mutually exclusive – that is, no food or ingredient is placed in more than one food group. Note that on the model questionnaire (see **Section 3**), three of the ten groups are further subdivided. This is for ease of recording and to make the questionnaire more intuitive for enumerators. For example, the food group “Meat, poultry and fish” is recorded on three rows (subgroups) on the questionnaire.

In addition, this section provides descriptions of six optional and two required categories[12] (pages 17–19) that appear on the model questionnaire (Section 3) but that are not part of the indicator calculation.

The optional categories are:

- Insects and other small protein foods
- Red palm oil
- Other oils and fats
- Savoury and fried snacks
- Sweets
- Sugar-sweetened beverages

The required categories are:

- Condiments and seasonings
- Other beverages and foods

The rationale for including both the optional and required categories is stated in the descriptions below. Some of these categories are of interest in the context of the nutrition transition while other categories are included primarily to provide a place for enumerators to mark each food and to avoid falsely classifying items into one of the ten MDD-W groups. The “Condiments and seasonings” category contains diverse foods and ingredients and is designed to avoid allowing foods consumed in very small quantities to “count” in the MDD-W indicator. See **Box 1** on page 13 for further discussion of “how much is enough to count?” and of the “Condiments and seasonings” category.

[12] These are referred to as “categories” rather than “groups” to avoid confusion with the MDD-W food groups. However, these, too, consist of lists of food or beverage items.

In addition to the descriptions in this section, detailed lists of foods belonging in each MDD-W food group, as well as in the other categories, are provided in **Appendix 2**. Appendix 2 also includes a table listing specific foods and ingredients that are difficult to classify.

A discussion of mixed dishes is provided at the end of this section.

Fortified foods and products

The MDD-W reflects healthy diversity in unfortified foods and is neither designed nor adequate for assessing coverage or impact of fortification or biofortification programmes. Separate questions on consumption of fortified foods and/or biofortified foods may be added to the questionnaire. These will be context-specific and are not described in this guide. Such questions could also assess coverage of specialised products, such as blended fortified foods (corn-soy blend, wheat-soy blend, etc.) or ready-to-use foods.

Guidance is available elsewhere on monitoring and evaluation of fortification programmes (e.g. WHO/FAO, 2006). Whether or not optional questions are developed and added to the model questionnaire, for the purposes of MDD-W, fortified and biofortified foods should be classified in their food group "home" (e.g. fortified wheat flour should be classified as a grain).

Selection of the ten food groups for MDD-W

Dietary diversity indicators group foods together when they are considered nutritionally similar and/or play the same role in the diet (Ruel, 2003). While developing the MDD-W, many different candidate indicators, with different numbers of food groups and different food group definitions, were considered. The indicator based on the ten groups described here had a stronger relationship to micronutrient adequacy than other candidate indicators with different groupings (Martin-Prével et al., 2015).

Food group descriptions

Note that the food groups described here generally follow culinary, rather than botanical, definitions and classifications for such items as fruits, vegetables and seeds. For example, tomatoes and peppers are classified as vegetables rather than fruits, and the "Nuts and seeds" group includes only certain types of seeds that are typically described as such in one or many cuisines (e.g. sesame seeds or pumpkin/squash seeds).

GROUP 1 – GRAINS, WHITE ROOTS AND TUBERS, AND PLANTAINS

This group is sometimes also called "starchy staples". These foods provide energy, varying amounts of micronutrients (e.g. certain B vitamins provided by grains) and varying amounts of anti-nutrients, such as phytates[13]. Note that white-fleshed plantains (a fruit) are included in this group because they share a similar nutrient profile to some roots and tubers and play the same role in diets as a "starchy staple" food.

Common examples from this group include all types of breads and flatbreads, stiff porridges of maize, sorghum, millet or cassava (manioc), pasta, potatoes, white-fleshed sweet potatoes, white yams, yucca and plantains.

13 Phytates are considered "anti-nutrients" because they bind with certain minerals and prevent absorption.

GROUP 2 – PULSES (BEANS, PEAS AND LENTILS)

This group includes members of the plant family *Fabaceae* (alternate name *Leguminoseae*), such as beans, peas and lentils. The seeds are harvested at maturity and dried and used as food or processed into a variety of food products. This group does not include the same plants harvested green or immature and eaten fresh in the pod – these are included in the "Other vegetables" group. It also does not include groundnut (peanut) because while groundnut is in the *Fabaceae* family, both its high fat content and most common culinary uses are different from other legumes and similar to those of tree nuts. The pulses group **does** include mature seeds (beans) and processed products, such as tofu, tempeh and other soy products. The group is high in protein and B vitamins, although the protein is not "complete" and certain amino acids must be supplied by other foods. Pulses represent a very important protein source in plant-based diets and among populations where animal-source foods are largely unaffordable. Fat content of pulses is generally low, with the exception of soybean. Pulses contain varying amounts of anti-nutrients that inhibit absorption of certain nutrients.

Common examples from this group include common bean (black, kidney, pinto), broad bean (fava, field bean), chickpea (garbanzo), pigeon pea, cowpea, lentil and soybean/soybean products or other legume products.

GROUP 3 – NUTS AND SEEDS[14]

This group comprises mostly tree nuts but also includes groundnut (peanut) and may include certain seeds when consumed in substantial quantities. While seeds are usually recorded in the "Condiments and seasonings" category (below), they are included in the nuts/seeds category if they are a substantial ingredient in local mixed dishes or if they are eaten as a substantial snack or side dish. This group also includes nut and seed "butters", such as pounded groundnut/peanut butter, cashew butter or sesame butter (tahini), when consumed in substantial amounts and not merely added to flavour mixed dishes. See "Condiments and seasonings" (below) and **Box 1** for more detailed discussion of when to include particular nuts and seeds in this food group. Note that oils extracted from nuts and seeds are **not** included in this group.

Nuts and certain seeds are rich in unsaturated fatty acids, vegetable protein, fibre, minerals, tocopherols, phytosterols and phenolic compounds. They may have unique health benefits (Alasalvar and Bolling, 2015; Del Gobbo et al., 2015; Ros, 2015). With the exception of chestnuts, they generally have a very high fat content.

Common tropical tree nuts include cashew, macadamia and Brazil nut; common nuts grown in more temperate zones include almond, chestnut, hazelnut, pecan, pistachio and walnut. Peanut/groundnut cultivars are grown in a wide range of climates. Commonly consumed seeds include sesame, sunflower, pumpkin/squash/gourd and pine nut (see **Appendix 2**).

14 "Seeds" in the botanical sense includes a very broad range of items, including grains and pulses. However, in culinary systems, there is usually a limited number of other seeds, typically high in fat content and consumed as snacks or side dishes, in pastes or to season mixed dishes. For purposes of this grouping, "seeds" excludes grains and pulses. The group also excludes seeds when they are added in small amount to flavour dishes (see Box 1). Examples of seeds that may be eaten in larger amounts include squash/melon/gourd seeds used as a main ingredient in West African stews and sesame seed paste (tahini) in some dishes in Middle Eastern cuisines.

GROUP 4 – DAIRY

Dairy foods are easily understood as a group and are important sources of high-quality protein, potassium and calcium, as well as vitamin B12 (available only from animal-source foods) and other micronutrients. This group includes almost all liquid and solid dairy products from cows, goats, buffalo, sheep or camels. Tinned, powdered or ultra-high temperature (UHT) milk, soft and hard cheeses and yoghurt and kefir are also included.

However, butter, cream and sour cream, ice cream, sweetened condensed milk and processed/ packaged "yoghurt drinks" are excluded. Butter, cream and sour cream are classified with fats and oils because of their high fat content and most typical culinary uses. Ice cream and sweetened condensed milk are classified with sweets. Commercially processed/packaged "yoghurt drinks" are classified with sweet drinks, because these are usually high in sugar and low in dairy content. While high-quality ice cream and yoghurt drinks can contain substantial amounts of dairy and associated nutrients, cheaper and poorer-quality products do not, and the classification is aimed to avoid false inflation of the proportion of women consuming nutritious dairy products.

GROUP 5 – MEAT, POULTRY AND FISH

This group is sometimes referred to as "flesh foods". All meats, organ meats, poultry and other birds and fresh and dried fish and seafood/shellfish are included. Wild birds and mammals ("bush meat"), snakes, frogs and other reptiles and amphibians are also included. On the questionnaire, these appear as three subgroups: organ meat, meat and poultry, and fish/seafood. All flesh foods are important sources of high-quality protein and bioavailable micronutrients, notably iron, zinc and vitamin B12 (the last is available only from animal-source foods).

There is increasing interest in and concern regarding consumption of red meat and processed meats (see, for example, Bouvard et al., 2015, and http://www.who.int/features/qa/cancer-red-meat/en/). In some settings, consumption of animal-source foods is very low, while in others it is consumed in excess of needs.

For the purposes of the MDD-W indicator, all flesh foods, including red meat and processed meat, are included in this group. However, in settings where there are public health concerns about excessive consumption and/or where processed meats are widely consumed, an additional row could be added to the questionnaire to disaggregate and capture descriptive information about specific types of meat of concern, i.e. to separate red meat and/or processed meat from other items. For global comparability, however, these items should still "count" in MDD-W in the same way as poultry or fish.

GROUP 6 – EGGS

This group includes eggs from any type of bird (domesticated poultry and wild birds) but not fish roe, which are classified with small protein foods (see "Insects and other small protein foods", p. 17). Like other animal-source foods, eggs are a good source of protein, vitamin B12 and a range of bioavailable micronutrients.

Box 1. The issue of quantity – how much is enough to "count" towards food group diversity?

Ideally, women of reproductive age (WRA) would consume adequate amounts of diverse foods, such as fruits, vegetables, legumes, nuts and animal-source foods. But what is "adequate"? Various national food-based dietary guidelines provide recommendations on serving sizes and number of servings to consume from various food groups. However, there is no global harmonisation of what constitutes a serving size or on recommended numbers of servings per day for the various food groups.

Furthermore, Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) was developed exactly for situations where collection of quantitative dietary information is not feasible, that is, where it is not feasible to ask about the number and size of servings consumed.

So, how much is needed for a food group to "count" in the MDD-W? And how can this be determined without asking about quantities?

Several studies suggest that even if it is not possible to assess servings or an "adequate" amount, it is worthwhile to try to exclude very small quantities (Arimond et al., 2010; Gewa et al., 2014; Martin-Prével et al., 2015). The relationship between food group diversity and micronutrient adequacy is stronger when very small amounts of a food group are not allowed to "count". Several studies have used a cutoff of ≥15 g (for many foods that is about one tablespoon). So for the purposes of defining "large-enough" quantities, consider if, when consumed, the food is **usually** consumed by WRA in quantities ≥15 g.

Experience with large dietary diversity surveys has shown that it is both feasible and best to define foods and ingredients that do and do not count for constructing the MDD-W indicator during questionnaire adaptation – that is, before enumerator training and data collection begin. Foods usually consumed in trivial quantities are placed in the "Condiments and seasonings" category. Enumerators should know the principle of not counting small quantities but **should not** be making decisions during data collection about whether or not a quantity is sufficient to count.

When surveys will be repeated in the same geographic area across time, it is essential to maintain the same definitions of foods that do and do not count across survey rounds. It is also useful to aim for consistency among various users in the same geographic area and to follow the same principles and process across different countries or geographic areas. To promote consistency, this manual therefore provides a principle, suggestions for the adaptation process (**Section 4**) and examples (**Appendix 2**).

- **Principle:** When necessary, err on the side of **not** falsely inflating food group diversity. This is particularly important when foods or ingredients are expensive and the poorest and most vulnerable women are those most likely to consume trivial amounts.
- **Process:** Engage nutrition experts in questionnaire adaptation. When this is not feasible, follow the classification decisions in this manual (**Appendix 2**) for classifying items into the "Condiments and seasonings" category.

Box 1. *continued*

Condiments and seasonings

Condiments and seasonings are food ingredients that are either usually or often used in small quantities in the "family pot" or in foods prepared outside the home. Often these food items are added to provide flavour. Common examples include all fresh or dried herbs, spices, chili peppers, garlic, ginger root, fish powder, bean paste, fermented bean paste, tomato paste, seeds added for flavouring, bouillon cubes and similar flavour cubes, soy sauce, fish sauce and pepper sauce (see also **Appendix 2**). Some of these are very nutritious but **the amount consumed by individuals consuming the dish is most often very small**. Furthermore, in cases where these ingredients are expensive, the quantities added in poorer households may be smaller than in better-off households.

In the MDD-W method described in this manual, these items are placed in the "Condiments and seasonings" category and do not count in the ten food groups that comprise MDD-W (see **Section 6** on tabulation of the indicator). This reflects a judgement that the risk of falsely inflating food group diversity is more serious than the risk of excluding these items and underestimating diversity for the relatively small number of instances where consumption of these items might be more substantial.

During survey adaptation (**Section 4**), survey designers can decide if there are culturally specific exceptions to this – for example, if there are situations where seeds or seed pastes are **usually** eaten in large quantities. In some settings, there may be additional context- and cuisine-specific items that are usually used in trivial amounts and should be excluded from the count by placing them in the "Condiments and seasonings" category (e.g. small amounts of nuts, legumes or grated vegetables if **usually** used to top dishes). These items can also be added to the "Condiments and seasonings" category at the discretion of nutrition experts involved in survey adaptation.

These types of decisions should be taken only in consultation with experts; when this is not possible, follow the classification decisions suggested in this manual.

GROUP 7 – DARK GREEN LEAFY VEGETABLES

Essentially all medium-to-dark green leafy vegetables are vitamin A-rich (see **Box 2** for criteria for classifying items as vitamin A-rich). Only very light leaves, such as iceberg lettuce, are not. Medium green leaves, such as Chinese cabbage, romaine and bibb lettuce, along with darker greens, are all vitamin A-rich and are included in this group. In addition to being rich in vitamin A, many green leafy vegetables are rich in folate and several other micronutrients.

Commonly consumed leaves vary widely by country and region, and include many wild and foraged species, as well as the green leaves of other food crops (e.g. cassava leaves, bean leaves, pumpkin leaves, amaranth leaves and others). See **Appendix 2** for a detailed list of cultivated leafy vegetables. In the absence of information on nutrient content, wild/foraged leaves that are medium-to-dark green can be assumed to be vitamin A-rich and placed in this group.

Box 2. Criteria for defining foods and liquids as "sources" of vitamin A

For plant foods: Foods providing at least 120 retinol equivalents (RE) per 100 g are considered "sources" of vitamin A.* This is roughly equivalent to 60 retinol activity equivalents (RAE). Food composition tables may report vitamin A content of foods using the older RE units or the more recently adopted RAE.

For liquids (e.g. juices): Liquids providing 60 RE or 30 RAE per 100 g are considered to be sources of vitamin A.

*120 RE per 100 g corresponds to 15 percent of the Nutrient Reference Value (NRV; 800 RE) established by the Codex Alimentarius. The Codex standard for identifying a food as a "source" of any nutrient states that the food should provide any of the following: 15 percent per 100 g solid food, 7.5 percent per 100 g liquids, 5 percent per 100 kcal or 15 percent per serving. To be identified as a "high source", the food must provide twice this amount (e.g. 30 percent or 240 RE per 100 g solid food). The NRVs are set at a level that should meet the needs of approximately 97 percent of individuals in the age/sex group with highest needs (excluding pregnant and lactating women). For the definition of "source", see Codex Alimentarius Commission, Guidelines adopted 1997, revised 2004. For the definition of NRV, see Codex Alimentarius Commission, Guidelines adopted 1985, revised 1993 (for all Codex Standards, see http://www.codexalimentarius.org/).

GROUP 8 – OTHER VITAMIN A-RICH FRUITS AND VEGETABLES

This group includes both vitamin A-rich fruits and a small but diverse group of vitamin A-rich vegetables other than leafy greens. These foods may also be good sources of vitamin C and/or folate and/or other micronutrients. While "Other vitamin A-rich fruits and vegetables" constitutes one of the ten distinct food groups in the indicator, fruits are listed separately from vegetables on the questionnaire, as this may be more intuitive for enumerators.

The most common vitamin A-rich fruits are ripe mango and ripe papaya; others include red palm fruit/pulp, passion fruit, apricot and several types of melon. When eaten "green" (unripe), mango and papaya are **not** rich in vitamin A and if consumed "green" should be classified with "Other fruits".

Certain varieties of ripe, deep yellow-fleshed or orange-fleshed bananas are also rich in vitamin A, but white/cream-fleshed bananas are not. Deep yellow-fleshed and orange-fleshed bananas may be classified with vitamin A-rich fruits when their high vitamin A content is known to survey planners **and** it is considered feasible to distinguish bananas by colour during fieldwork. Otherwise, all bananas should be classified with "Other fruits" (see below), to avoid falsely inflating the proportion of women consuming vitamin A-rich fruits and vegetables.

Other vitamin A-rich vegetables include orange-fleshed sweet potato, carrot, pumpkin and deep yellow- or orange-fleshed squash. See **Appendix 2** for a list of other vitamin A-rich fruits and vegetables.

GROUP 9 – OTHER VEGETABLES

This group includes vegetables not counted above as dark green leafy vegetables or as other vitamin A-rich vegetables. Diets rich in fruits and vegetables are associated with positive health outcomes. This may be due to consumption of a range of bioactive compounds found in fruits and vegetables, including phenolics, flavonoids and fibre, and not just to their commonly recognised role as sources of micronutrients (Liu, 2013; Turati et al., 2015).

This group includes legumes when the fresh/green pod is consumed (as in fresh peas, snow peas, snap peas or green beans). In general, the "Other vegetables" group follows the culinary definition of a vegetable, not the botanical definition. It includes stems, fruits and flowers of plants when generally consumed in savoury dishes and considered as vegetables in culinary systems. So, for example, cucumber, tomato and okra (all fruits in botanical terms) are included as "Other vegetables".

However, this group excludes high-carbohydrate "starchy" roots and tubers, such as white potatoes, white yams, cassava and cocoyam, because their nutrient contributions differ, even though they are considered vegetables in some culinary definitions. Exclusion of roots and tubers is consistent with how WHO documents define which vegetables count towards the recommended consumption of fruits and vegetables[15].

As with dark green leafy vegetables, commonly consumed vegetables vary widely with geography and can include foraged as well as cultivated foods.

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15 For example, see the Healthy Diet Fact Sheet at http://www.who.int/mediacentre/factsheets/fs394/en/, accessed July 1, 2015, and Agudo, 2005.

GROUP 10 – OTHER FRUITS

This group includes most fruits, excluding vitamin A-rich fruits. Health effects of diets rich in fruits and vegetables were noted above. As with "Other vegetables", this group follows the culinary definition of fruits and so does not include tomatoes, etc., as explained above. Fruits are usually easily recognised and classified as such. Note that plantains are classified with starchy staples (Group 1, above), but sweet white bananas are classified with fruit.

As with vegetables, commonly consumed fruits vary widely with geography and can include foraged as well as cultivated fruits. A detailed list is provided in **Appendix 2**.

OTHER FOOD CATEGORIES

The food categories listed below do not count in the construction of the MDD-W indicator.

Insects and small protein foods – optional

This category includes insects, insect larvae/grubs, insect eggs, fish roe, spiders, land and sea snails and any other small invertebrates. It does not include frogs, snakes or other reptiles and amphibians, which are included in the "Meat, poultry and fish" group.

Insects and other small protein foods are diverse and have diverse nutrient content. Considering insects alone, it is estimated that there are more than 2,000 edible species, but nutrient data are available for only about 10 percent of these (Rumpold and Schlüter, 2013). Data on quantities consumed are also scant. For those species with nutrient composition data, it appears insects are nutrient dense and could potentially provide protein, fatty acids and micronutrients. But information on bioavailability is also lacking. Given these uncertainties, insects and other small protein foods are not included in the MDD-W count (this is also in harmony with the IYCF MDD indicator). As with condiments and several other items above, it is judged better to err on the side of not including/not counting these small protein foods given the diversity in nutrient content and uncertainty about the amount usually consumed. This avoids the risk of falsely inflating the proportion of women reported to consume nutrient-dense animal-source foods.

Reasons for including this category on the questionnaire: the category includes highly nutritious foods, and there may be an interest in knowing the proportion of WRA who are consuming these foods. These foods are also being promoted to play a greater role in the future in filling nutrient gaps (FAO, 2013).

If these foods are not eaten or are considered very rare throughout the survey area, this category does not need to be included on the questionnaire.

Red palm oil – optional

This category includes only red palm oil, which is usually consumed as an ingredient in mixed dishes.

Reason for including this category on the questionnaire: red palm oil is extremely high in vitamin A. In geographic areas where it is available, it may be of interest to know the proportion of WRA consuming it. Note that the oily red palm fruit is classified as a vitamin A-rich fruit. In areas where grown, either the oil or the oily fruit may be consumed, depending on the particular mixed dish.

If red palm oil is not available, not consumed or considered very rare throughout the survey area, this category does not need to be included on the questionnaire.

Other oils and fats – optional, but recommended

This category includes all other solid and liquid oils and fats, including those of plant or animal origin. Examples are lard, suet (tallow) and butter (solid animal fats); margarine and "shortening" (hydrogenated vegetable oil); and a range of oils extracted from nuts, seeds and grains. This category also includes very high-fat dairy items, such as cream and sour cream.

Note that it is usually not feasible to capture information on the quality and type of fats and oils consumed in the context of simple food group recall surveys. In many contexts, labelling is insufficient and/or oils are locally produced, unlabelled or repackaged into unlabelled containers or sachets. Respondents often will not know the type of oil consumed.

Reasons for including this category on the questionnaire: to estimate the proportion of women consuming any fats/oils, particularly in very high poverty areas where fat consumption is considered too low, and to give enumerators some place to mark when these are mentioned as ingredients in mixed dishes.

Savoury and fried snacks – optional

This category includes different foods in different settings, but in many settings crisps, chips, puffs and other low-cost and nutrient-poor snack foods are increasingly common. This category also includes other, more-substantial fried snacks, such as doughnuts/fried dough, samosas and other deep fried snacks and "street food" snacks. These foods may include very small amounts of meat or vegetables but are mainly fat and simple carbohydrate and may often be high in sodium as well.

Note that other fried foods – for example, fried potatoes and fried plantains – which may be consumed as meals or snacks are classified with roots and tubers because in some settings potatoes or plantains are staple foods, and classifying them with snacks might mean there would be no staple food in the count. This could result in a false "deflation" of food group diversity. Depending on their role in local diets, survey objectives and the likelihood of this false deflation, survey designers could choose to classify fried potatoes, fried plantains and similar in the "Savoury and fried snacks" category.

Reasons for including this category on questionnaires: to begin to provide descriptive information on the proportion of WRA consuming snacks that are generally nutrient-poor and energy-dense, and also to provide a place to mark these foods.

Sweets – optional

This category includes sweet foods, such as candy, chocolates, cakes, sweet biscuits/cookies, sweet pastries and ice cream.

Reasons for including this category on the questionnaire are the same as for savoury and fried snacks.

Sugar-sweetened beverages – optional

This category includes all sweetened fruit juices and "juice drinks", soft drinks/fizzy drinks, chocolate drinks (including those made with powders), sweet tea or coffee with sugar. It also includes fortified sweet drinks, malt drinks and "energy drinks", which are popular in some places.

Reasons for including this category on the questionnaire are the same as for savoury snacks and sweets. In addition, sugar-sweetened beverages have been associated with health risk factors in a number of studies and meta-analyses (Malik et al., 2013; Xi et al., 2015), and there is increasing interest in documenting prevalence of consumption.

Condiments and seasonings – REQUIRED

This category includes all minor ingredients in mixed dishes, which primarily provide flavour and would be consumed in very small amounts in any individual serving of the dish. It includes items added at any stage of cooking or when serving food (e.g. garnishes sprinkled on top of a dish to add flavour or visual appeal). This category includes fresh or dried herbs, spices, chili peppers, ginger root, garlic, fish powder, bean paste, fermented bean paste, tomato paste and seeds added for flavour or to garnish mixed dishes. It also includes bouillon cubes, "Maggi cubes" and similar items, soy sauce, fish sauce and pepper sauce. It includes sugar when sugar is added as a flavouring to mixed dishes or side dishes.

Note that many of these items that are added to flavour dishes may be nutritious and could be promoted as nutrient-rich additions to the family meal. But the amounts consumed are typically small and do not contribute substantially to micronutrient adequacy. Several studies have shown that exclusion of foods eaten in very small quantities strengthens the association between food group diversity and micronutrient adequacy (Arimond et al. 2010; Gewa et al., 2014; Martin-Prével et al., 2015). Therefore, these items are placed in the "Condiments and seasonings" category to avoid a false inflation of women's dietary diversity. See **Box 1** for further discussion of exclusion of small quantities.

The reason for including this category on the questionnaire is primarily to give a place for enumerators to mark these foods to avoid falsely classifying elsewhere. See **Section 5** for a discussion of training enumerators regarding this food category and see **Appendix 2** for more examples.

Other beverages and foods – REQUIRED

This category includes beverages, such as unsweetened tea, unsweetened coffee, clear broth, herbal infusions and alcohol, and miscellaneous foods, such as pickles and olives.

In addition and optionally, a space can be left where enumerators can write down other recalled foods if they are uncertain where to classify the item on the questionnaire. If it will not be possible for supervisors to review forms with enumerators on an ongoing basis (as in many large-scale surveys), having enumerators write in "other" foods is not advised. In surveys with smaller sample sizes, allowing use of this space can contribute to ongoing enumerator training and data quality control, especially if there is timely review by supervisors and feedback to the enumerator.

The reason for including this category on the questionnaire is primarily to give a place for enumerators to mark these foods to avoid falsely classifying elsewhere.

Mixed dishes and food items with multiple ingredients

Mixed dishes and food items with multiple ingredients present the most difficult challenge to implementation of food group recall surveys. It is not possible to provide comprehensive lists for classification. This guide aims to provide principles and some examples to aid in questionnaire adaptation and in training enumerators to record information about these dishes and food items.

One principle underlying many of the difficult choices reflected in the content of this guide is to **err on the side of NOT falsely inflating food group diversity**. This is particularly important when foods or ingredients are expensive and the poorest and most vulnerable women are more likely to consume trivial amounts.

The principle is applied to two distinct but related situations. The first involves "taking apart" mixed dishes and deciding which ingredients should be classified so that they can count in the MDD-W and which should be classified with "Condiments and seasonings". These are decisions that need to be made at the level of adapting the questionnaire with local foods. Enumerator instructions and training must also include clear guidance on probing for details of mixed dishes and on recording ingredients in their respective food groups and categories, including into the "Condiments and seasonings" category.

The second situation involves items that are known to contain multiple ingredients but should nevertheless be classified as a single food for purposes of the survey (e.g. bread). These should be categorised into a single food group or category during questionnaire adaptation and reviewed during enumerator training.

MIXED DISHES

Mixed dishes may contain some ingredients in large quantities ("main ingredients") and others in smaller quantities to add flavour. The principle stated above (and also in **Box 1**) presents a rationale for excluding items likely to be consumed in very small quantities from counting in the MDD-W. Box 1 also provides an argument for consistency across surveys. To support consistency, this guide provides a list of items that should not count and should instead be classified as "Condiments and seasonings", as described above on page 19 and as listed in **Appendix 2**.

Survey designers can still choose to make different decisions, but they should do so only when they have access to nutrition experts with very good understanding of the principles of food group recalls and of variability in preparation of mixed dishes across the range of households in the survey. In addition, survey designers should realize that if different decisions are made for surveys in the same geographic area, survey results will not be comparable.

See **Box 3** for some examples of classification for the following types of mixed dishes:

- Thin soups
- Thick soups, stews and curries
- Dark green leafy vegetables and other vegetable dishes
- Sandwiches

Box 3. Mixed dishes – Examples for classifying ingredients into rows on the model questionnaire

In the examples below, groups that "count" for Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) are in **bold font and underlined**.

Thin and thick soups, stews and curries can all be served alone or served alongside or on top of a staple food. When relevant, enumerators should probe to determine which parts of the dish were consumed.

THIN SOUPS can include any combination of meat, fish, vegetables and seasonings boiled in liquid and may or may not include oil. Thin soups have a high water content, and individual ingredients can often be easily picked out and consumed or not consumed by individuals.

EXAMPLE OF THIN SOUP: CHICKEN SOUP – THIN BROTH [Respondent reports the soup contained chicken, water, onion, garlic and herbs]

Respondent reports she consumed:	the broth only	Mark under "Condiments and seasonings" (for the garlic and herbs) and "Other beverages and foods" (for the broth).
	all parts of the soup	Mark under the two groups above and also mark "**Meat and poultry**" (for the chicken) and "**Other vegetables**" (for the onion).

THICK SOUPS AND STEWS have the same types of ingredients as thin soups but are served with thicker consistency because of long, slow cooking and sometimes as a result of adding thickeners (starch). In thick stews, there may be little or no broth. In thinner stews, some items are dissolved in the broth, but it may still be possible to pick out some items, particularly when meat is included.

EXAMPLE OF THICK SOUP OR STEW: KIDNEY BEAN STEW

Respondent reports the stew contained kidney beans, water, oil, garlic and spices.	Mark under "**Pulses (beans, peas and lentils)**" (for the kidney beans), "Condiments and seasonings" (for the garlic and spices) and "Other oils and fats" (for the oil).

CURRIES are similar to stews and can contain meat, fish or vegetables. Curries are usually characterised by use of many spices and seasonings.

EXAMPLE OF A CURRY: EGGPLANT AND ONION CURRY

Respondent reports the curry contained eggplants, onions, tomatoes, garlic, ginger, chilies, cumin seed, coriander seed and cilantro (coriander leaf).	Mark under "**Other vegetables**" (for the eggplants, onions and tomatoes) and "Condiments and seasonings" (for the garlic, ginger, chilies, cumin seed, coriander seed and cilantro).

DARK GREEN LEAFY VEGETABLES ("GREENS") AND OTHER VEGETABLES can be included in soups, stews or curries, or they can be the main ingredient in dishes. In many cuisines, dishes where vegetables are the main ingredient contain no other ingredients or only very small amounts of other ingredients.

EXAMPLE OF A VEGETABLE DISH: CASSAVA LEAVES WITH FISH POWDER

Respondent reports the dish was made with pounded cassava leaves, water, salt and fish powder.	Mark under "**Dark green leafy vegetables**" (for the cassava leaves) and "Condiments and seasonings" (for the salt and the fish powder).

SANDWICHES are mixed dishes with meat, cheese, vegetables and/or spreads served on bread, with or without toppings or condiments that are added mainly for flavour.

Respondent reports she had a cheese sandwich with mustard.	Mark under "**Grains, white roots and tubers, and plantains**" (for the bread), "**Dairy**" (for the cheese) and "Condiments and seasonings" (for the mustard).

Food items with multiple ingredients

Some food items present a situation exactly opposite that of mixed dishes. These are items that typically have more than one ingredient, but that are usually dominated by one ingredient. For these items, it is not necessary to probe for ingredients, as the item can be classified into one food group or category based on the main ingredient. See **Box 4** for a list of examples of these items. This list is not exhaustive but aims to provide sufficient information so that survey designers can identify similar local items that should be treated in the same way.

Box 4. Food items with multiple ingredients

Certain food items with multiple ingredients are classified into a single food row on the questionnaire, based on the major ingredient and on the role of the item in the diet. Such classification is also typical in the visual guidance (pyramids, plates, etc.) developed by countries to illustrate food-based dietary guidelines.

The following list of examples is brief but should give some guidance for classification of similar items during adaptation of the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) questionnaire.

Principles:

- To err on the side of not falsely inflating food group diversity
- To err on the side of simplicity, when a single ingredient usually dominates in a food or is most likely to dominate in lower-cost versions of the food

Example	Row on questionnaire	Rationale
Bread	Foods made from grains	The primary ingredient in bread is usually a grain. The simplest breads are grain (flour) and water. Rich breads may include small amounts of dairy, eggs, fats or oils, and some types of bread include cheese, fruits or nuts. However, amounts of other ingredients vary and are typically small, and to avoid falsely inflating food group diversity all types of bread should be classified with grains.
Pizza	Foods made from grains	In many settings, pizza is an item high in grain content and **usually** with very small quantities of dairy (cheese), meat or vegetable toppings. The cheaper the item, the less likely there is a substantial quantity of these toppings. To avoid falsely inflating diversity, classify pizza with grains. However, during the adaptation process, a different decision could be made by survey designers in settings where pizza **usually** provides more dairy, meat or vegetables.
Porridge	Foods made from grains or white roots and tubers and plantains	The rationale is the same; the main ingredient is usually a grain or a root or tuber (e.g. cassava) and other ingredients, if present, are present in small quantities.
Cake, sweet pastry	Sweets	These items are classified based on their role in the diet as sweets. Otherwise, they would be classified in the grain group on the same rationale as above. However, there is growing interest in capturing information on consumption of sweets. Further, women who consume cake are unlikely to do so as their only starchy staple for the day, so not counting this item as a grain is very unlikely to affect the number of food groups counted.
Samosas, similar fried savoury pastries	Savoury and fried snacks	Similar to sweets, there is growing interest in capturing information on consumption of energy-dense and nutrient-poor fried snacks. In addition to grain, samosas contain small amounts of meat or vegetables, but the amounts vary and particularly for lower-priced items consumed by the poor, the quantity of meat or vegetable is typically very small.
Sweet drinks with dairy content	Sweet drink	As above, there is growing interest in capturing information about consumption of sugar-sweetened beverages. Many such beverages, and particularly lower-cost items, are marketed and described as containing milk but actually contain little or no milk. These items are classified with sweet drinks to avoid falsely inflating the proportion of women consuming dairy.

Section 3. Model questionnaire

This section provides two elements that comprise the MDD-W questionnaire. The first element is a block of standard text (a “script”) to adapt and use in guiding the respondent through an open recall of foods and beverages consumed the previous day and night. The text also includes statements to guide the enumerator in recording information. The second element is a model questionnaire form, which needs to be adapted with local foods (see **Section 4** for guidance on translation and adaptation of the text and questionnaire).

The guidance to enumerators for recording information is provided as an example and is not meant to be prescriptive, as different surveys employ different standard procedures (circling versus underlining or “ticking” foods; codes for “yes” and “no” answers; etc.).

Forms may also optionally provide a space for enumerators to record each food or ingredient as mentioned. A grid structure for morning, mid-day and evening may be helpful. This type of questionnaire structure has been used and found to be helpful in a number of small- to medium-sized surveys; however, it is not reflected in the instruction text below. This approach requires the enumerator to first write the foods/ingredients, then to code each food or ingredient item into its respective row on the questionnaire at the end of each interview. This two-step process may not be feasible in larger surveys.

Increasingly, survey teams may be carrying out Computer-Assisted Personal Interviewing (CAPI) using tablets or other devices to capture data. The methods for marking responses will differ when using CAPI as compared with paper forms.

Guiding the respondent through an open recall and recording information

The following text can be provided to enumerators on a job aid/guidance sheet or included on the questionnaire form; the italics indicate the example script that would be spoken to the respondent:

Now I'd like to ask you to describe everything that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else. Please include all foods and drinks, any snacks or small meals, as well as any main meals. Remember to include all foods you may have eaten while preparing meals or preparing food for others. Please also include food you ate even if it was eaten elsewhere, away from your home. Let's start with the first food or drink consumed yesterday.

*Did you have anything to eat or drink when you woke? If yes, what? Anything else?**

*Did you have anything to eat or drink later in the morning? If yes, what? Anything else?**

*Did you eat or drink anything at mid-day? If yes, what? Anything else?**

*Did you have anything to eat or drink during the afternoon? If yes, what? Anything else?**

*Did you have anything to eat in the evening? If yes, what? Anything else?**

*Did you have anything else to eat or drink in the evening before going to bed or during the night? If yes, what? Anything else?**

* For each eating episode, after the respondent mentions foods and drinks, probe to ask if she ate or drank anything else. Continue probing until she says "no, nothing else". If the respondent mentions a mixed dish like a soup or stew, ask for all the ingredients in the mixed dish. For mixed dishes where it is possible to pick out ingredients or consume only broth, ask if she herself ate each ingredient or if she only had the broth. Continue to probe about ingredients until she says "nothing else".

INSTRUCTIONS FOR RECORDING INFORMATION

The following text can be provided to enumerators on a job aid or included on the questionnaire form:

As the respondent recalls foods and drinks, mark the corresponding item in the "Description/ examples to be adapted" column and mark '1' in the response column for that row on the questionnaire. If more than one item in a row is mentioned, mark each item. If the same food or drink is mentioned more than once, you do not need to mark it again after the first time. *[Optionally: If the food is not listed in any of the rows on the questionnaire, write the food in the bottom row labelled "Other beverages and foods".]*

In some surveys, it may be possible for the enumerator to review the foods that have been reported by repeating them to the respondent and making a final probe ("anything else?"), but this will depend on the specific survey context. Immediately after completing the recall, the enumerator should mark "no"[16] for rows where the respondent did not report consuming any items.

[16] Again, the method for marking "no" will vary depending on standard practice preferred by the survey designers; it can be entered as a code "0" in a blank space (|0|) or codes on the form may be circled or ticked.

Model questionnaire

The model questionnaire on the next two pages provides a few examples of food items for each row in the questionnaire. During questionnaire adaptation, these examples of food items need to be replaced by lists of common foods in the local context that fall into the row (see **Section 4**).

Table 3. MDD-W model questionnaire

Required – Rows A–N (14 rows) will be aggregated during analysis into the ten MDD-W food groups			
	Food categories	**Description/examples to be adapted** Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	**Consumed** Yes = 1 No= 0
A	**Foods made from grains**	*Porridge, bread, rice, pasta/noodles or other foods made from grains*	___yes (1) ___no (0)
B	**White roots and tubers and plantains**	*White potatoes, white yams, manioc/cassava/yucca, cocoyam, taro or any other foods made from white-fleshed roots or tubers, or plantains*	___yes (1) ___no (0)
C	**Pulses (beans, peas and lentils)**	*Mature beans or peas (fresh or dried seed), lentils or bean/pea products, including hummus, tofu and tempeh*	___yes (1) ___no (0)
D	**Nuts and seeds**	*Any tree nut, groundnut/peanut or certain seeds, or nut/seed "butters" or pastes*	___yes (1) ___no (0)
E	**Milk and milk products**	*Milk, cheese, yoghurt or other milk products but NOT including butter, ice cream, cream or sour cream*	___yes (1) ___no (0)
F	**Organ meat**	*Liver, kidney, heart or other organ meats or blood-based foods, including from wild game*	___yes (1) ___no (0)
G	**Meat and poultry**	*Beef, pork, lamb, goat, rabbit, wild game meat, chicken, duck or other bird*	___yes (1) ___no (0)
H	**Fish and seafood**	*Fresh or dried fish, shellfish or seafood*	___yes (1) ___no (0)
I	**Eggs**	*Eggs from poultry or any other bird*	___yes (1) ___no (0)
J	**Dark green leafy vegetables**	*List examples of any medium-to-dark green leafy vegetables, including wild/foraged leaves*	___yes (1) ___no (0)
K	**Vitamin A-rich vegetables, roots and tubers**	*Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside (see **Appendix 2** for other less-common vitamin A-rich vegetables)*	___yes (1) ___no (0)
L	**Vitamin A-rich fruits**	*Ripe mango, ripe papaya (see **Appendix 2** for other less-common vitamin A-rich fruits)*	___yes (1) ___no (0)
M	**Other vegetables**	*List examples of any other vegetables*	___yes (1) ___no (0)
N	**Other fruits**	*List examples of any other fruits*	___yes (1) ___no (0)

Other food categories, not included in construction of MDD-W

	Food categories	Description/examples to be adapted Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	Consumed Yes = 1 No= 0
Optional; inclusion to be determined by survey designers during adaptation process			
O	**Insects and other small protein foods**	*Insects, insect larvae/grubs, insect eggs and land and sea snails*	___ yes (1) ___ no (0)
P	**Red palm oil**	*Red palm oil*	___ yes (1) ___ no (0)
Q	**Other oils and fats**	*Oil; fats or butter added to food or used for cooking, including extracted oils from nuts, fruits and seeds; and all animal fat*	___ yes (1) ___ no (0)
R	**Savoury and fried snacks**	*Crisps and chips, fried dough or other fried snacks*	___ yes (1) ___ no (0)
S	**Sweets**	*Sugary foods, such as chocolates, candies, cookies/sweet biscuits and cakes, sweet pastries or ice cream*	___ yes (1) ___ no (0)
T	**Sugar-sweetened beverages**	*Sweetened fruit juices and "juice drinks", soft drinks/fizzy drinks, chocolate drinks, malt drinks, yoghurt drinks or sweet tea or coffee with sugar*	___ yes (1) ___ no (0)
Required			
	Food categories	**Description/examples to be adapted** Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	**Consumed** Yes = 1 No= 0
U	**Condiments and seasonings**	*Ingredients used in small quantities for flavour, such as chilies, spices, herbs, fish powder, tomato paste, flavour cubes or seeds*	___ yes (1) ___ no (0)
V	**Other beverages and foods**[a] ***(optionally, specify if not listed)***	*Tea or coffee if not sweetened, clear broth, alcohol* *Pickles, olives and similar* ______________________________	___ yes (1) ___ no (0)

[a] If rows O, P, Q, R, S and/or T are not included, examples for the "Other beverages and foods" category must be expanded to include these types of items.

The final two rows ("Condiments and seasonings" and "Other beverages and foods") should always be included on the questionnaire.

Section 4. Preparing the MDD-W questionnaire

Before measuring MDD-W in a new setting, it is important to prepare the data collection materials to reflect the foods and dietary habits of the target population. This section covers a series of steps to be carried out by survey designers for preparing a linguistically and culturally adapted MDD-W questionnaire.

In locations where previous food group diversity surveys have been implemented, existing questionnaires can be useful inputs to this process. If it is known that previous surveys were prepared following a thorough process (i.e. steps similar to those described in this guide), questionnaire adaptation can be much shorter, as food items on previous questionnaires can be used to populate the adapted MDD-W questionnaire.

Steps for adapting the model questionnaire in **Section 3** include: making a decision on the data collection approach and on how many of the optional categories to include; creating a basic translation of the MDD-W model questionnaire in the survey language(s); and reviewing and adjusting the translated enumerator instructions and introductory text using words and phrases that are easily understood by both the enumerators and the respondents. Following this, it will be necessary to adapt the foods listed in each row of the MDD-W model questionnaire to include seasonally and locally available foods commonly consumed, using local names where appropriate.

This preparatory work can be undertaken at a basic level or, if time and resources permit, may be expanded to include qualitative research on different population subgroups to ensure completeness of the food and beverage examples listed in each questionnaire row and to gather local recipes for mixed dishes. While this second level of adaption is highly recommended so that the list of foods consumed by survey populations will be as accurate as possible, it may not be feasible to carry out in all cases.

Decision on method for collecting the information

The survey team will need to decide whether to follow the recommended method of soliciting an open recall of all foods and beverages consumed from when the respondent awoke the previous day through the day and night, or whether to use the list-based method of inquiring about each food group (see **Section 1**, Methodological approaches to measurement of food group diversity, and **Appendix 3** for discussion of the list-based method). This decision will determine the type of enumerator instructions and the opening text to read to respondents, as well as enumerator training content.

Content of the survey-specific MDD-W questionnaire

The model questionnaire provided in **Section 3** includes 22 mutually exclusive food groups and categories, 14 of which will be aggregated to create the MDD-W 10 food group indicator. Among the remaining eight categories, at a minimum the “Condiments and seasonings” and “Other beverages and food” categories (rows “U” and “V” on the model questionnaire) must be included.

Survey designers should decide whether or not to include the other optional categories (rows “O” through “T” on the model questionnaire) in addition to those required for constructing the MDD-W indicator. For example, they need to determine if insects and other small protein foods and red palm oil are consumed in the survey area and if so, to decide whether to include these categories on the questionnaire.

In addition to the categories listed in the model questionnaire, other foods of interest, including fortified and/or biofortified foods, can be added. Also, model questionnaire rows could be further disaggregated for data collection if survey designers want to capture consumption of one or more specific foods within an MDD-W food group or other food category. This may be the case when specific food items are promoted during interventions.

When modifying the questionnaire in these ways, survey designers should take care to ensure that it is still possible to construct the MDD-W indicator.

In the case when questions are added to capture consumption of fortified or biofortified foods, it is best to train enumerators to mark items in their “home” food group (e.g. grains, for fortified flour or golden rice) in addition to eliciting answers for added questions specific to fortified/biofortified foods. Note this “breaks the rule” of mutually exclusive food groups and categories as found in the model questionnaire. But marking in “home” food groups allows the standard construction of the MDD-W indicator.

When further disaggregating food groups to capture specific targeted foods, the questionnaire rows should be mutually exclusive. The tabulation instructions need to be modified to reflect the disaggregation.

When using the open recall method, further disaggregation of questionnaire rows does not affect responses or results, because the enumerator does not read the lists of items/examples to the respondent. However, when the list-based method is used, disaggregation of groups is likely to result in recall of more food items and can change survey results.

Translation and adaptation of the questionnaire

INITIAL TRANSLATION OF THE MDD-W MODEL QUESTIONNAIRE INTO SURVEY LANGUAGES

This guide, which is in English[17], contains an MDD-W model questionnaire. In countries where English is not the predominant language, the MDD-W model questionnaire with its generic food examples should be translated first into one of the major survey languages as a starting point for the linguistic and cultural adaptation work that follows. There are several methods of ensuring good translation, including group work to reach consensus on translation and back-translation to English[18]. This initial

17 There are plans to make Spanish and French versions available in the future.

18 Although back-translation of survey questionnaires has been a common practice, some now emphasise focusing attention on first producing the best possible translation and then directly evaluating the translation produced in the target language, rather than indirectly through a back-translation. See, for example, http://ccsg.isr.umich.edu/translation.cfm.

translation into the predominant survey language will reflect the generic examples of foods provided in the MDD-W model questionnaire. The initial translation will be the starting point for adapting the questionnaire in other survey languages, if any.

BASIC LEVEL OF LINGUISTIC AND CULTURAL ADAPTATION OF THE MDD-W QUESTIONNAIRE

Linguistic and cultural adaptation means modifying the translated MDD-W questionnaire to reflect cultural norms, vocabulary and usage (words and phrases) that will be easily understood and to include locally available and commonly consumed foods. This step will be carried out by the survey designers in consultation with a nutritionist and involves customising the introductory text and the food items in each questionnaire row.

Involvement of field staff (enumerators and supervisors) is also ideal, because in an open recall enumerators will be required to correctly classify reported foods into the food categories listed in each row on the questionnaire. Their ability to do this will be influenced by their comprehension of the objectives and by the quality and comprehensiveness of the examples filled in for each food category. Thus, involving field staff early in the adaptation process provides additional assurance of their ability to collect accurate information during the survey. Their input is also useful in reviewing the translation of the introductory text to make sure the language and terms will be understood by the respondent. Particular attention should be taken to carefully translate terms used to describe key concepts (such as “meal”, “snack” or “main meal”).

During this step, the names of the food categories should be reviewed and translated, and the list of examples in each filled in with a comprehensive list of seasonally and locally available foods, using local names where appropriate. (**Appendix 2** provides guidance on how to classify individual food items into the questionnaire rows.) At some time during the process, it will be necessary to consult with individuals familiar with commonly consumed foods in the target population and with a nutritionist to review the draft questionnaire and advise on correct classification of the food items into the rows. The review can be done either by the nutritionist alone or, ideally, together with the survey designers and the field staff. Other resources may be consulted as well, such as questionnaires from nutrition modules in previous surveys, if available.

If the survey team is unable to carry out the second level of adaptation (below) because of time and/or resource limitations, the work to identify ingredients of commonly consumed mixed dishes and foods likely to be consumed in small quantities, as described in the next section, should be done during the basic adaptation, using information from team members and knowledgeable persons.

SECOND LEVEL OF ADAPTATION

When time and resources permit, it is strongly recommended that a second level of adaptation be carried out to complete the lists of example food items for the questionnaire rows. This step involves consultations with members of the target population in the form of key informant interviews and focus group discussions in different subpopulations or locations within the survey area(s)[19]. These conversations provide critical information on:

- Seasonally and locally available food items (including foods gathered in the wild) and their common names
- Commonly consumed mixed dishes and ingredients used in these local dishes

[19] This step may be incorporated into enumerator training, as was done in Tajikistan, when the training was focused only on collecting dietary diversity information (see http://www.fao.org/fileadmin/templates/nutrition_assessment/Workshops/ Training_Report_Khujand_April_2015__03062015_.pdf). However, this would not be practical when training on the MDD-W is incorporated into a broader enumerator training session for multi-topic surveys.

- Foods that are typically consumed in small amounts that should not count as part of an MDD-W food group (see **Box 1**) but rather should be classified as condiments or seasonings
- Commonly consumed "street foods" and prepared foods purchased outside the home

Informants for this process can include experts at the local and national levels, community leaders, agricultural or health extension workers at the local level and women in the community who are responsible for food planning and preparation for their households. Informants from various communities in the survey area whose food patterns may differ should also be included: urban, rural and peri-urban residents, and different ethnic and livelihood groups. For surveys that will be carried out over large geographic areas with distinct dietary practices by location, it may be necessary to produce more than one adapted questionnaire.

OUTPUTS FROM THE LINGUISTIC AND CULTURAL ADAPTATION

Outputs of the adaptation process always include the adapted MDD-W questionnaire and can include job aids/guidance sheets on common ingredients of mixed dishes and on foods to place in the "Condiments and seasonings" category. Such guidance sheets are extremely useful for enumerator training, as well as for use as reminders during data collection. They may be in the form of cards, photographs or printed sheets.

Once this preparatory work has been done in a specific geographic area, subsequent surveys could use the same adapted questionnaires, enumerator instructions and guidance sheets, greatly reducing the preparation time.

Field testing, finalisation and piloting

FIELD TESTING

Before finalising the MDD-W questionnaire, it is recommended that a small field test with a limited number of respondents (5–10 may be sufficient) be carried out to make sure that the examples in each questionnaire row are complete and that the respondents understand the script and the probing that elicit their open recall. The respondents are usually informed that this is a trial to improve the data collection instrument, and they may be interviewed afterwards to get their views on how well they understood the questions and were able to answer them. Members of the survey team would conduct interviews with a small convenience sample in locations similar to where the survey will be conducted and compare notes afterwards to identify any gaps or potential problems in comprehension by the respondents. Fine-tuning may be required to complete the food lists for each row or to modify the script and probing questions to improve clarity.

This last step in the adaptation process does not replace the standard practice of piloting the complete and final questionnaire when the MDD-W is incorporated into larger multi-topic surveys (see below).

FINALISATION OF THE MDD-W QUESTIONNAIRE

Once these steps have been carried out in the major survey language, the final version of the MDD-W questionnaire is ready for use. If the survey is to be carried out using multiple languages, it will be necessary to repeat the steps above for each language to ensure that instructions are clearly understood and that the questionnaire includes the correct names of foods in each language. However, if the process of translation and adaptation into the first language is thorough, adaptation to additional languages can be more rapidly accomplished.

PILOT STUDIES IN THE CONTEXT OF THE LARGER SURVEY

In most situations, MDD-W will be measured in the context of surveys that include multiple topics and modules. A pilot study is a practice of all the survey steps, from start to finish, including all survey modules and procedures. Often a convenience sample of approximately 50 respondents is interviewed and their responses coded and analysed. Questions that are not clearly understood are modified, problems administering the questionnaire are addressed and the final revisions of the questionnaire are made[20].

20 See, for example, http://www.tools4dev.org/wp-content/uploads/how-to-pretest-and-pilot-a-survey-questionnaire.pdf.

Section 5. Selection and training of enumerators

Enumerator selection

Since the open recall method recommended in this guide places the burden on the enumerator to correctly classify reported foods into the rows on the questionnaire, it is strongly recommended to use enumerators who have some training in nutrition surveys or who have participated in the questionnaire adaptation. Ideally, enumerators will also have direct personal experience in shopping for and preparing local foods; in many cultures, this means they will be female.

When the MDD-W is included in large-scale, multi-topic surveys, it might not be possible to select enumerators with this range of knowledge and survey experience. In any case, it is recommended that enumerators have some post-high school education and experience in survey methodology and interviewing.

Enumerator training

TOPICS TO COVER DURING TRAINING

This section highlights a few main points and issues unique to training enumerators for collecting food group diversity data using the recall method[21].

Training should include classroom instruction, discussion and field practice. Once the questionnaire rows with locally available foods are reviewed, a fair amount of time should be allotted to discussions, as the trainees need to be familiar with the foods (including commonly consumed mixed dishes) and their classification into rows in order to correctly record data on the MDD-W questionnaire.

The following scheme provides some points to consider when designing enumerator training for the MDD-W.

A. Introduction to and meaning of dietary diversity and the MDD-W

- Discuss the objectives of the questionnaire, i.e. to gain information on the foods and food groups consumed by the woman respondent the previous day and night. Explain that healthy diets are diverse and include many foods and food groups. Explain and show that the questionnaire organizes foods into groups by showing food items in rows of similar foods.
- Explain that the final output from the questionnaire is a count of food groups and explain that there are some rows that "count" and others that do not "count", either because the foods are not nutritious or because people usually consume very small amounts.

21 Many resources are available that cover enumerator training more generally. See, for example, the Demographic and Health Surveys manual for training field staff.

B. Description of questionnaire rows and exercises in classifying foods

- Review the groupings listed on the adapted questionnaire (MDD-W groups and other categories) and clarify any questions regarding why items are placed in the various rows. Special issues may need to be discussed and specific guidance given, such as classifying beverages, condiments and seasonings, etc. (see **Appendix 2** for a list of foods that are difficult to classify).
- In an exercise, have enumerators sort/classify foods into the appropriate rows of the adapted questionnaire (e.g. using a stack of food cards or photographs).

C. Introduction to the open recall method and to recording information on the MDD-W questionnaire

- Explain the principles behind the open recall method (to obtain a report of all foods and drinks consumed by the respondent during the day and night at meals, between meals and during food preparation, and consumed both in the home and outside the home).
- Explain the time period of the recall – from the time the respondent woke the previous day through the day and overnight. Explain that the aim is to gather information about a 24-hour period.
- Explain the concept of mixed dishes.
- Discuss how to probe about mixed dishes and where to place ingredients in the questionnaire rows. If available, introduce the guidance sheets on common mixed dishes developed during the adaptation phase and practice using them.
- Explain that certain foods are classified in only one row even if they have several ingredients (e.g. bread).
- Review the "Condiments and seasonings" list developed during the adaptation phase and (if available) explain how to use the guidance sheets to aid in correctly classifying these items.
- Explain and demonstrate an open recall and show how enumerators should record the information on the questionnaire when using a printed questionnaire or tablet.

D. Practice in carrying out the open recall

- In an exercise, have trainees practice/role play in pairs and then select several pairs to practice in front of the group. Ask other trainees to comment on the role play; follow with corrections as needed.
- Review the questionnaires marked during the role plays, correcting errors as needed.
- Throughout training, allow sufficient time for questions and comments from enumerator trainees, as this may indicate the need to modify some parts of the questionnaire, enumerator instructions or guidance sheets to improve ease of administration and clarity for the respondent.

E. Final adjustment of questionnaire prior to data collection

- Follow standard practices established by the survey organizers for field testing and field practice by trainees; standard practice will vary by the type and scale of the survey in which the MDD-W questionnaire is embedded.
- Following training, field testing and piloting, revise the questionnaire and enumerator instructions as needed and review all changes with enumerator trainees.

Normal practice for large-scale, multi-topic surveys is to conduct thorough enumerator training that may last 2 weeks or more, with pilot testing of the entire survey (all survey modules) prior to starting data collection. When the MDD-W is included, it would be ideal, although not always realistic, to schedule up to 2 days on the MDD-W into the overall enumerator training schedule. If the enumerators are nutritionists or have experience with nutrition questionnaires, initial training could be accomplished in 1 day. In all cases, enumerators can continue to learn during survey implementation through direct feedback from supervisors, debriefing and group discussions during field staff meetings and, in the case of extended periods of data collection, through periodic retraining.

Section 6. Tabulation, presentation and interpretation

Constructing the MDD-W indicator

To construct the MDD-W indicator, the first step is to combine (aggregate) questionnaire rows (food groups and subfood groups) into the 10 MDD-W food groups, as shown in **Table 4.**

Table 4. Aggregation to construct Minimum Dietary Diversity for Women of Reproductive Age (MDD-W)

Groups/items/rows on model questionnaire[22]		10 food groups in MDD-W
A. B.	Foods made from grains White roots and tubers and plantains	1. Grains, white roots and tubers, and plantains
C.	Pulses (beans, peas and lentils)	2. Pulses (beans, peas and lentils)
D.	Nuts and seeds	3. Nuts and seeds
E.	Milk and milk products	4. Dairy
F. G. H.	Organ meat Meat and poultry Fish and seafood	5. Meat, poultry and fish
I.	Eggs	6. Eggs
J.	Dark green leafy vegetables	7. Dark green leafy vegetables
K. L.	Vitamin A-rich vegetables, roots and tubers Vitamin A-rich fruits	8. Other vitamin A-rich fruits and vegetables
M.	Other vegetables	9. Other vegetables
N.	Other fruits	10. Other fruits
Other categories not included in MDD-W		
O.	Insects and other small protein foods	
P.	Red palm oil	
Q.	Other oils and fats	
R.	Savoury and fried snacks	
S.	Sweets	
T.	Sugar-sweetened beverages	
U.	Condiments and seasonings	
V.	Other beverages and foods	

For example, if a questionnaire is coded "1" for "yes" for either subgroup "A" or "B", the woman receives a point for the first MDD-W group ("Grains, white roots and tubers, and plantains"). **She does not receive an additional point if she consumed food items from both subgroups.** The 10 MDD-W groups are first summed into a score ranging from 0 to 10. Each woman is then coded "yes" or "no" for scoring ≥ 5, followed by calculation of the proportion of women who score from 5 to 10.

22 The order of items/rows differs slightly on the list-based questionnaire in Appendix 3. When using the list-based method, for example, it is better to have "Vitamin A-rich vegetables, roots and tubers" precede "White roots and tubers and plantains" to avoid misclassification of orange-/yellow-fleshed sweet potatoes, carrots, etc.

Since many users may also calculate the infant and young child feeding (IYCF) indicator for MDD, **Appendix 4** provides a table showing how the ten food groups in the MDD-W compare with the seven groups in the IYCF MDD indicator. See also **Table 1** in Section 1 for a comparison of the indicators.

Presentation and interpretation of results

Presentation can be as simple as the percent of WRA achieving MDD-W or "minimum dietary diversity". The indicator was developed for exactly this purpose, i.e. when a single, simple, dichotomous indicator is needed.

The interpretation of the indicator is: "X% of women achieved minimum dietary diversity, and they are more likely to have higher (more adequate) micronutrient intakes than the X% of women who did not".

In some cases, it may be useful to present results separately by selected geographic, socioeconomic or household characteristics (e.g. urban vs. rural households, by region, by wealth quintile or by level of education), but decisions on appropriate disaggregation will be survey- and context-specific and will depend on objectives, sampling and sample sizes. Example figures on the following pages present hypothetical data for urban and rural households.

While designed to meet the need for a single, simple indicator, the data collected to construct the indicator also provide a rich description of diet patterns. The information may also reflect specific food groups of interest in particular contexts (e.g. animal-source foods, fruits and vegetables, nutrient-poor and/or energy-dense groups and other specific food groups promoted in interventions).

The following figures are illustrative and are not an exhaustive set of presentation options.

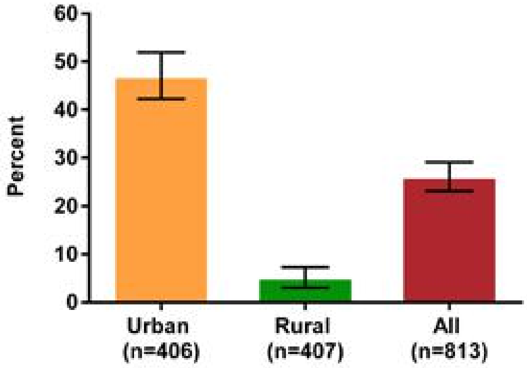
The data used to generate the graphs are from two data sets, one urban and one rural, with a sample size of approximately 400 in each site[23]. Figures show percent and means (standard deviation), along with 95% confidence intervals.

FOOD GROUP DIVERSITY

In addition to presenting the percent of WRA achieving minimum dietary diversity, it can be useful to present the average (mean) diversity score and a histogram illustrating the distribution of scores. This is especially useful where the percentage of women consuming foods from five or more food groups is low, as in the rural site shown below.

23 Real data were used, but to create data sets of equal size in urban and rural sites, data were randomly replicated (repeated) within the data sets.

Figure 1. Percent achieving Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) (≥5 food groups yesterday)



(Error bars indicate 95% confidence interval)

Figure 2. Mean (SD) number of food groups yesterday

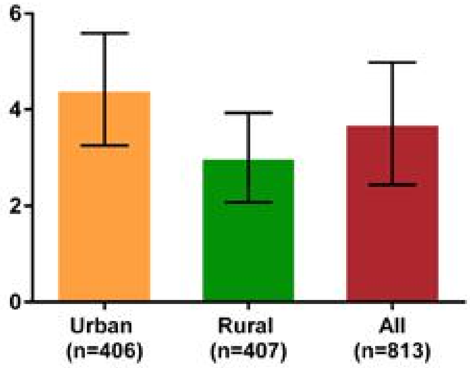
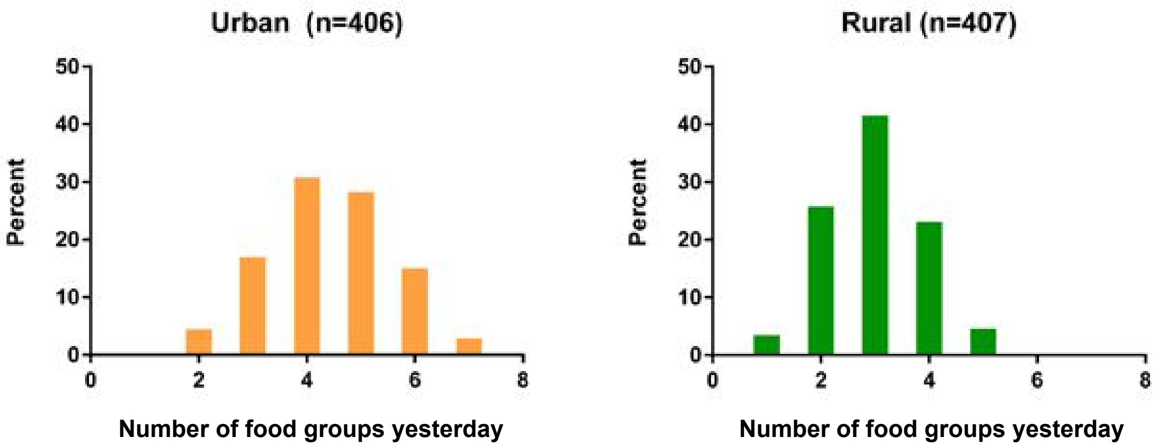
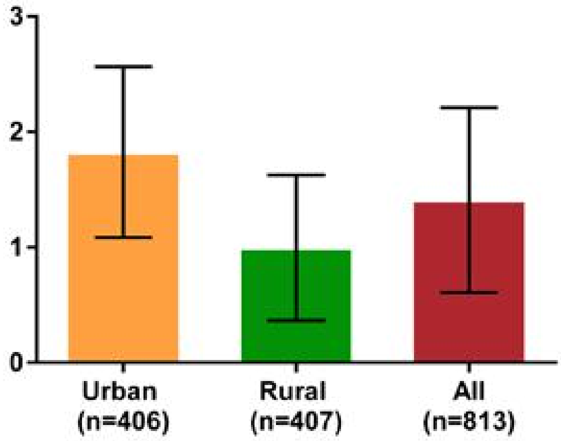


Figure 3. Food group diversity scores for yesterday (out of 10 groups)



It may also be useful to present the average number of fruit/vegetable groups consumed out of the four groups ("Dark green leafy vegetables", "Other vitamin A-rich fruits and vegetables" [usually dark yellow/orange/red], "Other fruits" and "Other vegetables")[24].

Figure 4. Mean (SD) number of fruit/vegetable groups yesterday (out of 4 groups)



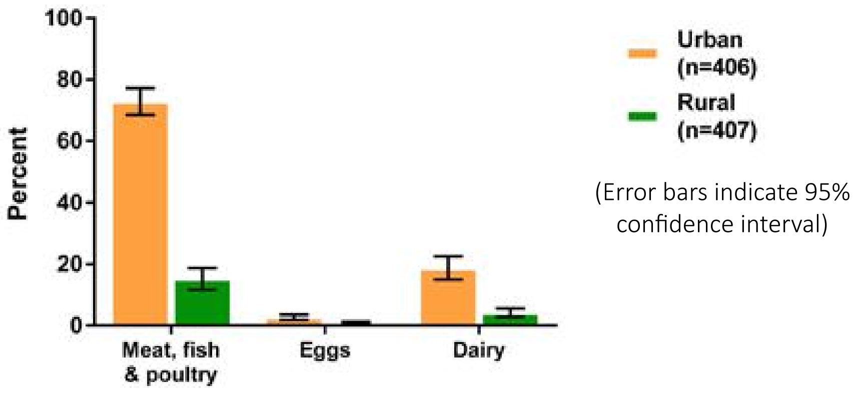
Consumption patterns for specific food groups

Presentation and examination of the percent of WRA consuming foods from specific food groups and subgroups provide a good qualitative description of the diet. Both the nutrient-rich food groups in the MDD-W and the optional, low nutrient density food groups may be of interest.

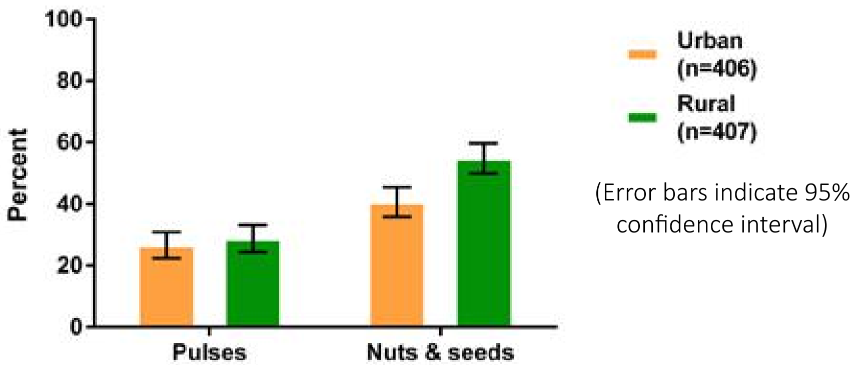
24 Different fruit/vegetable groups have different nutrient profiles, so consumption of a variety best ensures good intakes of micronutrients, as well as of other phytochemicals and fibre. Many national FBDG explicitly advise consumption of a variety of types or colours of fruits and vegetables, and several specifically advise consumption of dark green leafy vegetables; see global FBDG compiled by FAO at http://www.fao.org/nutrition/nutrition-education/food-dietary-guidelines/en/.

Figure 5. Percent consuming nutrient-rich foods yesterday

A. Animal-source foods



B. Pulses, nuts & seeds



C. Fruits and vegetables

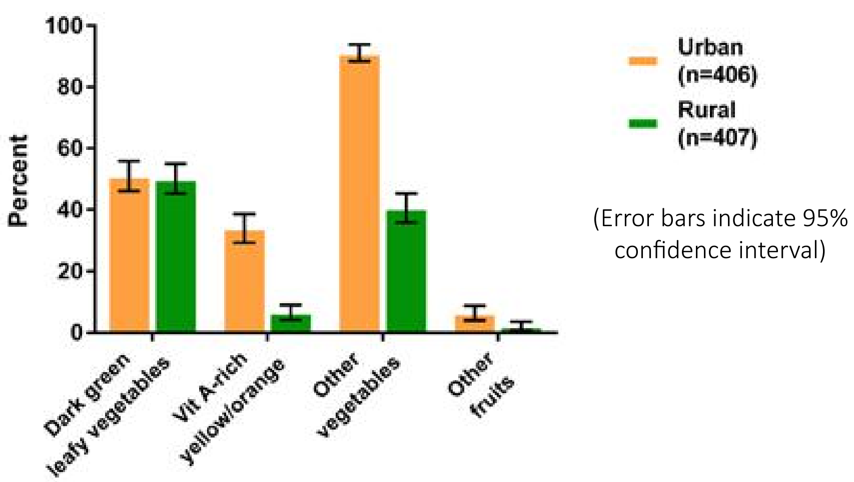
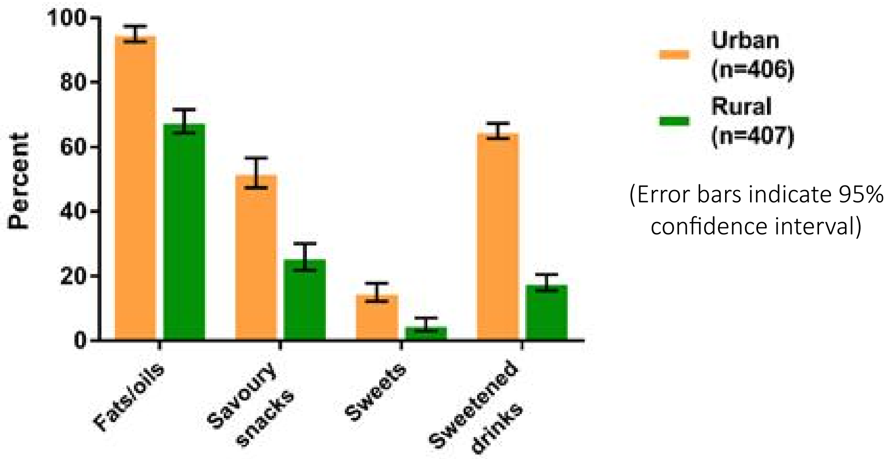


Figure 6. Percent consuming low nutrient density food groups yesterday[25]



The results shown in this section could also be presented in a tabular format.

The data from the MDD-W questionnaire also allow for a variety of context-specific descriptive analyses. For example, differences in food group consumption for those above or below the threshold can be explored and will vary by context. **Table 5** shows these differences in the same urban and rural sites used in the examples above.

Table 5. Percent consuming foods from various food groups yesterday, when above or below threshold of five food groups, by site[a]

	Rural		Urban	
	<5 groups	≥5 groups	<5 groups	≥5 groups
Pulses (beans, peas and lentils)	26	71	26	27
Nuts and seeds	52	100	18	66
Dairy	2	0	9	29
Meat, fish or poultry	14	38	58	90
Dark green leafy vegetables	49	71	32	73
Other vitamin A-rich fruits or vegetables	4	48	17	53
Other vegetables	40	57	88	94
Other fruit	1	19	2	12

a Starchy staples were consumed by 100 percent of women, and eggs were consumed by none in the rural site and by <1% of women in the urban site.

All data presentation choices will depend on the audience and objectives for presentation.

25 These data were not collected in the source data set used to construct other figures, so values are not real.

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Appendix 1. Sampling and design issues specific to measurement of Minimum Dietary Diversity for Women of Reproductive Age

There are numerous sampling, sample size and survey design decisions that depend on the objectives and context for data collection, but a general discussion of these issues is beyond the scope of this manual.

However, there are a few decisions specific to measurement of food group diversity for women of reproductive age (WRA), including selection of respondent(s) within the household, sampling of days of the week, sampling of "unusual" days (e.g. feasts) and issues related to seasonality.

Selection of respondent(s) within the household

There are two options for selection of respondent women within the household: selection of all age-eligible women or random selection of one age-eligible woman. Note that all age-eligible women include those considered to be living in the household, even if not present at the time the survey team visits.

Age

For both options, first screen women on age and select those who have reached their 15th birthday but who have not yet reached their 50th birthday. In cases where exact birth dates or ages are unknown, local calendars are sometimes used to help establish estimated ages[26].

Number of respondents

The decision on whether to include all women in the household or to randomly select one will depend on the broader sample design decisions.

Random selection of one of several women within a household requires use of appropriate sampling weights during analysis to avoid under-representation of women who live in larger households with multiple WRA. Calculation of sampling weights in turn requires information on the number of age-eligible women in the household.

Selection of all age-eligible women results in non-independent observations and this too must be handled appropriately during data analysis.

Either choice is valid, so long as analysis methods and inferences account correctly for this choice.

Sampling of days of the week

Every effort should be made to collect data on all days of the week. People may eat differently on different days of the week; this is part of the overall diet and part of the picture of diet quality at population level. If days of the week are represented with equal frequency in the data set, eating patterns will also be properly represented. If it is not possible to collect data on all days of the week, for example, for legal or cultural reasons associated with work on the Sabbath, it is still important to have data collection take place on the other 6 days.

26 See, for example: FAO. 2008. *Guidelines for Estimating the Month and Year of Birth of Young Children* (available at http://www.ifad.org/hfs/docs/guidelines.pdf). This document describes the use of local calendars.

Sampling “unusual” days

In general, there is no need to avoid using feast days, weddings or other celebration days as the day recalled by the respondent, for the same reason noted above in relation to sampling all days of the week. It is fine if some individuals in the sample have consumed more than usual, for one reason or another, on the day recalled. This is part of normal variation in intakes.

However, if a large proportion of a community has participated in a special feast or celebration, it is better not to visit (sample) that community the following day, as the recall day would be unusual for the entire community.

Ramadan presents a specific problem because of its duration and because eating patterns may be different for many or all members of the community as compared with all other times of year. Except in the context of surveys that are rolling or that sample the entire year, it is better to avoid fielding food group diversity surveys during Ramadan. If it is necessary to field during Ramadan, this should be considered during interpretation of results.

While certain days of the week and/or celebrations may entail increased and more varied intakes, intakes and variety may be lower than usual when people are ill. However, there is no need to avoid sampling or using data from days when respondents report that they had low appetite or illness on the day recalled. This too is part of normal variation in intakes within a population on any given day.

In summary, unusual intakes at the individual level are not a problem and should not be treated differently during data collection or analysis. However, when there is reason to believe intakes for an entire community or a large segment of the community would be highly unusual, it is better to avoid surveying at that time.

Seasonality

Diet patterns in many contexts vary with season. For example, mango season may strongly affect the proportion of women reporting consumption of vitamin A-rich fruits and thus may affect the proportion reaching the threshold of five or more food groups. Other seasonal foods may have less impact; for example, in some settings, types of green leafy vegetables vary with season, but one type or another is consumed year-round.

It is also possible for food group diversity to increase during lean/hunger seasons, when foraged foods may be consumed. These foods may add diversity, and even micronutrients, but in the context of inadequate caloric intakes. In this situation, an increase in diversity cannot be viewed in isolation.

Survey designers should consider seasonality when fielding and when interpreting results from food group diversity surveys. In particular, avoid direct comparisons between surveys conducted during different seasons, if it is apparent that seasonality could affect diversity in the context[27]. Similarly, avoid direct comparisons between surveys conducted in different geographic areas experiencing different seasons – for example, do not compare results from the hunger season in one zone to the post-harvest season in another, even if they occur in the same month.

Ideally, food group diversity indicators should not be compared unless there are rolling surveys covering all seasons or the indicators are generated from surveys carried out in the same season. When data and capacity allow (e.g. in research contexts), it is also possible to adjust for seasonality using the survey date and geographic positioning system data.

This challenge is not unique to data collection for the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) indicator; seasonality is an issue for many food security, health and nutrition indicators.

[27] The exception would be in research or other contexts where survey designers aim to capture and describe seasonal variation, as the topic of study.

Appendix 2. Guidance on assigning individual foods to food groups for Minimum Dietary Diversity for Women of Reproductive Age[28]

This appendix provides extensive examples for each of the rows on the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) model questionnaire in **Section 3** of the guide.

Fourteen groups (rows) on the questionnaire are used to construct the ten MDD-W food groups. Several of the MDD-W food groups are further divided on the questionnaire (e.g. meat and poultry are separated from fish and seafood). These 14 rows (A–N) are followed by 6 optional categories (rows O–T on the questionnaire) and two required final categories (row U, “Condiments and seasonings”, and row V, “Other beverages and foods”).

Examples are provided for rows A–V on the model questionnaire. At the end of this appendix, following the examples for row V, there is a table providing guidance on typical classification challenges.

Note that the row order differs in the alternative list-based questionnaire in **Appendix 3**. This is because when using the list-based method, it is necessary to consider how the order of the foods listed might influence responses to avoid double-counting of certain foods. This is not an issue in an open recall. See Appendix 3 for further explanation.

This appendix can be used during adaptation of the questionnaire.

When listing example items in each row of the questionnaire, use local names for foods. This is especially important for staple foods and other groups where the source ingredient typically undergoes processing (commercially or in the home). For example, rather than listing “wheat” on the questionnaire, list local food names, such as bread, chapatti, noodle, pasta, roti, seitan and/or wheat tortilla. Similarly, in the pulses group, be sure to list hummus, tofu and/or other locally consumed processed products made from pulses. In other food groups, food and ingredient names may be fine (e.g. most fruits and vegetables).

28 This section is adapted from: WHO. 2010. *Indicators for assessing infant and young child feeding practices Part 2: Measurement*. WHO: Geneva.

A. Foods made from grains

Include products and foods derived from cereal crops. Any staple dishes or products like breads *(e.g. bagels, rolls, chapatti, roti, tortillas*), porridge *(ugali, nsima/nshima, posho, sadza, mealies, dalia, muesli, papilla, grain fufu)* and noodles *(pasta, soba, spaghetti, vermicelli)* made from the grains listed below, and from flours of these grains, should be included in this category.

Sweet biscuits and cakes are **not** included and are classified with “Sweets” (category “S” below).

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Amaranth *(kiwicha)*	*Amaranthus*	Amaranthaceae	Seed
Barley	*Hordeum vulgare*	Poaceae	Seed
Buckwheat	*Fagopyrum esculentum*	Polygonaceae	Seed
Corn *(maize)*	*Zea mays*	Poaceae	Seed
Fonio	*Digitaria exilis*	Poaceae	Seed
Kamut	*Triticum turanicum*	Poaceae	Wheat-like seed
Millet	*Pennisetum typhoides*	Poaceae	Seed
Oats	*Avena sativa*	Poaceae	Seed
Palmer’s grass	*Distichlis palmeri*	Poaceae	Wheat-like seed
Qañiwa *(kañiwa, canihua)*	*Chenopodium pallidicaule*	Amaranthaceae	Seed
Quinoa *(quinua)*	*Chenopodium quinoa*	Amaranthaceae	Seed
Rice	*Oryza sativa*	Poaceae	Seed
Rye	*Secale cereale*	Poaceae	Seed
Sorghum	*Sorghum bicolour*	Poaceae	Seed
Spelt	*Triticum spelta*	Poaceae	Wheat-like seed
Teff	*Eragrastris albysinnica*	Poaceae	Seed
Triticale *(cross between wheat and rye)*	*Triticosecale*	Poaceae	Seed
Wheat	*Triticum*	Poaceae	Seed

B. White roots and tubers and plantains

Include non-coloured items mainly providing carbohydrate. This group includes all non-grain-based starchy staples. Any staple dishes/casseroles and pastes made from roots, tubers and plantains should also be included in this category.

Common name *(regional common names)*	***Binomial name OR genus***	**Family**	**Edible part of the plant**
Ahipa *(ajipa)*	*Pachyrhizus ahipa*	Fabaceae	Tuberous root
Arracacha *(racacha, white carrot)*	*Arracia xanthorhiza*	Apiaceae	Tuberous root
Arrowroot	*Maranta arundinacea*	Marantaceae	Rhizome
Bananas *(green/unripe)*	*Musa*	Musaceae	Starchy fruit
Breadfruit	*Artocarpus*	Moraceae	Starchy fruit
Burdock root	*Arctium lappa*	Asteraceae	Taproot
Canna lily *(achira)*	*Canna*	Cannaceae	Starchy rhizome
Cassava *(yucca, manioc, mandioca)*	*Manihot esculentum*	Euphorbiaceae	Tuberous root
Chicory root	*Cichorium intybus*	Asteraceae	Tuberous root
Elephant foot yam *(white)*	*Amorhophallus paeoniifoleus*	Araceae	Starchy corm
Jicama/Yambean	*Pachyorhizuserosus*	Fabaceae	Tuberous root
Lotus root	*Nelumbo nucifera*	Nelumbonaceae	Spongy root
Maca	*Lepidium meyenii*	Brassicaceae	Tuberous root
Mashwa *(mashua)*	*Tropaeolum tuberosum*	Tropaeolaceae	Stem tuber
Mauka	*Mirabilis longiflora*	Nyctaginaceae	Tuberous root
Nopal	*Opuntia*	Cactaceae	Succulent stem
Oca	*Oxalis tuberosa*	Oxalidaceae	Tuberous root
Parsnip	*Pastinacea sativa*	Apicaceae	Tuberous root
Plantains *(ripe and green)*	*Musa*	Musaceae	Starchy fruit
Potatoes *(all skin colours – white, yellow, blue, purple, black)*	*Solanum tubeosum*	Solanaceae	Stem tuber
Rutabaga	*Brassica napobrassica*	Brassicaceae	Tuberous root
Sweet potato *(white/pale yellow-fleshed)*	*Ipomoea batatas*	Convolvulaceae	Tuberous root
Tannia *(yautia)*	*Xanthosoma sagittifolium*	Araceae	Starchy corm
Taro root *(cocoyam, dasheen, eddo, tannia, colocasia, arbi/arvi)*	*Colocasia esculenta*	Araceae	Starchy corm
Turnip	*Brassica rapa*	Brassicaceae	Tuberous root
Ulloco *(melloco)*	*Ullucus tuberosus*	Chenopodiaceae	Stem tuber
Water chestnut	*Eleocharis dulcis*	Cyperaceae	Starchy corm
Yam	*Dioscorea*	Dioscoreaceae	Tuberous root

C. Pulses (beans, peas and lentils)

This group includes members of the plant family Fabaceae (alternate name Leguminoseae), including beans, peas and lentils. The seeds are harvested at maturity and dried and used as food or processed into a variety of food products. This group does not include the same plants harvested green/ immature and eaten fresh in the pod – these are included in the "Other vegetables" group (group "M"). It also does not include groundnut (peanut), because while groundnut is in the Fabaceae family, both its high fat content and most common culinary uses are different from other legumes and similar to those of tree nuts. Groundnut is included in the "Nuts and seeds" group (group "D").

The pulses group includes mature seeds (beans), sprouted pulses and processed/prepared products, such as hummus, tofu, tempeh, soy milk, soy cheese, texturized vegetable protein and other soy products and products of any of the pulses listed in the table.

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Adzuki bean	*Vigna angularis*	Fabaceae	Mature seed
Bambara groundnut *(jugo bean)*	*Vigna subterranea*	Fabaceae	Mature seed
Broad bean *(fava bean, faba bean, horse bean, field bean, tic bean)*	*Vicia faba*	Fabaceae	Mature seed
Chickpea *(chana dal)*	*Cicer arietinum*	Fabaceae	Mature seed
Cluster bean *(guar)*	*Cyamopsis tetragonoloba*	Fabaceae	Mature seed
Common bean *(black bean, kidney bean, pinto bean, others)*	*Phaseolus vulgaris*	Fabaceae	Mature seed
Coral bean *(Cherokee bean)*	*Erythrina herbacea*	Fabaceae	Mature seed
Cowpea *(black-eyed pea, catjang, yardlong bean, southern pea, zombi pea)*	*Vigna unguiculata*	Fabaceae	Mature seed
Horse gram	*Macrotyloma uniflorum*	Fabaceae	Mature seed
Hyacinth bean	*Lablab purpureus*	Fabaceae	Mature seed
Jack bean	*Canavalia*	Fabaceae	Mature seed
Lentil *(dal, pulses)*	*Lens culinaris*	Fabaceae	Mature seed
Lima bean	*Phaseolus limensis*	Fabaceae	Mature seed
Lupin *(lupini, tarwi, tarhui, chocho)*	*Lupinus sp.*	Fabaceae	Mature seed
Moth bean	*Vigna aconitifolia*	Fabaceae	Mature seed
Mung bean *(green gram)*	*Vigna radiata*	Fabaceae	Mature seed
Pea	*Pisum sativum*	Fabaceae	Mature seed
Pencil yam	*Vigna lanceolata*	Fabaceae	Mature seed
Pigeon pea	*Cajanus*	Fabaceae	Mature seed
Rice bean	*Vigna umbellata*	Fabaceae	Mature seed
Soybean *(soya bean)*	*Glycine max*	Fabaceae	Mature seed
Sweet pea	*Lathyrus odoratus*	Fabaceae	Mature seed
Urad bean *(black gram)*	*Vigna mungo*	Fabaceae	Mature seed
Velvet bean *(cowitch)*	*Mucuna pruriens*	Fabaceae	Mature seed
Winged bean *(Goa bean)*	*Psophocarpus tetragonolobus*	Fabaceae	Mature seed

D. Nuts and seeds

This group comprises mostly tree nuts but also includes groundnut (peanut) and may include certain seeds when consumed in substantial quantities. Defining “seeds” for inclusion in this category is challenging; see discussion below the table. In many cases, seeds should be included in category “U” (Condiments and seasonings).

This group also includes nut and seed “butters”, such as pounded groundnut/peanut butter, cashew butter or sesame butter (tahini) when consumed in substantial amounts and not merely added to flavour mixed dishes.

Note that oils extracted from nuts and seeds are **not** included in this group; they are included in “Other oils and fats” (category “Q”).

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Peanut/groundnut	*Arachis hypogaea*	Fabaceae	Pod/seed
Tree nuts			
Almond	*Prunus dulcis*	Rosaceae	Nut
Brazil nut	*Bertholletia excelsa*	Lecythidaceae	Nut
Cashew	*Anacardium occidentale*	Anacardiaceae	Nut
Chestnut	*Castanea*	Fagaceae	Nut
Filbert	*Corylus maxima*	Betulaceae	Nut
Hazelnut	*Corylus avellana*	Betulaceae	Nut
Macadamia nut	*Macadamia*	Proteaceae	Nut
Pecan	*Carya illinoinensis*	Juglandaceae	Nut
Pistachio	*Pistacia vera*	Anacardiaceae	Nut
Walnut	*Juglans*	Juglandaceae	Nut
Seeds			
Baobab seed *(monkey bread)*	*Adansonia*	Malvaceae	Seed
Chia seed	*Salvia hispanica*	Lamiaceae	Seed
Wild mango *(bush mango, dika, ogbono)*	*Irvingia gabonensis*	Irvingiaceae	Seed
Flaxseed	*Linum usitatissimum*	Linaceae	Seed
Hibiscus seed *(dried, may be fermented)*	*Hibiscus sabdariffa*	Malvaceae	Seed
Locust bean seeds *(néré; may be fermented; soumbala)*	*Parkia biglobosa*	Fabaceae	Seed
Melon seeds *(egusi)*	*Citrullus lanatus*	Cucurbitaceae	Seed
Pine nut *(piñon)*	*Pinus*	Pinaceae	Seed
Poppy seed	*Papaver somniferum*	Papaveraceae	Seed
Pumpkin seed *(pepita)*	*Cucurbita*	Cucurbitaceae	Seed
Sesame seed	*Sesamum indicum*	Pedaliacae	Seed
Shea butter seed/kernel	*Vitellaria paradoxa*	Sapotaceae	Seed
Sunflower seed	*Helianthus*	Asteraceae	Seed

Seeds

There are two issues in determining items to list as examples of seeds in row D of the questionnaire: the definition of seeds and the usual amount consumed.

In the botanical sense, seeds include a very broad range of items, including nuts, grains and legumes. But in culinary systems, there are usually a limited number of other seeds (i.e. not considered as nuts, grains or legumes), which are typically high in fat content and consumed as snacks or side dishes, in pastes, to season or garnish mixed dishes or to chew as a digestive.

For the purposes of this guide, the culinary definition of "seeds" excludes tree nuts, grains and legumes. A very wide range of seeds are foraged or cultivated and used in cuisines in many regions. It is not possible to provide a comprehensive list of seeds used as foods; the table above provides examples.

Because they are often consumed in very small quantities, most seeds should be listed on the questionnaire among the examples in the "Condiments and seasonings" row (category "U", below) of the questionnaire, not in the "Nuts and seeds" group, and enumerators should mark consumption in category "U".

However, seeds may be listed as examples in row D, "Nuts and seeds", if it is known that they are **usually** added as a substantial ingredient in local mixed dishes or if they are **usually** eaten as a substantial snack or side dish (see **Box 1** on page 13 for more detailed discussion of quantities). If there is uncertainty about quantities usually consumed, seeds should be classified with "Condiments and seasonings" to avoid inflating the proportion of women reported to consume this nutrient-dense food group.

The decision on where to place various types of seeds (and their products) on the questionnaire should be made during questionnaire adaptation.

E. Milk and milk products

This group includes almost all liquid and solid dairy products from cows, goats, buffalo, sheep or camels.

Milk and dairy products are often used as ingredients in mixed dishes or are added to other beverages. See **Boxes 1** and **3** (pages 13 and 21) for a discussion of ingredients used in mixed dishes. When milk or dairy products are added to mixed dishes, often the amount of dairy consumed in a serving of the mixed dish is small. Decisions on how to classify milk added in mixed dishes should be made during questionnaire adaptation. If there is uncertainty about quantities usually consumed, milk/dairy ingredients should **not** be classified in the "Milk and milk products" group (group "E") to avoid inflating the proportion of women reported to consume the nutrient-dense dairy group. Unless nutritionists involved in adaptation advise otherwise, classify as indicated here.

Items in this group include:

- Fresh whole, low-fat and skim milk when **drunk/consumed as such**
- Reconstituted powdered or evaporated milk or ultra-high temperature (UHT) (boxed) milk **consumed as such**
- Hard cheese (e.g. cheddar, mozzarella, Swiss, parmesan)
- Soft cheese (e.g. ricotta, cottage, paneer)
- Kefir
- Yoghurt/curd

Items **not** included in this group and classified into other categories:

- Butter, cream and sour cream: Classify with "Other oils and fats" (category "Q") because of their high fat content and most typical culinary uses.

- Cocoa drinks with milk: Classify with “Sugar-sweetened beverages” (category “T”).
- Ice cream: Classify with “Sweets” (category “S”).
- Processed/packaged yoghurt drinks: Classify with “Sugar-sweetened beverages” (category “T”), because these are usually high in sugar and low in dairy content.
- Sweetened condensed milk: Classify with “Sweets” (category “S”) if used as a food ingredient and with “Sugar-sweetened beverages” (category “T”) if diluted and consumed as a beverage.
- Tea or coffee with milk: Classify with “Other beverages and foods” (category “V”) if unsweetened and with “Sugar-sweetened beverages” (category “T”) if taken with sugar.

Note: The next three groups are separated into three rows on the questionnaire but are combined into one group for calculation of the MDD-W indicator.

F. Organ meat

This group includes different types of red organ meats that are usually rich in iron. Because of their high iron content, blood sausage and other blood products are also included.

- Blood sausage, other blood products
- Gizzard
- Heart
- Kidney
- Liver

Pale organ meats, such as tripe, are **not** included because the iron content is far lower. Tripe and other pale organ meat can be classified with “Meat and poultry” (group “G”).

G. Meat and poultry

All flesh meats from mammals, birds, reptiles and amphibians are included. Processed meats are also included.

- Beef, goat, lamb, mutton, pork, rabbit, yak, deer, antelope, buffalo or other large wild (bush meat) or domesticated mammals
- Tripe or other pale organ meats
- Cane rat, guinea pig, rat, agouti, opossum, cat, dog, anteater or other small wild (bush meat) or domesticated mammals
- Chicken, duck, goose, guinea fowl, turkey, pigeon or other wild or domesticated birds
- Crocodile, frog, snake and other reptiles and amphibians

There is increasing interest in and concern regarding consumption of red meat and processed meats (see, for example, Bouvard et al., 2015, and http://www.who.int/features/qa/cancer-red-meat/en/). In some settings, consumption of animal-source foods is very low, while in others it is consumed in excess of needs.

For the purposes of the MDD-W indicator, all flesh foods, including red meat and processed meat, are included in this group. However, in settings where there are public health concerns about excessive consumption and/or where processed meats are widely consumed, an additional row could be added to the questionnaire to disaggregate and capture descriptive information about specific types of meat of concern, i.e. to separate red meat and/or processed meat from other flesh foods.

H. Fish and seafood

This group includes fish and seafood from both marine and freshwater environments.

- Fresh, frozen or dried fish, large or small, all species
- Canned fish (e.g. anchovies, tuna and sardines)
- Clams, mussels, oysters and scallops (bivalves)
- Shrimp, lobster, crayfish and crabs (crustaceans)
- Edible sea urchins and sea cucumbers (echinoderms)
- Octopus, squid and cuttlefish
- Shark
- Whale

Fish roe and snails are **not** included and are classified with "Insects and other small protein foods" (category "O").

I. Eggs

This group includes all kinds of bird eggs.

- Chicken eggs
- Duck eggs
- Guinea fowl eggs
- Quail eggs

J. Dark green leafy vegetables

Essentially all medium-to-dark green leafy vegetables are vitamin A-rich (see **Box 2** on page 15 for criteria for classifying items as vitamin A-rich). Only very light leaves, such as iceberg lettuce, are not. Commonly consumed leaves include many wild and foraged species, as well as the green leaves of food crops. In the absence of information on nutrient content, wild/foraged leaves that are medium-to-dark green can be assumed to be vitamin A-rich and placed in this group.

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Alfalfa greens	*Medicago sativa*	Fabaceae	Leaves
Amaranth greens *(bugga, kiwicha, dodo)*	*Amaranthus*	Amaranthaceae	Leaves
Arugula *(rocket, rúcula, oruga)*	*Eruca sativa*	Brassicaceae	Leaves
Baobab greens	*Adansonia*	Malvaceae	Leaves
Bean greens	*Phaselus mungo*	Papilinaceae	Leaves
Beet greens *(Swiss chard, silverbeet, perpetual spinach, crab beet, mangold)*	*Beta vulgaris*	Chenopoidiaceae	Leaves
Bitter leaf *(ewuro, ndole, onugbu)*	*Vernonia calvoana*	Asteraceae	Leaves
Bitter melon greens	*Momordica charantia*	Cucurbitaceae	Leaves
Broccoli	*Brassica oleracea*	Brassicaceae	Leaves and head (flower buds)
Broccoli rabe *(rappi, broccoletti)*	*Brassica rapa*	Brassicaceae	Leaves
Carrot greens	*Daucus carota*	Umbelliferae	Leaves
Cassava greens	*Manihot esculenta*	Euphotbiaceae	Leaves
Chicory greens	*Cichorium intybus*	Asteraceae	Leaves
Chili greens	*Capsicum frutescens*	Solanaceae	Leaves

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Chinese cabbage *(bok choy, pak choy)*	*Brassica rapa*	Brassicaceae	Leaves
Collard greens *(Chinese kale, Chinese broccoli, gai-lan/kai-lan)*	*Brassica oleracea*	Brassicaceae	Leaves
Cowpea greens	*Vigna unguiculata*	Paplionaceae	Leaves
Dandelion greens	*Taravacum*	Asteraceae	Leaves
Drumstick greens *(moringa)*	*Moringa oleifera*	Moringaceae	Leaves
Endive	*Cichorium endivia*	Asteraceae	Leaves
Fenugreek greens *(methi)*	*Trigonella foenum*	Fabaceae	Leaves
Fiddlehead fern *(dod)*	*Pteridium aquilinum*	Dennstaedtiaceae	Leaves
Garden cress *(pepper grass)*	*Lepidium sativum*	Brassicaceae	Leaves
Kale *(spring greens)*	*Brassica oleracea*	Brassicaceae	Leaves
Lamb's quarters *(bathua)*	*Chenopodium alba*	Chenopodiaceae	Leaves
Lettuce *(bibb, romaine)*	*Lactuca sativa*	Asteraceae	Leaves
Malva greens *(mallow)*	*Malva vertcillata*	Malvaceae	Leaves
Mustard greens	*Sinapsis alba*	Brassicaceae	Leaves
Okra greens *(lady's finger, gumbo)*	*Abelmoschus esculentus*	Malvaceae	Leaves
Pumpkin greens	*Cucurbeta pepo*	Cucurbitaceae	Leaves
Purslane	*Portulaca oleracea*	Portlacaceae	Leaves
Quinoa greens *(quinua)*	*Chenopodium quinoa*	Amaranthaceae	Leaves
Spinach	*Spinous oleracea*	Amaranthaceae	Leaves
Sweet potato leaves	*Ipomoea batatas*	Convolvulaceae	Leaves
Tannia greens	*Xanthosoma*	Araceae	Leaves
Taro greens	*Colocasia esculenta*	Araceae	Leaves
Turnip greens	*Brassica rapa*	Brassicaceae	Leaves
Watercress	*Nasturtium officinale*	Brassicaceae	Leaves
Water spinach *(swamp cabbage, water morning-glory, kangkung, kang kung)*	*Ipoemoea aquatica*	Convolvulaceae	Leaves
Yau choy	*Brassica napus*	Brassicaceae	Leaves

Note: The next two groups ("Vitamin A-rich vegetables, roots and tubers" and "Vitamin A-rich fruits") are separated into two rows on the questionnaire but are combined into one group for calculation of the MDD-W indicator.

K. Vitamin A-rich vegetables, roots and tubers

Include only roots, tubers and other red/yellow/orange vegetables that are sources of vitamin A (see **Box 2** on page 15). Several items that are botanically fruits but are typically used as vegetables for culinary purposes are included here.

Common name	*Binomial name OR genus*	Family	Edible part of the plant
Carrot	*Daucus carota*	Umbelliferae	Tuberous root
Pumpkin	*Cucurbita pepo*	Cucurbitaceae	Fruit
Red pepper *(sweet)*	*Capsicum annuum*	Solanaceae	Fruit
Squash *(orange- or dark yellow-fleshed only)*	*Cucurbita*	Cucurbitaceae	Fruit
Sweet potato *(orange- or dark yellow-fleshed only)*	*Ipomoea batatas*	Convolvulaceae	Tuberous root

L. Vitamin A-rich fruits

In addition to the examples in the table below, include any other locally available dark yellow or orange fruits that are sources of vitamin A (see **Box 2**).

Note: Certain fruits (e.g. mango and papaya) are high in vitamin A when ripe, but not when eaten "green" or unripe. When they are eaten "green" (unripe), mango and papaya should be classified with "Other fruits" (group "N"). If appropriate, these fruits should be listed as "ripe" in this row of the questionnaire and as "green" in the "Other fruits" row. In this situation, enumerators should be trained on this point.

Certain varieties of ripe, deep yellow- or orange-fleshed bananas are also rich in vitamin A, but white/cream-fleshed bananas are not. Deep yellow- and orange-fleshed bananas may be classified with vitamin A-rich fruits when their high vitamin A content is known to survey planners **and** it is considered feasible to distinguish bananas by colour during fieldwork. Otherwise, all bananas should be classified with "Other fruits" (group "N"), to avoid inflating the proportion of women reported to consume vitamin A-rich foods.

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Apricot *(fresh and dried)*	*Prunus armeniaca*	Rosaceae	Fruit
Cantaloupe melon *(ripe)*	*Cucumis melo*	Cucurbitaceae	Fruit
Hog plum	*Spondias mombin*	Anacardiaceae	Fruit
Locust bean fruit/pulp	*Parkia biglobosa*	Fabaceae	Fruit
Loquat	*Eriobotrya japonica*	Rosaceae	Fruit
Mango *(ripe, fresh and dried)*	*Mangifera indica*	Anacardiaceae	Fruit
Musk melon	*Cucumis melo*	Cucurbitaceae	Fruit
Papaya *(ripe, fresh and dried)*	*Carica papaya*	Caricaceae	Fruit
Passion fruit *(ripe)*	*Passiflora edulis*	Passifloraceae	Fruit
Peaches *(dried or raw)*	*Prunus persica*	Rosaceae	Fruit
Persimmon *(ripe)*	*Diospyros kaki*	Ebenaceae	Fruit
Pitanga *(Surinam cherry, Brazilian cherry)*	*Eugenia uniflora*	Myrtaceae	Fruit
Red palm fruit, red palm pulp	*Elaeis guineensis*	Arecaceae	Fruit
Tree tomato *(tamarillo)*	*Solanum betaceum*	Solanaceae	Fruit

M. Other vegetables

In general, the "Other vegetables" group follows the culinary definition of a vegetable and not the botanical definition. It includes stems, fruits and flowers of plants when generally consumed in savoury dishes and considered as vegetables in culinary systems. So, for example, cucumber, tomato and okra (all fruits in botanical terms) are included as "Other vegetables".

This group includes legumes when the fresh/green pod is consumed (as in fresh peas, snow peas, snap peas or green beans).

This group does **not** include high-carbohydrate "starchy" roots and tubers, such as white potatoes, white yams, cassava and cocoyam, which are classified in the "White roots and tubers and plantains" group (group "B").

As with dark green leafy vegetables, commonly consumed vegetables vary widely with geography and can include foraged as well as cultivated foods. The following table provides a long list of examples, but other local vegetables can also be classified in this group.

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Artichoke	*Cynara cardumculus*	Asteraceae	Fleshy bracts
Asparagus	*Asparagus officinales*	Asparagaceae	Young shoots
Bamboo shoots	*Bambusavulgaris*	Poaceae	Young stem
Beans (various) when eaten as fresh pods[a]	*Phaseolus, others*	Fabaceae	Young pod
Beets	*Beta vulgaris*	Chenopodiaceae	Root
Bitter melon	*Momordica charantia*	Cucurbitaceae	Fruit
Brussels sprouts	*Brassica oleracea*	Brassicaceae	Fleshy bracts
Cabbage *(common and red varieties)*	*Brassica oleracea*	Brassicaceae	Leaves
Caigua *(caihua, slipper gourd)*	*Cyclanthera pedata*	Cucurbitaceae	Fruit
Cattail	*Typha*	Typhaceae	Rhizome
Cauliflower	*Brassica oleracea*	Brassicaceae	Head (thalamus and flower buds)
Celery	*Apium graveolens*	Apiaceae	Leaf stalk
Ceylon spinach	*Basella alba*	Basellaceae	Succulent leaves
Chayote *(sayote, tayota, choko, chocho, chow-chow, christophine)*	*Sechium edule*	Cucurbitaceae	Fruit
Corn *(fresh, not dried/flour/meal) (green maize)*	*Zea mays*	Poaceae	Corn cobs, kernels
Cucumbers	*Cucurbita Species*	Cucurbitaceae	Fruit
Eggplant *(aubergine, brinjal)*	*Solanum melongena*	Solanaceae	Fleshy fruit
Fennel	*Foeniculum vulgare*	Apiaceae	Bulb, stem, leaves
Green pepper	*Capsicum annum*	Solanaceae	Fruit
Jicama *(yam bean)*	*Pachyrhizus erosus*	Fabaceae	Tuberous root
Kohlrabi *(German turnip)*	*Brassica oleracea*	Brassicaceae	Stem
Leek	*Allium ampeloprasum*	Alliaceae	Stem/leaf sheaths
Lettuce *(light green)*	*Lactuca sativa*	Asteraceae	Leaves
Luffa *(rigged gourd)*	*Luffa acutangula*	Cucurbitaceae	Fruit
Mushroom	*Agaricus bisporus*	Agaricaceae	Stem and cap
Nakati *(mock tomato)*	*Solanum aethiopicum*	Solanaceae	Leaves
Okra	*Abelmoschus esculentus*	Malvaceae	Green fruit
Onion	*Alleum cepa*	Liliaceae	Bulb
Palm hearts *(palmito, chonta, swamp cabbage)*	*Bactris gasipaes*	Arecaceae	Inner core
Parwal *(pointed gourd)*	*Trichosanthes dioica*	Cucurbitaceae	Fruit
Peas, green, when eaten as fresh pod	*Pisum sativum*	Fabaceae	Young pod
Radish	*Raphanus sativus*	Brassicaceae	Tuberous root
Snake gourd *(serpent gourd, chichinga, and padwal)*	*Trichosanthes cucumerina*	Cucurbitaceae	Fruit
Squash *(summer and other light-coloured squash)*	*Cucurbita maxima*	Cucurbitaceae	Fruit
Tomatillo	*Physalis philadelphica*	Solanaceae	Fruit
Tomato	*Solanum lycopersicum*	Solanaceae	Fruit
Winter melon *(white gourd, ash gourd)*	*Benincasa hispida*	Cucurbitaceae	Fruit
Zucchini	*Cucurbita pepo*	Cucurbitaceae	Fruit

[a] Various varieties of young bean pods are eaten as vegetables; please refer to the "Pulses (beans, peas and lentils)" group (group "C") for a list of many varieties. All the varieties of bean consumed as a young pod should be included in this category. When only mature seeds are eaten (fresh or dried), they should be listed under group "C".

N. Other fruits

This group includes most fruits, excluding vitamin A-rich fruits (group "L") and starchy fruits, such as plantain (group "B"). As with "Other vegetables", this group follows the culinary definition of fruits and so does not include tomatoes, etc., as explained above. As with vegetables, commonly consumed fruits vary widely with geography and can include foraged as well as cultivated fruits.

This group includes fresh and dried fruits but does **not** include sugar-sweetened processed fruit products; these should be classified with "Sweets" (category "S") or sugar-sweetened beverages (category "T").

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Acerola *(West Indian cherry)*	*Malpighia glabra*	Malpighiaceae	Fruit
Apple	*Malus domestica*	Rosaceae	Fruit
Avocado	*Persea americana*	Lauraceae	Fruit
Banana	*Musa indica*	Musaceae	Fruit
Baobab fruit *(monkey bread)*	*Adansonia*	Malvaceae	Fruit
Blackberry	*Rubus fruticosus*	Rosaceae	Fruit
Black current	*Ribes nigrum*	Grassulariaceae	Fruit
Blueberry	*Vaccinium*	Ericaceae	Fruit
Cactus pear	*Opuntia*	Cactaceae	Succulent stem
Cape gooseberry *(ground cherry, golden berry)*	*Physalis peruviana*	Solanaceae	Fruit
Cashew fruit *(cashew apple, tupi)*	*Anacardium occidentale*	Anacardiaceae	Fruit
Cherries *(cornelian)*	*Corneus*	Cornaceae	Fruit
Coconut flesh	*Cocos nucifera*	Arecaceae	Fruit
Cranberry	*Vaccinium*	Ericaceae	Fruit
Dates *(fresh and dried)*	*Phoenix dactyfera*	Arecaceae	Fruit
Durian	*Durio*	Malvaceae	Fruit
Elderberry	*Sambucus*	Adoxaceae	Fruit
Figs *(sycamore)*	*Ficus*	Moraceae	Fruit
Gooseberry	*Ribes species*	Grassulariaceae	Fruit
Grapefruit	*Citrus paradisi*	Rutaceae	Fruit
Grapes	*Vitis*	Vitaceae	Fruit
Guava	*Psidum*	Myrtaceae	Fruit
Guinep *(chenette, genip)*	*Mamoncillo/Mellicoccus*	Sapindaceae	Fruit
Honeydew melon	*Cucunis melo*	Cucurbitaceae	Fruit
Huckleberry	*Vaccinium*	Ericaceae	Fruit
Indian gooseberry *(amla)*	*Ribes crispa*	Saxifragales	Fruit
Jackfruit *(kathal)*	*Artocarpus heterophyllus*	Moraceae	Fruit
Jujube	*Ziziphus jujuba*	Rhamnaceae	Fruit
June plum *(Jew plum, golden apple)*	*Spondias dulcis*	Anacardiaceae	Fruit
Kiwi	*Actinidia deliciosa*	Actinidiaceae	Fruit
Lemon	*Citrus limon*	Rutaceae	Fruit
Lime	*Citrus aurantifolia*	Rutaceae	Fruit
Litchi	*Litchi chinensis*	Sapindaceae	Fruit
Mandarin orange	*Citrus reticulate*	Rutaceae	Fruit

Common name *(regional common names)*	*Binomial name OR genus*	Family	Edible part of the plant
Mulberry	*Morus nigra*	Moraceae	Fruit
Nectarine	*Prunus persica*	Rosaceae	Fruit
Orange	*Citrus sinesis*	Rutaceae	Fruit
Peach	*Prunus persica*	Rosaceae	Fruit
Pear	*Pyrus communis*	Rosaceae	Fruit
Pineapple	*Ananas*	Bomeliaceae	Fruit
Plum	*Prunus*	Rosaceae	Fruit
Pomegranate *(anar)*	*Punica granatum*	Luthraceae	Fruit
Pomelo	*Citrus grandis*	Rutaceae	Fruit
Pomerac *(Malay apple)*	*Syzigium malaccense*	Myrtaceae	Fruit
Prune	*Prunus domesticus*	Rosaceae	Fruit
Quince	*Cydonia oblongata*	Rosaceae	Fruit
Rambutan	*Nephelium lappaceum*	Sapindaceae	Fruit
Raspberry	*Rubus*	Rosaceae	Fruit
Sapodella *(naseberry)*	*Manikara zapota*	Sapotaceae	Fruit
Soursop *(guanábana, graviola)*	*Annona muricata*	Annonaceae	Fruit
Star fruit *(kamrakh)*	*Averrhoa*	Oxalidaceae	Fruit
Strawberry	*Prunus*	Rosaceae	Fruit
Sweetsop *(sugar apple, custard apple)*	*Annona squamosa*	Annonaceae	Fruit
Tamarind	*Tamarindus indica*	Caesalpinioideae	Fruit
Tangerine	*Citrus tangerina*	Rutaceae	Fruit
Watermelon	*Citrullus lanatus*	Cucurbitaceae	Fruit
Yacon	*Smallanthus sonchifolius*	Asteraceae	Fruit

Note: The next six categories are optional food categories. A decision on including these categories should be taken by survey designers early in the adaptation process (see Section 4).

O. Insects and other small protein foods

This group includes a very wide variety of insects and other small protein foods. With an estimate of more than 2,000 insect species alone (Rumpold and Schlüter, 2013), it is not possible to provide a comprehensive list.

Items in this group include:

- Fish roe
- Insects
- Insect eggs
- Insect larvae/grubs
- Snails
- Spiders
- Any other small invertebrates

This category does **not** include frogs, snakes or other reptiles and amphibians, which are included in the “Meat and poultry” group (group “G”).

If these foods are not eaten or are considered very rare throughout the survey area, this category does not need to be included on the questionnaire.

P. Red palm oil

This category includes only red palm oil, which is usually consumed as an ingredient in mixed dishes. Note that the oily red palm fruit is classified with "Vitamin A-rich fruits" (group "L"). In areas where grown, the oil and/or the oily fruit may be consumed, depending on the particular mixed dish.

If red palm oil is not available, not consumed or considered very rare throughout the survey area, this category does not need to be included on the questionnaire.

Q. Other oils and fats

This category includes all solid and liquid oils and fats other than red palm oil, including those of plant or animal origin:

- Butter
- Cream
- Ghee
- Lard, suet, tallow (animal fats)
- Margarine, shortening (hydrogenated vegetable oil)
- Mayonnaise
- Palm oil (not red palm oil)
- Sour cream
- Vegetable/fruit/nut/seed oils (e.g. oils made from canola, coconut, cottonseed, groundnut, maize, olives, rapeseed, safflower, sesame, soybean, sunflowers and walnuts)
- Any other oil extracted from a nut, seed or grain

Note: In many surveys, some or all of the respondents will not know the type of oil consumed. Labelling is insufficient and/or oils are locally produced, unlabelled or repackaged into unlabelled container or sachets. Oils can still be classified into this category as "Other oil or fat".

R. Savoury and fried snacks

This optional category will include different foods in different settings. There is currently no consensus and no standard approach to data collection on this category of food. However, there is growing interest in gathering information on nutrient-poor and/or energy-dense foods that are often consumed as snacks. This category includes highly processed commercial products but also a variety of processed "street foods".

Examples include:

- Cassava chips, fried cassava balls, other cassava-based fried snacks
- Corn/maize chips/fried tortilla strips
- Crisps
- Potato chips
- Sweet potato chips
- Puffs (cheese puffs, corn/maize puffs, other "puffs")
- Doughnuts/fried dough/"fry bread"
- Samosas
- Other deep-fried, mainly carbohydrate, snack foods

Note: Some of these items (e.g. samosas) may include small amounts of meat or vegetables but are high in fat and simple carbohydrate and often may be high in sodium as well.

Other fried foods, such as fried potatoes and fried plantains, which may be consumed as meals or snacks, are classified with roots and tubers (group "B") because in some settings potatoes or plantains are staple foods and classifying them with snacks might mean there would be no staple food in the count. This could result in a false "deflation" of food group diversity. Depending on their role in local diets, survey objectives and the likelihood of this false deflation, survey designers could choose to also classify fried potatoes, fried plantains and similar food in the "Savoury and fried snacks" category.

S. Sweets

As with category "R", there is no consensus and no standard approach to data collection on "sweets", but there is interest in capturing descriptive information on consumption. This category includes highly processed commercial products but also a variety of locally produced and processed snacks and "street foods".

Include all food items with a high content of different sweetening agents (e.g. sugar, corn syrup, other syrup, honey, molasses or jaggery), such as:

- Baklava
- Biscuits (sweet)
- Cakes
- Candies (hard candies, toffees, "milk toffees" or candies made with sweetened condensed milk, any other candies)
- Chocolates
- Coconut candies and sweet biscuits, and other sweetened coconut snacks
- Cookies
- Frozen custard/frozen yoghurt
- Fruit canned in sugar syrup
- Fruit "gummy" candies, fruit "leathers"
- Ice cream
- Halwa
- Honey
- Jam
- Marmalade
- Pastries (sweet, fried or baked)
- Pie
- Sesame seed candies
- Sweetened condensed milk
- Any other sweets

T. Sugar-sweetened beverages

This category includes all sugar-sweetened beverages, with any/all other ingredients. Examples include:

- Chocolate drinks, fortified and unfortified, both pre-packaged fluid drinks and powders
- Coffee with sugar
- "Energy drinks"
- Fruit drinks, sweetened fruit juices
- Malt drinks, fortified and unfortified
- Soft drinks/sodas/carbonated or "fizzy drinks", including colas, fruit flavours and other flavours
- Tea with sugar
- Any other drink sweetened with sugar, corn syrup, honey or other sweetener

Note: Include sweet drinks here even if they have some dairy content.

Note: The next and final two categories are REQUIRED food categories.

U. Condiments and seasonings

This category includes all minor ingredients in mixed dishes, which primarily provide flavour and would be consumed in very small amounts in any individual serving of the dish. It includes items added at any stage of cooking or when serving food (e.g. garnishes sprinkled on top of a dish to add flavour or visual appeal).

It is not possible to provide a complete listing of such items globally, but the examples listed here should help guide users in populating this category:

- Bean paste, fermented bean paste
- Bouillon cubes, flavour cubes
- Chili peppers (hot)
- Chives
- Dried soup seasoning packets
- Fish powder
- Fish sauce
- Garlic
- Ginger root
- Horseradish
- Herbs, dried and fresh, all types
- Ketchup (“catsup”)
- Lemon or lime or other juice, added to “bring up flavour” of mixed dishes
- Monosodium glutamate (MSG) and flavour products made with MSG
- Mustard
- Pepper sauce
- Seeds or seed pastes, when used to flavour or garnish a dish (see list of seeds in “Nuts and seeds”, group “D”)
- Soy sauce, tamari
- Spices, dried and fresh, all types
- Sugar, when added to flavour a mixed dish
- Tomato paste
- Any other seasoning or flavouring added during cooking
- Any garnish added at the end of cooking or when serving (e.g. grated cheese, grated vegetable, seeds or legumes)

V. Other beverages and foods

This miscellaneous category includes all food and beverage items not in groups "A"–"U". When survey designers choose not to include any or all of the six optional categories (categories "O"–"T"), then examples from those categories should also be listed in the questionnaire row in this category, so that enumerators know where to mark those foods (e.g. insects, fats and oil, savoury snacks, sweets and sugar-sweetened beverages).

Items always categorised here include:

- Alcohol, all types
- Chutney or pickle (British)
- Clear broth, soup broth
- Coffee, with or without milk, if unsweetened
- Herbal beverages/infusions
- Olives
- Pickled cucumbers
- Tea, with or without milk, if unsweetened
- Any other food or beverage not included in previous groups/categories

Note: Olives and pickles are listed here because they are usually consumed in small quantities, to the side of or to accent main dishes. Even if eaten in larger quantities, because olives and pickles are usually high in sodium, they are not similar to other fruits and vegetables. Chutney or pickle (British) is also eaten to the side or as a garnish. All these items could also be classified as "Condiments or seasonings" if that is a better fit locally. In either case, they should not be classified into an MDD-W food group.

Classification challenges

Table A2-1 presents some food classification challenges. While there are no perfect solutions to some challenges, standardisation in classification can help ensure comparability between surveys, and in general we recommend a standard approach to these difficult choices. Three types of items present challenges or uncertainties: items that are unusual for a group (e.g. several high-fat fruits), items that contain multiple ingredients but that are considered a single food (e.g. bread) and items that are often consumed in small quantities.

The classification decisions in this table follow two principles. When necessary:

- Err on the side of not falsely inflating food group diversity
- Err on the side of simplicity when a single ingredient usually dominates in a food or is most likely to dominate in lower-cost versions of the food

Table A2-1. How to classify problem foods

Problem foods	Questionnaire category and comments
Avocado	"Other fruits"
Biofortified foods	Classify as a "natural" food and, if desired, design additional questions to capture information on consumption of biofortified crops or varieties. For example, biofortified maize should be classified with "Foods made from grains" for the purposes of Minimum Dietary Diversity for Women of Reproductive Age (MDD-W).
Blended fortified foods, such as corn-soy blend, wheat-soy blend, donated commodities or local blends/fortified cereals	Classify with main ingredient (usually grain). It is also advisable to add separate questions to capture coverage of fortified foods if this is of interest to the survey designers.
Bread	"Foods made from grains"
Chili peppers, red and green	"Condiments and seasonings"
Clear broth	"Other beverages and foods"
Coconut flesh	"Other fruits"
Coconut milk[a]	"Condiments and seasonings" or "Other oils and fats"
Coconut water	"Other beverages and foods"
Coffee, sweetened, with or without milk or cream	"Sugar-sweetened beverages". Though the amount of milk or cream can vary and be high, very often it is not, and this classification is intended to avoid the risk of falsely inflating the proportion of women reported to consume the nutrient-dense dairy group.
Coffee, unsweetened, with or without milk or cream	"Other beverages and foods". Rationale as above.
Doughnuts (fried dough)	"Savoury and fried snacks"
Dried soup seasoning packets	"Condiments and seasonings". These may be rehydrated and consumed as a main dish in a meal, but are not very different nutritionally from bouillon cubes. They are typically high in sodium and, if they contain dried vegetables, the amounts are typically very small, particularly for lower-cost products.
Fish powder	"Condiments and seasonings"
Fortified foods and products	Classify as if unfortified and, if desired, design additional questions to capture information on consumption of fortified foods or products. For example, fortified oil should be classified with "Other oils and fats".
Fruit juices (100% fruit)	If it is known that 100% fruit juice is commonly consumed **and** if survey designers consider it is feasible to train enumerators to probe and distinguish this from sugar-sweetened juice, this can be placed in the "Other vitamin A-rich fruits and vegetables" (e.g. mango juice) or "Other fruits" group, depending on the type of fruit. If this is not certain or not feasible, all juices should be placed in the "Sugar-sweetened beverages" category.
Fruits, canned with sugar syrup	"Sweets"
Garlic	"Condiments and seasonings"
Herbs	"Condiments and seasonings"

[a] This food is not part of any of the MDD-W groups, so this classification choice does not affect the indicator. In some areas (particularly poor rural areas), coconut milk may be the predominant fat source in the diet, and there may be an interest in including this in the "Other oils and fats" category. In other areas, particularly where coconut milk is typically made very thin with water, it is more appropriate to consider in the "Condiments and seasonings" category.

Problem foods	Questionnaire category and comments
Olives	"Other beverages and foods"
Palm fruit	"Other vitamin A-rich fruits and vegetables". Note that this may be referred to as "palm nut" in some cuisines because the entire pulp-covered kernel is cooked in stews. It is the oily flesh/pulp of the fruit that is high in vitamin A.
Pastries, sweet breads	"Sweets"
Pickles	"Other beverages and foods"
Ready-to-use therapeutic food, ready-to-use supplementary food	These specialised products are sometimes distributed to women of reproductive age, particularly during pregnancy. Classify based on main ingredient. Often this is peanut (so classify with "Nuts and seeds"), but it may be a pulse. It is also advisable to add separate questions to capture coverage of these specialised products, if this is of interest to survey designers.
Samosas and similar savoury fried pastries	"Savoury and fried snacks"
Seaweed	"Other vegetables". Most species/varieties are not vitamin A-rich, but a few are. If a locally consumed type of seaweed is known to be vitamin A-rich (defined as ≥120 RE[b]/100 g, in form as eaten), it can be classified with "Dark green leafy vegetables".
Snails	"Insects and other small protein foods"
Street foods/other mixed foods prepared outside the home	Probe for main ingredients and record as for mixed dishes. If mainly one ingredient, place in category for main ingredient (e.g. porridges, rice dishes in "Foods made from grain"). If fried snacks, place in category for "Savoury and fried snacks".
Sugar added to mixed dishes	"Condiments and seasonings". The questionnaire is not designed to capture total intake of free sugars. This is not feasible in a simple food group recall. It does capture prevalence of consumption of two categories of interest: sugar-sweetened beverages and items that are commonly considered as sweets (cakes, candies, etc.).
Sweetened condensed milk	"Sweets" if boiled and served as a sweet; "Sugar-sweetened beverages" if diluted and consumed as a drink.
Sweet drinks with milk (e.g. drinks made with milk and chocolate powder, including fortified powders; sweet tea or coffee with milk)	"Sugar-sweetened beverages". Though such drinks will provide varying amounts of dairy, they are classified as sugar-sweetened beverages to avoid the risk of falsely inflating the proportion of women reported to consume the nutrient-dense dairy group because often the amount of dairy is small.
Tea, sweetened, with or without milk	"Sugar-sweetened beverages". Rationale as for coffee.
Tea, unsweetened, with or without milk	"Other beverages and foods". Rationale as above.
Tomato paste	"Condiments and seasonings"
Vegetable juices (100%)	The issue is the same as for fruit juices. If 100% vegetable juice is commonly consumed **and** survey designers consider it is feasible to train enumerators to probe and distinguish this from sugar-sweetened juice, this can be placed in the "Other vitamin A-rich fruits and vegetables" (e.g. carrot juice) or "Other vegetables" group, depending on the type of vegetable. If this is not certain or not feasible, all juices should be placed in the "Sugar-sweetened beverages" category.

[b] RE = retinol equivalents

Appendix 3. Alternative method for collecting information on food groups consumed – the list-based method

The Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) guide to measurement details how to collect food group dietary diversity information from women of reproductive age (WRA) in a survey using an open recall. This appendix describes an alternative method for gathering information about foods consumed when it is not practical to carry out an open recall.

The open recall elicits information by guiding the respondent through an "open recall" of foods and beverages consumed the previous day and night. The recall is organized by time (starting the previous morning) and is intuitive for respondents.

The alternative "list-based" method instead asks the respondent to report if she has consumed any foods during the previous day and night from each of the food categories. The enumerator reads out loud a list of example food items for each category (as written in the "description/examples" column of the questionnaire). The respondent must mentally shift back and forth in time and mentally "decompose" mixed dishes to respond correctly when lists of foods, in groups, are read to her.

Additional advantages and disadvantages of the open recall and list-based methods are described in detail in **Section 1** of this guide (see **Table 2** on page 7).

In summary, the open recall makes fewer cognitive demands on the respondent and for this reason may result in more accurate recalls. However, correct administration of an open recall requires more enumerator capacity and training. The time required for administering each type of questionnaire varies depending on the complexity of the local diet. The open recall tends to be less tedious for enumerators and respondents.

The alternative MDD-W model questionnaire to use for the list-based method is shown below, along with suggested enumerator instructions and text to read to the respondent.

Order of food groups/categories

Note that the order of the food group categories in this version differs from the MDD-W model questionnaire presented in **Section 3** of this guide. This is to avoid the situation where a respondent replies "yes" to the roots and tubers question when she has in fact consumed a vitamin A-rich orange- or yellow-fleshed sweet potato. By placing the "special" category of orange-fleshed roots, tubers and vegetables before the general category of roots and tubers, this problem is avoided. The other vegetable categories are also moved up in the sequence to avoid a gap in time before querying about "other" vegetables. This aims to avoid the possibility of double-counting items like carrots and orange-flesh sweet potatoes (i.e. having the respondent say "yes" for both categories when only one item, such as carrot, was consumed).

Changing the number of rows on the list-based questionnaire

In the list-based method, unlike in the open recall, responses and the resulting "count" of food groups are influenced by the total number of categories and by the choices made in disaggregating categories. In general, the larger the number of questions (rows) on a list-based questionnaire, the larger the number of "yes" responses, which in some cases leads to a higher count among the ten MDD-W food groups.

Ideally if users wish to compare across time or space, the list-based questionnaires should remain the same/have the same number of questions. However, it is allowable to add questions to capture information about one or several specific, targeted food items, but additions should be few and made thoughtfully to avoid biases in responses and in the constructed indicator.

Other steps in questionnaire adaptation

Please note that the steps described in **Section 4** for adapting the food lists should also be taken when using the list-based method.

MDD-W alternative questionnaire using a list-based data collection method

Enumerator instructions

Begin by reading the introductory portion of the questionnaire slowly, emphasising that the question concerns what the woman drank or ate yesterday during both the day and night. Then ask about each of the food group categories and provide examples of foods belonging to them in the order that they appear in the questionnaire. Mark ‘1’ for “yes” if any item in a category was consumed and “no” if the woman reports she did not consume items in the category.

The following script can be included on the questionnaire or on a job aid/guidance sheet to be carried by the enumerator.

To be read to the respondent:

> *Now I’d like to ask you about foods and drinks that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else.*
>
> *I am interested in whether you had the food items I will mention even if they were combined with other foods. For example, if you had a soup made with carrots, potatoes and meat, you should reply “yes” for each of these ingredients when I read you the list. However, if you consumed only the broth of a soup, but not the meat or vegetable, do not say “yes” for the meat or vegetable.*
>
> *As I ask you about foods and drinks, please think of foods and drinks you had as snacks or small meals as well as during any main meals. Please also remember foods you may have eaten while preparing meals or preparing food for others.*
>
> *Please do not include any food used in a small amount for seasoning or condiments (like chilies, spices, herbs or fish powder). I will ask you about those foods separately.*

Model list-based questionnaire

Yesterday during the day or at night, did you eat or drink:

	Food categories	**Description/examples to be adapted** Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	**Consumed** Yes = 1 No = 0
A	**Any foods made from grains, like:**	*Porridge, bread, rice, pasta/noodles or other foods made from grains*	___ yes (1) ___ no (0)
B	**Any vegetables or roots that are orange-coloured inside, like:**	*Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside [see **Appendix 2** for other less-common vitamin A-rich vegetables]*	___ yes (1) ___ no (0)
C	**Any white roots and tubers or plantains, such as:**	*White potatoes, white yams, manioc/cassava/yucca, cocoyam, taro or any other foods made from white-fleshed roots or tubers, or plantains*	___ yes (1) ___ no (0)
D	**Any dark green leafy vegetables, such as:**	*List examples of any medium-to-dark green leafy vegetables, including wild/foraged leaves*	___ yes (1) ___ no (0)
E	**Any fruits that are dark yellow or orange inside, like:**	*Ripe mango, ripe papaya [see **Appendix 2** for other less-common vitamin A-rich fruits]*	___ yes (1) ___ no (0)
F	**Any other fruits**	*List examples of any other fruits*	___ yes (1) ___ no (0)
G	**Any other vegetables**	*List examples of any other vegetables*	___ yes (1) ___ no (0)
H	**Any meat made from animal organs, such as:**	*Liver, kidney, heart or other organ meats or blood-based foods, including from wild game*	___ yes (1) ___ no (0)
I	**Any other types of meat or poultry, like:**	*Beef, pork, lamb, goat, rabbit, wild game meat, chicken, duck, other birds*	___ yes (1) ___ no (0)
J	**Any eggs**	*Eggs from poultry or any other bird*	___ yes (1) ___ no (0)
K	**Any fish or seafood, whether fresh or dried**	*Fresh or dried fish, shellfish or seafood*	___ yes (1) ___ no (0)
L	**Any beans or peas, such as:**	*Mature beans or peas (fresh or dried seed), lentils or bean/pea products, including hummus, tofu and tempeh*	___ yes (1) ___ no (0)
M	**Any nuts or seeds, like:**	*Any tree nut, groundnut/peanut, or certain seeds or nut/seed "butters" or pastes*	___ yes (1) ___ no (0)
N	**Any milk or milk products, such as:**	*Milk, cheese, yoghurt or other milk products, but NOT including butter, ice cream, cream or sour cream*	___ yes (1) ___ no (0)

Other food categories, not included in construction of MDD-W

Optional; inclusion to be determined by survey designers during adaptation process

Yesterday during the day or at night, did you eat or drink:

	Food categories	**Description/examples to be adapted** Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	**Consumed** Yes = 1 No= 0
O	**Any insects or other small protein foods, including:**	*Insects, insect larvae/grubs, insect eggs and land and sea snails*	___ yes (1) ___ no (0)
P	**Any red palm oil**	*Red palm oil*	___ yes (1) ___ no (0)
Q	**Any oils and fats**	*Oil, fats or butter added to food or used for cooking, including extracted oils from nuts, fruits and seeds, and all animal fat*	___ yes (1) ___ no (0)
R	**Any savoury and fried snacks, such as:**	*Crisps and chips, fried dough, other fried snacks*	___ yes (1) ___ no (0)
S	**Any sweets, such as:**	*Sugary foods, such as chocolates, candies, cookies/sweet biscuits and cakes, sweet pastries or ice cream*	___ yes (1) ___ no (0)
T	**Any sugar-sweetened beverages, like:**	*Sweetened fruit juices and "juice drinks", soft drinks/fizzy drinks, chocolate drinks, malt drinks, yoghurt drinks, sweet tea or coffee with sugar*	___ yes (1) ___ no (0)

Required

	Food categories	**Description/examples to be adapted** Consult **Appendix 2** and replace the example foods below with items commonly consumed in the survey area(s).	**Consumed** Yes = 1 No= 0
U	**Any condiments and seasonings, such as:**	*Ingredients used in small quantities for flavour, such as chilies, spices, herbs, fish powder, tomato paste, flavour cubes or seeds*	___ yes (1) ___ no (0)
V	**Any other beverages and foods**[a] ***(optionally, specify if not listed)***	*Tea or coffee if not sweetened, clear broth, alcohol* *Pickles, olives and similar* ______________________	___ yes (1) ___ no (0)

[a] If rows O, P, Q, R, S and/or T are not included, examples for the "Other beverages and foods" category must be expanded to include these types of items.

The final two rows ("Condiments and seasonings" and "Other beverages and foods") should always be included on the questionnaire.

Appendix 4. Comparing Minimum Dietary Diversity for Women of Reproductive Age and Infant and Young Child Feeding Minimum Dietary Diversity

Both the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) indicator and the Infant and Young Child Feeding Minimum Dietary Diversity (IYCF MDD) indicator are dichotomous indicators based on consumption of a number of food groups the previous day or night.

Since some users may wish to construct both indicators, this appendix provides two tables, one to show which food groups comprise the indicators (**Table A4-1**) and one to describe several small differences in classification of individual food items between the two indicators (**Table A4-2**).

Table A4-1. Comparing food groups in the Infant and Young Children Feeding Minimum Dietary Diversity (IYCF MDD) indicator and the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) indicator

Groups/rows on the MDD-W questionnaire[a]		10 food groups in the MDD-W	7 food groups in the IYCF MDD[b]
A. B.	Foods made from grains White roots and tubers and plantains	1. Grains, white roots and tubers, and plantains	1. Grains, roots and tubers
C.	Pulses (beans, peas and lentils)	2. Pulses (beans, peas and lentils)	2. Legumes and nuts
D.	Nuts and seeds	3. Nuts and seeds	
E.	Milk and milk products	4. Dairy	3. Dairy products
F. G. H.	Organ meat Meat and poultry Fish and seafood	5. Meat, poultry and fish	4. Flesh foods (meat, fish, poultry and liver/organ meats)
I.	Eggs	6. Eggs	5. Eggs
J.	Dark green leafy vegetables	7. Dark green leafy vegetables	6. Vitamin A-rich fruits and vegetables
K. L.	Vitamin A-rich vegetables, roots and tubers Vitamin A-rich fruits	8. Other vitamin A-rich fruits and vegetables	
M.	Other vegetables	9. Other vegetables	7. Other fruits and vegetables
N.	Other fruits	10. Other fruits	

[a] Only the first 14 rows used to calculate the MDD-W are listed here. Questionnaires for both indicators (IYCF MDD and MDD-W) may include other optional foods/groups, and the MDD-W questionnaire has two more required categories (“Condiments and seasonings” and “Other beverages and foods”).

[b] Food groups names as listed in: World Health Organization (WHO). 2008. *Indicators for assessing infant and young child feeding practices. Part I: Definitions*. Geneva, WHO.

Table A4-2. Foods and beverages classified differently in the Infant and Young Child Feeding Minimum Dietary Diversity (IYCF MDD) indicator compared with the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) indicator

Food	In IYCF MDD	In MDD-W	Reason for difference
100% fruit juices 100% vegetable juices	All juices were grouped with "Sugar-sweetened beverages" and excluded from the indicator calculation	In settings where survey designers consider 100% juices to be commonly consumed **and** where they feel that enumerators can be trained to distinguish them, can be included in the appropriate fruit and vegetable groups and count in the score.	For the IYCF MDD, it was considered too difficult to distinguish in the field between juices with and without sugar added, and it was considered that those with sugar were more common. Experience since then suggests that, in some contexts, 100% juice is common and can be distinguished by enumerators, so this is left open as an option.
Ice cream	Classified in the "Dairy" group	Classified with "Sweets"	For the IYCF MDD, any dairy likely to be eaten in substantial quantity (and to provide calcium and other nutrients) was counted as dairy. Since that time, there has been increasing concern with other dimensions of diet quality, in the context of the nutrition transition. For the MDD-W, ice cream is not classified with dairy because it is a high-fat/high-sugar food and also because many low-quality ice cream products contain little dairy.
Garlic	Classified with "Other fruits and vegetables"	Classified with "Condiments and seasonings"	In the MDD-W, there is a stronger focus on excluding items usually consumed in small quantities.
Endive	Classified with "Other vegetables"	Classified with "Dark green leafy vegetables"	The current vitamin A value in the U.S. Department of Agriculture nutrient database (release 28) indicates that endive exceeds the criteria value defining a vitamin A source (see **Box 2** for explanation of criteria).
Olives	Classified with "Other fruits and vegetables"	Classified with "Other beverages and foods"	In the MDD-W, there is a stronger focus on excluding items usually consumed in small quantities.
Red palm oil	In contexts where consumed, included with "Vitamin A-rich fruits and vegetables" and counted in the score	Excluded from indicator calculation	The IYCF MDD reflected a strong focus on vitamin A. The MDD-W, while still focused on micronutrient adequacy, also seeks to balance other diet quality issues and, in this context, it is clear that an oil should not be grouped with fruits and vegetables. Note that red palm fruit/pulp is classified as a vitamin A-rich fruit for both indicator calculations.
Fish roe Snails	Classified with "Fish and seafood"	Classified with "Insects and other small protein foods"	In the MDD-W, there is a stronger focus on excluding items usually consumed in small quantities.
Seaweed	Classified with "Dark green leafy vegetables"	Classified with "Other vegetables"	Many types of seaweed are consumed globally and most do not meet the criteria for "vitamin A-rich". In local cases where it is known that the type(s) consumed meet the criteria (see **Box 2**), survey designers could still classify as "Dark green leafy vegetables".

ANNEX H

Survey questionnaire

National Nutrition Survey 2018

PAKISTAN NATIONAL NUTRITION SURVEY 2018
SURVEY QUESTIONNAIRE

GOVERNMENT OF PAKISTAN

Instructions for Questionnaire:

- *Geographical Areas will be automatically captured by application*
- *Enumerator/Field data collector will take verbal consent from respondent before starting interview by reading out the consent for the understanding of respondent*
- *Phlebotomist will take written consent from the respondents for collecting urine and blood samples on a prescribed format*
- *Household head or any eligible household member will be approached for Household and members information*
- *After completion of Household Head/eligible member interview, salt iodization and identification and observation of hand-washing place will be conducted*
- *All eligible members will be called for anthropometric measurements*
- *All eligible members will be interviewed for their respective modules and sections*

MODULE A
DEMOGRAPHIC INFORMATION AND SOCIO ECONOMIC STATUS

SECTION H1: HOUSEHOLD AND MEMBERS INFORMATION (HH)

Instructions: The GPS co-ordinates will be auto-filled by application, while the check on location will ensure the correct enumeration block

HOUSEHOLD INFORMATION	HH
H101. Geographical Area: (Check To Be Added For Re-Confirmation) جغرافیائی علاقہ	**H102.** Enumeration Block number: ڈیٹا کلشن بلاک نمبر [__] [__] [__] [__] [__] [__]

a) PROVINCE:	b) DISTRICT:	c) TEHSIL/TALUKA:	d) CITY/VILLAGE:
صوبہ __________	ضلع____________	تحصیل /طالکا________	شہر/گاؤں_________

H103. Household number:	**H104**. Interviewer's name and number:	**H105**. Team Leader's name and number:
گھرانا نمبر __________	انٹرویو لینے والے کا نام اور نمبر______________	ٹیم لیڈر کا نام اور نمبر ____________

H106. Date and time of interview: انٹرویو کی تاریخ اور وقت	__/___/___ ___:___	**H107.** Name of the Respondent: جواب دہندہ کانام __________	**H108**.Age of Respondent in completed years جواب دہندہ کی عمر مکمل سالوں میں [__] [__] Years

H109. Education of Respondent جواب دہندہ کی تعلیم______________	**H110**. Occupation of Respondent جواب دہندہ کا پیشہ______________
H111. For which type of sample this household is selected? یہ گھر کس قسم کے نمونےکے لیے منتخب کیاگیا ہے؟	1.For Blood and urine samples پیشاب اور خون کے نمونے لینے کے لیے ---------- Y/N 2. For Water Quality Testing پانی کے معیار کو جانچنے کے لیے ---------- Y/N
The enumerator will read out the consent for understanding of respondent and will mention the purpose of the study and time required to complete the interviews (a separate consent sheet will be provided to the enumerators) سوال کنندہ اجازت نامہ جواب دہندہ سمجھانے کے لیے پڑھ کر سنائے گا اور مطالعہ کا مقصد اور انٹرویو کے لیے درکار وقت کے متعلق آگا ہ کرےگا ۔ (سوال کنندہ کو علیحدہ سے اجازت نامہ کی شیٹ مہیا کی جائےگی)	
H112. Was consent taken?؟ کیااجازت لی گئی	1.verbal consent زبانی اجازت نامہ ---------- Y/N 2.written consent تحریری اجازت نامہ ---------- Y/N
If verbal consent is not given STOP interview and move to last Question of this section to record the outcome of the interview اگر زبانی /تحریری اجازت نامہ نہ ملے تو انٹرویو کو روک دیں اور اس سیکشن کے آخر میں جائے سوال کےنتائج ریکارڈ کریں	
H113. Reason of Refusal (Select all applies): انکار کی وجہ (متعلقہ جوابات کو منتخب کریں) (Multiple responses)	Inappropriate timingنامناسب وقت ....1 Not Interestedدلچسپی نہیں ....2 Waste of time وقت کا ضائع ....3 Interferes with privacy رازدار ی میں مداخلت ....4 Do not trust surveys سروے پر اعتبار نہیں ....5 Previous bad experience پچھلا برا تجربہ ....6 Collection of Blood and Urine Samples خون اور پیشاب کے نمونے کا لینا ....7 Other (Specify) دیگر وضاحت کریں........96

GPS coordinates will be taken automatically by the devices; the information taken is listed down:

- *Waypoint number*
- *Elevation*
- *Latitude (Direction, Degrees, Decimal Degrees)*
- *Longitude (Direction, Degrees, Decimal Degrees)*

SECTION H2: LIST OF HOUSEHOLD MEMBERS سیکشن 2: گھر کے افراد کی فہرست

H201. *Line number*	H202. First, please tell me the name of each person who usually lives here, starting with the head of the household. براہ مہربانی پہلے مجھے ان سب کانام بتائیں جو عام طور پر یہاں رہتے ہیں خاندان کے سربراہ سے شروع کریں *Probe for additional household members.* گھر کے دیگر افراد کے بارے میں پوچھیں	H203. relationship with *head of household?* گھر کے سربراہ سے رشتہ ؟	H204. Father Sr. No والدکا لائن نمبر	H205. Mother Sr. No والدہ کا لائن نمبر	H206. Gender جنس	H207. What is (*name*)'s date of birth? (نام) کی پیدائش کی تاریخ کیا ہے؟ 98 DON'T KNOW 98 معلوم نہیں 98 → Ask age	H208. How old is (*name*)? (نام)کتنی عمر ہے؟ *Record in completed days/months/years.* مکمل شدہ دن / مہینہ /سالوں میں ریکارڈکریں	H209. Education* تعلیم	H210. Occupation* پیشہ	H211. Marital Status* ازواجی حیثیت	H212. Is [name] available? (نام) کیا موجود ہے
LINE	NAME	RELATION*			M F	DD/MM/YY	DD/MM/YY				Y N
		0 1			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2
		__ __			1 2	________	__ __/__ __/__ __				1 2

H213. Contact No of HH Head گھر کے سربراہ کا فون نمبر ___ ___ ___ ___ ___ ___ ___

H214. Married Women (15-49) شادی شدہ خواتین کی تعداد ___ ___

Instructions: Total number of household members and their categorization will be done by application automatically

H215. Adolescents 10-19 نوعمر افراد کی تعداد
1.Male مرد_____ 2.Female خواتین_____

H216. Children under age 5 پانچ سال سے کم عمر بچوں کی تعداد
1.Boys لڑکے_____ 2.Girls لڑکیاں_____

H216.Total family members(incl. children) کل افراد کی تعداد (بشمول بچے)
1.Male مرد_____ 2.Female خواتین_____

3	*01 head, 02 spouse, 03 son / daughter, 04 son-in-law / daughter-in-law, 05 grandchild, 06 parent, 07 parent-in-law, 08 brother / sister, 09 brother-in-law / sister-in-law, 10 uncle/aunt, 11 niece / nephew, 12 other, 13 adopted / foster / stepchild, 14 servant (live-in), 96 other (not related), 98 Don't know relative*
9	*01 none, 02 pre-primary, 03 primary (1-5), 04 middle (6-8), 05 secondary (9-10), 06 intermediate, 07 graduation, 08 masters, 9 phd*
10	*01 none, 02 unskilled manual labour, 03 skilled manual labour, 04 agriculture, 05 sales and services, 06 professional, 07 student, 08 unemployed/housewife, 96 others (specify)*
11	*01 married, 02 widowed, 03 divorced, 04 separated, 05 never married*

SECTION H3: SOCIAL ECONOMIC STATUS سیکشن 3 : سماجی اور معاشی حیثیت

Instructions: This section will be filled by the Head of the household (HH) or A knowledgeable member at-least 18 years old of the HH

S#	Questions	Responses	Skip
H301	What is your mother tongue/native language? آپکی مادری زبان کیا ہے؟	Urdu اردو ---------- 1 Punjabi پنجابی ---------- 2 Sindhi سندھی ---------- 3 Pushtu پشتو ---------- 4 Baluchi بلوچی ---------- 5 Siraiki سرائیکی ---------- 6 Others specify دیگر وضاحت کریں ----------96	
H302	What is the main source of drinking water in your house hold? آپ کے گھر میں پینے کے پانی کا سب سے اہم ذریعہ کیا ہے ؟	***Piped water*** *Municipal committee piped into dwelling* ---------- 1 گھر میں میونسل کمیٹی کانلکا *Municipal committee piped to yard/plot* ---------- 2 صحن میں میونسل کمیٹی کا نلکا *Municipal committee piped to neighbor* ---------- 3 پڑوسی کے گھرمیونسل کمیٹی کا نلکا *Public tap/standpipe* ---------- 4 گلی / علاقہ کا نلکا *Tube well or borehole or suction pump* ---------- 5 پانی کھینچنے کی مشین/ٹیوب ویل/ بورنگ کا پانی *Hand pump* ہینڈ پمپ ---------- 6 *Well* کنواں ---------- 7 *Spring* چشمہ ---------- 8 *Rainwater* بارش کا پانی ---------- 9 *Tanker truck* پانی کا ٹینکر ----------10 *Filtration plant* فلٹیرشن پلانٹ ----------11 *Cart with small tank* ریڑھی کے ساتھ چھوٹی ٹنکی ----------12 *Surface water (river/dam/lake/pond/canal* ----------13 سطح والا پانی(دریا،جھیل ،ڈیم،تالاب/ ندی/نہر کا پانی) *Irrigation channel* آبپاشی ----------14 *Bottled water* بوتل کا پانی ----------15 *Other specify* دیگر وضاحت کریں ----------96	
H303	Do you take any step to make the water safer to drink? پانی کو محفوظ بنانے کے لیے آپ کوئی قدم اٹھاتے ہیں؟	Yes ہاں ---------- 1 No نہیں ---------- 2	2 → Q5
H304	If yes, what do you usually do to make the water safe to drink? اگر ہاں ،تو عموماً آپ پانی کو محفوظ کرنے کے لیے کیا کرتے ہیں؟	*Boil* ابالنا ---------- 1 *Add bleach/chlorine* بلیچ/کلورین ملاتے ہیں ---------- 2 *Strain through a cloth* کپڑے کے ذریعہ چھانتے ہیں ---------- 3 *Use water filter* پانی کا فلٹر استعمال کرنا ---------- 4 *Solar disinfection* سورج کی شعاعوں سے ---------- 5 *Let it stand and settle* برتن میں پانی ڈال کر ٹھہرنے کا انتظار کرتے ہیں ---------- 6 *Other specify* دیگر وضاحت کریں ----------96	
H305	What type of toilet facilities do you usually use in your house hold? عام طور پرآپ گھر میں کس قسم کی لیٹرین کی سہولت استعمال کرتے ہیں	***Flush or Pour Flush Toilet* فلش یا انڈیل کر پانی ڈالنے والا** *Flush to piped sewer system* فلش سیوریج کے نظام سے ملا ہوا ----------1 *Flush to septic tank* فلش سپٹک ٹینک سے جڑا ہوا ----------2 *Flush to pit latrine* فلش گڑھےواے لیٹرین سے جڑاہوا ----------3 *Flush to somewhere else* فلش کہیں اور ----------4 ***PIT Latrine* گڑھے والا لیٹرین** *Ventilated improved PIT latrine* بہتر ہوا دار گڑھے والا لیٹرین 5 *PIT latrine with slab* گڑھے والا لیٹرین ڈھکا ہوا ----------6 *PIT latrine without slab/open pit* گڑھے والا کھلاہوا لیٹرین -7 *Bucket toilet* بالٹی والا ٹوائلٹ ----------8 *No facility/bush/field* کوئی سہولت نہیں /جھاڑیوں/زمین پر -----9 *Other specify* دیگر وضاحت کریں ----------96	9 → Q8

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H306	Do you share this toilet facility with other households? کیاآپ ٹوائلٹ کی اس سہولت کا اشتراک دوسرے گھرانوں کے ساتھ کرتے ہیں	Yes ہاں ----------1 No نہیں ----------2	2 → Q8
H307	If yes, how many other households use this toilet facility? اگر ہاں،تو کتنے گھرانے یہ ٹوائلٹ کی سہولت کواستعمال کرتے ہیں ؟	No. Of households ---------- [__] [__] گھرانوں کی تعداد	
H308	What is done to dispose the stools of the youngest child? سب سے چھوٹے بچے کا پاخانہ پھینکنے کے لیے کیاکرتے ہیں؟	Child used toilet/latrine بچہ لیٹرین استعمال کرتا ہے ----------1 Put/rinsed into toiled or latrine پاخانہ لیٹرین سے بہادیتے ہیں2 Put/rinsed into drain/ditch پاخانہ نالی /گھڑھے سے بہادیتے ہیں ----------3 Thrown into garbage کچرے میں پھنک دیتے ہیں----------4 Left in open کھلا پڑا رہتا ہے----------5 Buried دفنا دیتے ہیں----------6 Other (Specify): دیگر وضاحت کریں ----------96	
H309	Are following facilities available in your house hold? مند رجہ ذیل سہولیات آپ کے گھر میں موجود ہیں *(Multiple Response)*	1. Electricity Connection بجلی---------- Y/N 2. Internet connection انٹرنیٹ کا کنکشن ---------- Y/N 3. Dish/Cable Network ڈیش /کیبل نیٹ ورک ---------- Y/N 4. Generator/UPS جینریٹر / یو-پی-ایس---------- Y/N 5.Solar Panels/Wind Turbineبجلی کی پن چکی/ سولر پینل- Y/N	
H310	Please report number of units for each item	1. Radio ریڈیو ----------[__] [__] 2. Television ٹیلی وژن----------[__] [__] *3.* Landline phone ٹیلوفون ----------[__] [__] 4. Refrigerator فریج ----------[__] [__] 5. Almirah/Cabinet الماری ----------[__] [__] 6. Chairکرسی ----------[__] [__] 7. Room Cooler روم کولر ----------[__] [__] 8. Air conditionerائیرکنڈیشن ----------[__] [__] 9. Washing machineواشنگ مشین ----------[__] [__] 10. Water Pump پانی کا پمپ ----------[__] [__] 11. Bed بستر ----------[__] [__] 12. Clock گھڑی ----------[__] [__] 13. Sofa صوفہ ----------[__] [__] 14. Cameraکیمرہ ----------[__] [__] 15. Sewing machineسلائی میشن ----------[__] [__] 16. Computer کمپیوٹر ----------[__] [__]	
H311	Observe what appliances are being used for main source of light in household مشاہدہ کریں کہ گھرمیں روشنی کرنے کے لئے کونسا مخصوص ذریعہ استعمال کرتے ہیں *(Multiple Response)*	Bulb بلب ---------- 1 Tube lightٹیوب لائٹ ---------- *2* LED Bulbs بلب *LED* ---------- 3 Energy Saver انرجی سیور ---------- 4 Candle موم بتی---------- 5 Lanternلاٹین---------- 6 Other specify دیگر وضاحت کریں ----------96	
H312	What type of fuel do you often use for cooking in your household? عام طورپر آپ کے گھر میں کھانا پکانے کے لیے کس قسم کا ایندھن استعمال ہوتا ہے ؟	Electricityبجلی ----------1 LPGایل –پی-جی سیلنڈر ----------2 Natural Gasقدرتی گیس ----------3 Biogasبائو گیس ----------4 Kerosene مٹی کا تیل ----------5 Coal/Lignite کوئلہ ----------6 Charcoalلکڑی کاکوئلہ ----------7 Wood لکڑی ----------8 Straw/Shrubs/*Grass*تنکے/جھاڑیاں/گھاس پھونس ----------9 Animal Dung*(اوپلے)*جانوروں کا گوبر ---------- 10 Other specify دیگر وضاحت کریں ----------96	
H313	Is the cooking usually done in the house, in a separate room/space, or outdoors? کیاعام طورپرکھانا گھرمیں،کسی الگ کمرہ /جگہ یاگھر سے باہر بنتا ہے؟	*In the house* گھر کے اندر ----------1 *In a separate room as kitchen*کچن/ الگ کمرہ ----------2 *Outdoors* بیرونی جگہ ----------3 *Other specify* دیگر وضاحت کریں----------96	
H314	Main material of the FLOOR گھر کا فرش بنانے میں کس قسم کا میٹریل استعمال کیاگیا ہے	***Natural Floor***قدرتی فرش *Earth/Sand/Mud*مٹی/ریت/زمین ----------1 *Dung*گوبرسے بنی ہوئی فرش ----------2 ***Rudimentary/Simple Floor*** بنیادی /سادہ فرش	

		Wooden/Wood planks لکڑی کے تختے ----------------------3 *Palm/Bamboo* کھجور /بانس اور مٹی ----------------------------4 ***Finished Floor*** مکمل فرش *Ceramic tiles* سرامک ٹائلیں ------------------------------------5 *Cement* سیمنٹ ---6 *Carpet* قالین---7 *Chips* چپس/موزیک --8 *Bricks* اینٹیں ---9 *Mats* دری--10 *Marble* سنگ مر مر ---11 *Other specify* دیگر وضاحت کریں ----------------------------*96*	
H315	Main material of the ROOF گھر کی چھت میں کس قسم کا میٹریل استعمال ہوا ہے	***Natural Roofing*** قدرتی چھت *No roof* کوئی چھت نہیں ---------------------------------------1 *Thatch/palm leaf* کھجو ر کے پتے سے بنی ہوئی ---------------2 *Sod/grass* گھاس پھوس سے بنی ہوئی چھت -------------------------3 ***Rudimentary/Simple Roofing*** بنیادی /سادہ چھت *Palm/Bamboo* کھجور /بانس -------------------------------------4 *Wood planks* لکڑی کے تختے ------------------------------------5 *Rustic mat* تنکے کی چٹائی -----------------------------------6 *Cardboard* گتے سے بنی ہوئی چھت -------------------------------7 ***Finished Roofing*** مکمل چھت *Iron sheets* لوہے کی چادر -------------------------------------8 *RCC* آر -سی -سی(پکی چھت) ------------------------------------9 *Metal* دھات سے بنی ہوئی --------------------------------------10 *Wood* لکڑی سے بنی ہوئی چھت ----------------------------------11 *Cemented Slab* سیمنٹ بلاک/ پکی اینٹیں (بغیر پلا سٹر) ---------12 *Cement Sheets* سیمنٹ(پلاسٹر) ---------------------------------13 *Other specify* دیگر وضاحت کریں ------------------------------96	
H316	Main material of the WALLS گھر کی دیوار وں میں کس قسم کا میٹریل استعمال ہوا ہے	*No walls* کوئی دیوار نہیں ---1 *Cane/Palm/Trunks* کھجور /بانس اور مٹی -------------------------2 *Mud/Dirt/Clay* کچی اینٹیں/مٹی -----------------------------------3 *Stone with mud* پتھر اور مٹی ------------------------------------4 *Bamboo with mud* بانس اور مٹی سے بنی ہوئی ------------------5 *Baked bricks* پکی اینٹیں ---6 *Cemented baked bricks* سیمنٹ اور پکی اینٹیں -------------------7 *Tent* شامیانہ---8 *Cement/cement blocks* سیمنٹ سے بنی ہوئی بلاکس -------------9 *Stone with cement/lime* پتھرچونے/سیمنٹ کے ساتھ ----------10 *Carton/plastic* گتے / پلاسٹک ----------------------------------11 *Other specify* دیگر وضاحت کریں -------------------------------96	
H317	How many rooms in this household are used for sleeping? آپ کے گھر میں سونے کے لیے کتنے کمرے ہیں ؟	Rooms: : کمرے --------------------------------------- [__] [__]	Range 1-15
H318	Does any member of this household own: کیا اس گھر میں کسی کے پاس یہ چیزیں موجود ہیں ؟ [Multiple response] ایک سے زیادہ جوابات آسکتے ہیں	*Watch* گھڑی---1 Mobile telephone موبائل --2 Bicycle سائیکل---3 Motorcycle or scooter موٹر سائیکل/ سکوٹر -------------------4 Animal-drawn cart جانوروں سے چلائے جانے والی گاڑی ------5 Car or truck or bus گاڑی /ٹرک/ بس ----------------------------6 Tractor ٹریکٹر ---7 Boat with a motor موٹر کے ساتھ کشتی --------------------------8 Boat without motor موٹر کے بغیر کشتی ------------------------9	
H319	Does any member of this household own any agricultural land? کیا اس گھر میں رہنے والا کوئی فرد زرعی زمین کا مالک ہے؟	Yes ہاں ---1 No نہیں ---2	2 → Q21
H320	If yes, how many acres or canals of agricultural land do members of this household own? اگر ہاں، تو اس گھر کے افراد کے پاس کتنے مربہ/ایکٹرپر مشتمل زمین ہیں؟	1. Acres ایکٹر---------------------------------- [__] [__] [__] 2. Canals کنال ---------------------------------- [__] [__] [__] Don't know معلوم نہیں ---98	
H321	Do you have your own livestock, animals or poultry? کیاآپ اپنا مال مویشی،جانور یا مرغی خانہ رکھتے ہیں؟	Yes ہاں ---1 No نہیں ---2	2→Next Section
H322	If yes, how many livestock, animals or poultry does your household own? اگر ہاں تو آپ کے گھر میں کتنے مویشی جانور یا مرغیاں موجود ہیں؟	1. Cows, Bulls مال مویشی (گائے اور بیل) ---------- [__][__][__] 2. Horses/Donkeys/ Mules گھوڑے/گدھے/خچر - [__][__][__] 3. Goats بکریاں -------------------------------------- [__][__][__]	Range 0-999

	Ask for each listed animals, one by one and observation by enumerator Insert 000 if none ایک ایک کر کے جانوروں کے نام پوچھیں اور شمار کنندہ مشاہدہ کرے اگر کوئی نہیں تو 000 لکھیں	4. Sheep بھیڑ ------- [__][__][__] 5. Chickens /Poultry مرغیاں ------- [__][__][__] 6. Buffalo بھینسیں ------- [__][__][__] 7. Camels اونٹ ------- [__][__][__]	

SECTION H4: HAND-WASHING سیکشن 5: ہاتھوں کا دھونا

S#.	Questions	Responses	Skip
H401	Please show us where you and members of your household most often wash their hands. براہ مہربانی دکھائیں کہ عام طورپر آپ اور آپ کے گھروالے اپنے ہاتھ کہاں دھوتے ہیں؟	*Observed* مشاہدہ ------- 1 ***Not observed*** مشاہدہ نہیں کیا *Not in dwelling/plot/yard* رہائش گاہ پلاٹ /صحن/ موجود نہیں 2 *No permission to see* دیکھنے کی اجازت نہیں ------- 3 *Other reason* کوئی اور وجہ ------- 4	2, 3 , 4 → Q4
H402	Observe presence of water at the specific place for hand washing. ہاتھ دھونے کے لئے مخصوص جگہ پر پانی کی موجودگی کا مشاہدہ کریں	*Water is available* پانی موجود ہے ------- 1 *Water is not available* پانی موجود نہیں ہے ------- 2	
H403	Record if soap or detergent is present at the specific place for hand washing اگرہاتھ دھونے کے لیے مخصوص جگہ پر صابن/ڈیٹرجنٹ موجود ہےتو ریکارڈ کریں (Multiple Response)	*Bar soap* صابن ------- 1 *Detergent (powder/liquid/paste)* ڈیٹرجنٹ/پاوڈر / مائع/پیسٹ - 2 *Liquid soap* مائع صابن ------- 3 *Ash/mud/sand* راکھ /مٹی /ریت ------- 4 *None* کوئی نہیں ------- 5	
H404	Do you have any soap or detergent in your household for wand washing? کیا آپ کے گھر میں ہاتھ دھونے کے لیے صابن یا ڈیٹرجنٹ موجود ہے؟	Yes ہاں ------- 1 No نہیں ------- 2	2→Q6
H405	If yes, can you please show it to me? اگر ہاں ،تو براہ مہربانی مجھے دیکھا سکتی ہیں ؟ [Multiple Response]	*Bar soap* صابن ------- 1 *Detergent (powder/liquid/paste)* ڈیٹرجنٹ/پاوڈر / مائع/پیسٹ - 2 *Liquid soap* مائع صابن ------- 3 *Ash/mud/sand* راکھ /مٹی /ریت ------- 4 *None* کوئی نہیں ------- 5	
H406	In what situations do you wash your hands with soap? آپ کس کس وقت اپنے ہاتھ صابن سے دھوتے/دھوتی ہیں؟	1. Before preparing food کھانا تیار کرنے سے پہلے -------Y/N 2. Before eating کھانے سے پہلے -------Y/N 3. Before feeding a child بچے کو کھانا کھلانے سے پہلے Y/N 4. After handling feces/diapers بچوں کا ڈائپر / پاخانہ صاف کرنے کے بعد -------Y/N 5. After defecate or using the latrine بیت الخلاء سے آنے کے بعد یابیت الخلاء استعمال کرنے بعد--Y/N 6. Other (specify) دیگر وضاحت کریں-------Y/N	
This is an open-ended question. Do not read the answer choices. یہ از خود وضاحت پر مشتمل سوال ہیں اس لئے جواب دہندہ کو جواب پڑھ کر نہ سنائیں After the respondent stops listing times, ask "Are there any other situations where you wash your hands with soap?" Keep asking this question until the respondent thinks there are no other times. Mark "Y" if the respondent mentioned the critical time and "N" if the respondent did not mention that critical time] جب جواب دہندہ رک جائے تو پوچھیں " کیا کوئی اورموقع صورتحال ہیں جہاں آپ اپنے ہاتھ صابن سے دھوتے /دھوتی ہیں"؟اس سوال کو پوچھتے رہیں جب تک جواب دہندہ کو لگتا ہے کہ کوئی اور موقع نہیں ہے ۔اگر جواب دہندہ کسی موقع کا ذکر کرتا/کرتی ہے تو (**y**) نشان لگائیں اور اگر نہیں تو (**N**) نشان لگائی			

SECTION H5: SALT IODIZATION سیکشن6: آیوڈین ملے نمک کے بارے میں

S #	QUESTION	RESPONSES	SKIP
H501	We would like to check whether the salt used in your household is iodised. May I have a sample of the salt used to cook meals in your household? ہم چیک کرنا چاہتے ہیں کہ کیاآپ کا گھرانا آیوڈین ملا نمک استعمال کرتا ہیں کیا ہم آپ کے نمک کا نمونہ لے سکتے ہیں جو آپ اپنے کھانے پکانے میں استعمال کرتے ہیں	***Salt tested*** نمک چیک کیاگیا *0 ppm (no reaction)* 0 پی پی ایم ک(کوئی ردعمل/کیمیائی تبدیلی نہیں) ------- 1 *below 15 ppm (between 0 and 15 ppm)*-------2 0 اور 15 پی پی ایم کے درمیان *above 15 ppm (at least 15 ppm)* -------3 15 پی پی سے زیادہ (15 پی پی ایم کم از کم) ***Salt not tested*** نمک چیک نہیں کیاگیا *no salt in the house* گھر میں نمک نہیں تھا -------4 *other reason* کوئی اور وضاحت کریں *(specify)* -------96	

Apply 2 drops of test solution, observe the darkest reaction within 30 seconds, compare to the colour chart and then record the response (1, 2 or 3) that corresponds to test outcome. دوقطرے ٹیسٹ سلوشن کے نمک پرڈالیں اور30 سیکنڈ کے لیے رک جائیں اور کلر چارٹ سے رنگ کا موازنہ کریں اور ریکارڈ کریں جوابات (3،2،1) ٹیسٹ کے نتائج کے مطابق نتیجہ(1،2 یا 3) ریکارڈ کریں			
H502	Observe the texture of the salt being used and logo on the wrapper استعمال ہونے والے نمک کی ساخت کا مشاہدہ کریں	**Texture:**ساخت Powder پاوڈر ------------------------------ 1 Grain دانےدار ------------------------------ 2 Raw خام نمک ------------------------------ 3	
H503	Observe "Handi" Logo printed or not? Skip if salt is kept in jar "ہانڈی" کانشان نمک کی تھیلی پر چھپا ہے یا نہیں؟	Yes ہاں------------------------------ 1 No نہیں ------------------------------ 2 Not Observed مشاہدہ نہیں کیا ------------------------------ 3 Salt in Jar برنی میں نمک ------------------------------ 4	

SECTION H6: FOOD INSECURITY EXPERIENCE SCALE سیکشن7: غذائی قلت اور عدم تحفظ

S #	QUESTION	RESPONSES	SKIP
Now I would like to ask you some questions about food. During the last 12 months was there a time when: میں آپ سے کھانے اور غذا کےبارے میں چند سوالات پوچھوں گا پچھلے 12 مہینوں کے دوران کسی موقع پر جب:			
H601	You or others in your household worried about not having enough food to eat because of a lack of money or other resources? کیاآپ اور آپ کے گھر والے پریشان رہتے ہیں کہ پیسوں اور دیگر وسائل کی کمی کی وجہ سے کھانے کے لئے غذا کافی نہیں ہے ؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ------------------------------ 99	
H602	Still thinking about the last 12 months, was there a time when you or others in your household were unable to eat healthy and nutritious food because of lack of money or other resources? پچھلے 12 مہینوں کے دوران سوچ کر بتائیں کہ کیا کبھی ایساوقت آیا کہ جب آپ اور آپ کے گھر والوں نے پیسوں اور دیگر وسائل کی کمی کی وجہ سے صحت مند اور غذائیت سے بھر پور غذا نہیں کھائی تھی؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H603	Was there a time when you or others in your household ate only a few kinds of foods because of lack of money or other resources? کیا کبھی ایسا وقت آیا کہ آپ اور آپ کے گھر والوں نے پیسوں اور وسائل کی کمی کی وجہ سے صرف چند غذائیں کھائی ہوں؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H604	Was there a time when you or others in your household had to skip a meal because there was not enough money or other resources to get food? کیا آپ یا آپ کے گھروالوں پر کبھی ایسا وقت آیاہیں پیسوں یا دیگر وسائل کی کمی کی وجہ سے ایک وقت کا کھانا چھوڑا ہو۔	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H605	Still thinking about the last 12 months, was there a time when you or others in your household ate less than you thought you should because of a lack of money or other resources? پچھلے 12 مہینوں کے دوران سوچ کر بتائیں کیا کبھی ایسا وقت آیا ہو کہ آپ اور آپ کے گھروالوں نے اپنی ضرورت سے کم کھانا کھایا ہو؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H606	Was there a time when your household ran out of food because of a lack of money or other resources? کیاکبھی ایسا وقت آیا جب پیسوں اور دیگر وسائل کی کمی کی وجہ سے آپ کے گھر میں کھانا نہ ہو؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H607	Was there a time when you or others in your household were hungry but did not eat because there was not enough money or other resources? کیا کبھی ایسا وقت آیا کہ جب آپ یا آپ کے گھر کے دوسرے افراد بھوکے تھے اور پیسوں کی کمی اور دیگر وسائل کی کمی کی وجہ سے کچھ نہیں کھاسکتے تھے؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	
H608	Was there a time when you or others in your household went without eating for a whole day because of a lack of money or other resources? کیاکبھی ایسا وقت آیا تھا کہ جب آپ یا گھر کے دوسرے افراد نے پیسوں اور دیگر وسائل کی کمی کی وجہ سے پورے دن کھانا نہ کھایا ہو؟	Yes ہاں ------------------------------1 No نہیں ------------------------------2 Don't know معلوم نہیں ------------------------------ 98 Refused جواب سے انکار ______________ 99	

H609	Was there a time when you or others in your household went outside for eating? کیا آپ یا آپ کے گھر والوں پر کبھی ایسا وقت آیا ہے کہ آپ کھانا کھانے کہیں باہر گئے ہوں؟	Yes ہاں ---1 No نہیں ---2 Don't know معلوم نہیں --- 98 Refused جواب سے انکار ____ 99	

SECTION H7: SOCIAL SAFETY NETS سیکشن 8: سوشل سیکورٹی ورک

S #	QUESTION	RESPONSES	SKIP
I would like to ask you about various external economic assistance programs provided to households. By external assistance I mean support that comes from the government or from non-governmental organizations such as religious, charitable, or community-based organizations. This excludes support from family, other relatives, friends or neighbors. میں آپ سے مختلف بیرونی معاشی امدادی پروگرام کے بارے میں پوچھوں گا جو گھر کی سطح پر امداد مہیا کرتے ہیں۔بیرونی امداد سے میرا مطلب حکومتی ادارے یا غیر سرکاری ادارے جیسے مذہبی فلاحی یا سماجی ادارے ہیں۔اس میں وہ امداد شامل نہیں ہے جو فیملی دیگر رشتہ دار، دوست یا پڑوسیوں سے حاصل ہوتی ہے ۔			
H7 01	Has your household or anyone in your household received financial assistance in last 12 months? کیاآپ یا آپ کے گھر میں کسی نے 12 مہینے سے امداد حاصل کی ہے؟	*YES* ہاں ---1 *NO* نہیں ---2	2 → Next section.
H7 02	How many HH members received the assistance? کتنے گھر کے افراد کو امداد ملی ؟	# of Recipients وصول کردہ کانمبر --- [__] [__]	

SECTION H7(a) : ASSISTANCE RECIPIENTS INFORMATION سیکشن 8:امداد وصول کرنے والے افراد کی معلومات

H703. Recipient وصول کرنے والا *(FROM SECTION A2)* سے دیکھ کر لکھیں A2سیکشن		H704. Duration مدت		H705. Can you please identify those programs?* کیاآپ ان پروگرامز کی شناخت کرسکتے ہیں ؟	H706. Amount in Last 12 months گزشتہ 12 مہینوں کے درمیان آپ نے کتنے پیسے وصول کئے؟	H707. How much amount from the last assistance provided used for purchasing of food? گزشتہ مہیا کی گئی سہولت میں سے کتنے پیسوں سے آپ نے کھانا خریدا تھا؟
Line No	Name	YY	MM	[Multiple response]		
					RS. ________	RS. ________
					RS. ________	RS. ________
					RS. ________	RS. ________
					RS. ________	RS. ________
					RS. ________	RS. ________

*04 **

01. Unconditional Cash Transfer غیر مشروط ادائیگی
02. Waseela-e-Haq وسیلہ حق
03. Waseela-e-Taleem وسیلہ تعلیم
04. Waseela-e-Rozgar وسیلہ روزگار
05 Waseela-e-Sehat وسیلہ صحت
06. Bait ul Mal بیت المال
07. EOBI ای اوبی ائی
08 Workers Welfare Funds کارکن فلاح بہبود کے فنڈ
09. National Income Support Program نیشنل انکم سپورٹ پروگرام
96. Others specify دیگر وضاحت کریں__________________

MODULE B

MWRA (15 to <50); REPRODUCTIVE HISTORY, LAST ANC, IFA AND MNP SUPPLEMENTS, 24 HOURS FOOD RECALL, FOOD FREQUENCY

SECTION W1: WOMEN INFORMATION PANEL (WM)

Instructions: This section will be filled for all eligible WRA in the household, relevant sections will be filled based on the marital and pregnancy status of the women. Before starting the interview, separate verbal consent to be taken from the respondent.

WOMAN INFORMATION			
W101. **CLUSTER NUMBER**)			W102. Household number
W103. Province: _ _ _ _ _ _ _ _ _ _ _ _ _ _		W104: District: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	
W105: Tehsil/Taluka: _ _ _ _ _ _ _ _ _ _ _ _ City/Village: _ _ _ _ _ _ _ _ _ _ _ _ _ _		a)	W106. Woman line number _______
		W107. Interviewer's name and number: _	W108. Team Leader's name and number: NAME
W109. Day / Month / Year of interview:			
___ ___ /___ ___ / 2 0 1 8			
W110. Record the time.		The enumerator will read out the consent for understanding of respondent and will mention the purpose of the study and time required to complete the interviews (a separate consent sheet will be provided to the enumerators)	
HOURS: ___	MINUTES: ___		
W111. **Name of Respondent**		---------------------------------------	

W112. Was consent taken?

	Yes	No
Verbal Consent	1	2
Written Consent	1	2

If verbal consent is not given STOP interview and move to last Question of this section to record the outcome of the interview

W113. *Result of woman's questionnaire* *Discuss any result not completed with Team Leader.*	*COMPLETED* .... 1 *NOT AT HOME* .... 2 *REFUSED*............ 3 *PARTIALLY COMPLETED* .... 4 *INCAPACITATED* .... 5 *OTHER* (specify)............ 6 ______________________________

SECTION W2: REPRODUCTIVE HISTORY

S #	QUESTION	RESPONSE	SKIP
W201	Name of married woman شادی شدہ خاتون کانام	--	
W202	Line No. of married woman شادی شدہ خاتون کالائن نمبر (from Section A2) سیکشن ***A2*** سے دیکھ کر لکھیں	[__] [__]	
W203	What was your age, when you get married? شادی کے وقت آپ کی عمر کیا تھی؟	Age in years عمر سالوں میں ----------------------- [__] [__]	

W204	Total number of pregnancies so far?کل حمل کی تعداد (Including current Pregnancy) (بشمول موجودہ حمل)	# of pregnancies -------------------------------------- [__] [__]	00→Section B6: MDD-W
W205	Are you currently pregnant? کیا آپ ابھی حاملہ ہیں؟	Yes ہاں-- 1 No نہیں -- 2	
IF FIRST PREGNANCY AFTER MARRIAGE THEN GO TO SECTION B2			
W206	What was age at the time of first birth? پہلےبچے کی پیدائش کے وقت آپ کی عمر کیاتھی؟	Age in years عمر سالوں میں ------------------------- [__] [__]	

SECTION W2(a) : DETAILS OF ALL PREGNANCIES

W207. Date of outcome *	W208. Outcome 1,2,5→ Skip Q3 to 6 and ask for next pregnancy. 4,6 → repeat Q3 to Q6 for each baby	W209. Child #	W210. Current Status of child * 1→ Ask Q5 2→ Ask Q6	W211. Age of alive child			W212. Age at time of death		
DD/MM/YYYY				Years	Months	Days	Years	Months	Days

2	1=Miscarriages حمل ضائع 2=Still Birth مردہ بچے کی پیدائش 3=Live Birth زندہ بچے کی پیدائش 4=Twin Birth Alive جڑواں بچوں کی پیدائش 5= Twin Still Birth جڑواں مردہ بچوں کی پیدائش 6= One Still Birth & one Live Birth ایک زندہ ایک مردہ بچوں کی پیدائش	4.	1] Alive حیات 2] Died فوت

SECTION W3: ANTE-NATAL CARE (To be filled for all MWRAs 15 to <50 with atleast one pregnancy. REF B1 Q4)

S #	QUESTION	RESPONSE	SKIP
W301	Did you see anyone for antenatal care during your last pregnancy with (**name**)? کیاآپ نے گزشتہ حمل کےدوران کسی سے اپنا معائنہ کرایاتھا؟	Yes ہاں-- 1 No نہیں -- 2	2→Q6
W302	Whom did you see? آپ نے کس سے معائنہ کروایاتھا؟ Probe: Anyone else? مزید پوچھیں :کوئی اور Probe for the type of person seen and record all answers given. مزید پوچھیں :معائنہ کرنے والے کے بارے میں مزید پوچھیں اور تمام جوابات کو ریکارڈ کریں [Multiple response]	*Gynaecologist*گائنا کالوجسٹ -----------------------------------1 *Other doctor* کوئی دوسرا ڈاکٹر --2 *Nurse*نرس --3 *CHW* کمیونٹی ہیلتھ ورکر --4 *LHW* لیڈی ہیلتھ ورکر ---5 CMWکیمونٹی مڈوائف --6 *LHV* لیڈی ہیلتھ وزیٹر---7 *TBA* دائی--8 *Other (specify)* دیگر ضاحت کریں ---------------------------- 96	
W303	How many weeks or months pregnant were you when you first received antenatal care for last pregnancy? جب آپ نے پہلی دفعہ اس حمل کے لئے معائنہ کروایا تو آپ کا کتنے ہفتوں یا مہینہ کا حمل تھا؟ Record the answer as stated by respondent. If "9 months" or later, record 9. جواب نوٹ کریں جیسے جوابدہندہ نے بتایا ہے ۔اگر 9 مہینے یا اس زیادہ ہے تو "9" ریکارڈ کریں	1.Weeksہفتے-- [__] [__] 2.Monthsمہینے ------------------------------------- [0] [__] Don't Known معلوم نہیں ------------------------------------- 98	
W304	How many times did you receive antenatal care during this pregnancy? اس حمل کے دوران آپ نے کتنی مرتبہ اپنا معائنہ کروایا؟ Probe to identify the number of times antenatal care was received. If a range is given, record the minimum number of times antenatal care received. مزید پوچھیں: حمل کے معائنے کے وزٹ کی تعداد کے بارے میں مزید پوچھیں ،اگر کوئی رینج دی ہے تو جو نمبر کم ہو وہ لکھیں	Number of timesمعائنے کی تعداد -------------------- [__] [__] Don't Known معلوم نہیں --- 98	
W305	As part of your antenatal care during your pregnancy, were any of the following done at least once: آپ کے حمل کے دوران طبی معائنے کے وقت کیا مندرجہ ذیل میں سے کوئی عمل کم از کم ایک دفعہ کیا گیا تھا (Ask about each option and circle all positive responses) (ہر انتخاب کے بارے میں پوچھیں اور تمام مثبت درعمل کو دائرہ کریں)	Were you weighedکیا آپ کا وزن کیاگیا -----------------------1 Was your bp measuredکیاآپ کا بلڈپریشر چیک کیاگیا ---------2 Did you give urine sampleکیا آپ نے پیشاب کانمونہ دیا -------3 Did you give blood sampleکیاآپ نے خون کا نمونہ دیا -------4 Ultrasoundالٹراساؤنڈ --5 Received advice on nutrition غذا کے باے میں معلومات لیں --6 Received advice on breastfeeding ماں کا دودھ پلانے کے بارے میں معلومات لیں-----------------------7 Received advice on family planning فیملی پلاننگ کے بارے میں معلومات لیں---------------------------8 Other specify دیگر وضاحت کریں ------------------------- 96	
W3 06	Do you have a card or other document with your own immunizations listed? If yes, ask: May I see it please? If a card is presented, use it to assist with answers to the following questions. کیا آپ کے پاس حفاظتی ٹیکہ جات سے متعلق کوئی کارڈ یا دستیاویزات موجود ہے ؟ اگر آپ کے پاس موجود ہے تو پوچھیں کیا میں دیکھ سکتی ہوں اگر کارڈ موجود ہے تو درج ذیل سوالات کے جوابات کا پتہ کریں	*Yes (card or other document seen)* ------------------------1 ہاں (کارڈ اور دیگر دستاویزات دیکھے *Yes (card or other document Not seen)*ہاں (کارڈ اور دیگر دستاویزاتنہیں دیکھے -------------2 *No* نہیں ---3 *Don't know* معلوم نہیں --98	
W307	When you were pregnant with (**name**), did you receive any injection in the arm or shoulder to prevent the baby from getting tetanus, that is, convulsions after birth? جب آپ حمل سے تھیں تو کیا آپ نے بازو یا کندھے پر بچے کو تشنج سے بچاؤ کے ٹیکہ لگوائے تھے؟جس میں بچے کو پیدائش جھٹکے آتے ہیں؟	Yes ہاں --1 No نہیں --2 Don't know معلوم نہیں ------------------------------------- 98	2,98→Q9

W308	How many times did you receive this tetanus injection during your pregnancy with (**name**)? آپ نے دوران حمل کتنی مرتبہ ،تشنج کی بیماری سے بچانے والا ٹیکہ /انجکشن لگوایا تھا؟	*Number of times*تعداد -------------------------------- [__] [__] *Don't know* معلوم نہیں -- 98	
W309	Have you ever taken any iron folic acid (IFA) while you were pregnant? کیا آپ نےکبھی حمل کے دوارن فولاد کی گولیاں استعمال کیں؟	Yes ہاں..1 No نہیں --2	2→Q13
W310	if yes, given or purchased? اگر ہاں ہے تو کسی نے دی یا خریدی	*1. Given at clinic*کلینک پر ملی----------------------------- Y/N *2. Purchased*خریدی --- Y/N *3. No, never given or purchased*نہ ملی نہ خریدی------ Y/N *Don't know* معلوم نہیں-- 98 *No response*جواب نہیں دیا ----------------------------------- 99	
W311	How often did you take IFA during pregnancy? آپ حمل کے دوارن کتنی مرتبہ فولاد کی گولیاں استعمال کرتی تھی؟	Daily روزانہ ---1 Once a week ہفتے میں ایک مرتبہ ------------------------------2 Biweekly ہفتے میں دو مرتبہ--3 Monthly ہرمہینے ---4 Rarely کبھی کبھار---5	
W312	How many months or days did you take IFA? کتنے مہینے یا کتنے دنوں تک آپ (آئرن فولک)گولیوں کا استعمال کرتی رہی تھی؟	Months-- [__] [__] Days--- [__] [__]	
W313	Have you ever taken multi-micronutrient tables (MNP) during pregnancy? کیا آپ نے کبھی دوران حمل اضافی طاقت کی گولیاں استعمال کیاتھا؟	Yes ہاں..1 No نہیں --2	2→Q16
W314	How often did you take MNP during pregnancy? عموماً کتنی دفعہ حمل کے دوران اضافی طاقت کی گولیوں کا استعمال کیا؟	Daily روزانہ ---1 Once a week ہفتے میں ایک مرتبہ ------------------------------2 Biweekly ہفتے میں دو مرتبہ--3 Monthly ہرمہینے ---4 Rarely کبھی کبھار---5	
W315	How many months or days did you take MNP? آپ کتنے مہینوں یا دنوں تک اضافی طاقت کی گولیاں کھاتی رہی تھی؟	Monthsمہینے -- [__] [__] Daysدنوں --- [__] [__]	
W316	Have you ever taken calcium tablets while you were pregnant? جب آپ حمل سے تھیں کیا آپ نے کبھی کیلشیم گولیاں استعمال کی تھیں؟	Yes ہاں---1 No نہیں 2	2→Q19
W317	How often did you take calcium tablets during pregnancy? آپ حمل کے دوران کیلیشم کی گولیاں کتنی بار کھاتی تھی؟	Daily روزانہ ---1 Once a week ہفتے میں ایک مرتبہ ------------------------------2 Biweekly ہفتے میں دو مرتبہ--3 Monthly ہرمہینے ---4 Rarely کبھی کبھار---5	
W318	How many months or days did you take calcium tablets? آپ کتنے مہینوں یا دنوں تک کیلیشم کی گولیاں کھاتی رہی تھی؟	Monthsمہینے --------------------------------------- [__] [__] Daysدنوں -- [__] [__]	
W319	Was deworming tablet were given to you during pregnancy? 'Probe questions on dosage and frequency' کیاآپ کو حمل کے دوران پیٹ کے کیڑوں کو ختم کرنے والی گولیاں دی گئی تھی؟	Yes ہاں---1 No نہیں ---2	
W320	Do you feel you had night blindness (difficulty in seeing clearly in dusk) during your last pregnancy? کیا آپ نے گزشتہ حمل کے دوران محسوس کیا کہ شام کے وقت آپ کو دیکھنے میں مشکل ہورہی تھی؟	Yes ہاں ---1 No نہیں --2 Don't know معلوم نہیں -------------------------------------- 98	

Section W4 LHW Coverage

S #	QUESTION	RESPONSE	SKIP
W401	When did LHW last visit your household? آپ کے گھر کا پچھلی مرتبہ لیڈی ہیلتھ ورکر نے کب دورہ کیا تھا؟	Monthsمہینوں -- [__] [__] Daysدنوں -- [__] [__] Never کبھی نہیں -- 98	98→Next Section B4
W402	How often does your LHW visit your household? آپ کو کتنی مرتبہ لیڈی ہیلتھ ورکر ملنے آتی ہے/آپ کے گھر کا کتنی مرتبہ دورہ کرتی ہے؟	Weekly ہرہفتے---1 Fortnightly ہر پندرہ دن بعد ------------------------------------2 Monthly ہر مہینے ---3 Occasionally کبھی کبھار --------------------------------------4 Only for polio صرف پولیو پلانے کے لیے ---------------------5 Other specify دیگر وضاحت کریں -------------------------- 96	
W403	What was the purpose of LHW's last visit? لیڈی ہیلتھ ورکر کے گزشتہ دورے کا مقصد کیاتھا؟	*Health and nutrition sessions*صحت اور غذائیت کا سیشن ----1 *Contraceptive supplies* مانع حمل کی فراہمی -----------------2 *Referral to hf*صحت مرکز کی طرف ریفر-----------------------3 *Vaccination* حفاظتی ٹیکوں کا شیڈول ---------------------------4 *Polio drops*پولیو کے قطرے-----------------------------------5 *Treatment for mother*ماں کا علاج ---------------------------6 *Treatment for child*بچے کا علاج -----------------------------7 *Nutrition supplies*اضافی خوراک کی فراہمی --------------------8	
W404	When did LHW last conduct a health and nutrition session? آخری دفعہ لیڈی ہیلتھ ورکر نے کب صحت کے متعلق سیشن دیئے تھے؟	Last month پچھلے مہینے--1 Last quarter تین مہینے پہلے--2 In the last 6 months پچھلے 6 ماہ---------------------------------3 Never کبھی نہیں --4	98→Next Section B4
W405	Have you ever attended one of her health and nutrition sessions? کیاآپ نے کبھی صحت اور غذائیت کے متعلق کسی سیشن میں شرکت کی تھی؟	*Yes* ہاں---1 *No* نہیں --2	98→Next Section B4
W406	How often do you attend these sessions? آپ عموماً کتنی دفعہ ان سیشن میں شرکت کرتی تھیں؟	*Every month* ہرماہ---1 *Once a quarter* ہر تین ماہ بعد ---------------------------------2 *In the last 6 months* پچھلے 6 ماہ میں -------------------------3 *Once a year* سالانہ ایک بار -----------------------------------4	

Section W5 Last Delivery Related Questions (Skip if first pregnancy)

S #	QUESTION	RESPONSE	SKIP
W501	Who assisted with the delivery of (**name**)? (نام) کو کس نے زچگی کے دوران مدد کروائی تھی Probe: Anyone else? پوچھیں : کوئی اور Probe for the type of person assisting and record all answers given. پوچھیں: زچگی میں مدد کروانے والوں کانام پوچھیں اور تمام جوابات لکھیں-	***Health professional*** *doctor* ڈاکٹر ---1 *nurse / midwife* نرس/دائی ---2 ***other person*** *traditional birth attendant* روایتی دائی ---3 *community health worker* کمیونٹی ہیلتھ ورکر---4 *relative / friend* رشتہ دار/ دوست ---5 *Other (**specify**)* دیگر وضاحت کریں --- 96 *No one* کوئی بھی نہیں--- 99	
W502	Where did you give birth to (**name**)? آپ کے بچے(نام) کی پیدائش کس جگہ واقع ہوئی تھی؟ Probe to identify the type of place. زچگی کی جگہ کو شناخت کرنے کے لیے سوالات پوچھیں	***Home*** *respondent's home* جواب دہندہ کے گھر پر---1 *other home* کسی اور کے گھر پر ---2 ***Public medical sector*** *government hospital* سرکاری ہسپتال---3 *government clinic /* سرکاری کلینک---4 *health centre* مرکز صحت---5 *government health post* سرکاری صحت کا ادارہ---6 *other public (**specify**)* دیگر جگہ(وضاحت کریں) ---7 ***Private medical sector*** *private hospital* نجی ہسپتال ---8 *private clinic* نجی کلینک ---9 *private maternity home* پرائیوٹ میٹرینٹی ہوم --- 10 *other private medical(specify)* دیگر صحت کا ادارہ --- 11 *Other (specify)* دیگر وضاحت کریں --- 96 (دیگر کی صورت میں جگہ کا نام لکھیں) ***Name of place*** **جگہ کا نام** ____________ 12	
W503	When (name) was born, was s/he very large, larger than average, average, smaller than average or very small? جب آپ کے بچے(نام) کی پیدائش ہوئی تھی ،کیاوہ بہت بڑا تھا،اوسطاً سے بڑا، اوسط سے چھوٹایا پھر بہت چھوٹا؟	*Very large* بہت بڑا---1 *Larger than average* اوسطً سے بڑا---2 *Average* اوسطً ---3 *Smaller than average* اوسطً سے چھوٹا ---4 *Very small* بہت چھوٹا ---5 *Don't know* معلوم نہیں --- 98	
W504	Was (**name**) weighed at birth? پیدائش پر آپ نے بچے کا وزن کیاتھا؟	Yes ہاں ---1 No نہیں ---2 Don't know معلوم نہیں --- 98	2→Q6
W505	How much did (**name**) weigh? آپ کے بچے(نام) کا وزن کتنا تھا؟ If a card is available, record weight from card. اگر کارڈ دستیاب ہوتوکارڈ سے وزن کو ریکارڈ کریں	1. From card کارڈ سے--- ***1 (kg)*** [__][__].[__][__] 2. From recall یاد کر کے --- ***2 (kg)*** [__][__].[__][__] *Don't know* معلوم نہیں --- 98	
W506	Within one hour after the birth, was (name) put directly on the bare skin of your chest? کیا پیدائش سے ایک گھنٹے کے اندر، بچے(نام) کو براہ راست سینے یا چھاتی سے لگایا گیاتھا؟	Yes ہاں---1 No نہیں---2 Don't know/ don't remember معلوم نہیں/ یاد نہیں --- 98	
W507	Was (name) dried or wiped soon after birth? کیا بچے کو پیدائش کے بعدفوراًخشک اورصاف کیاگیاتھا؟	Yes ہاں---1 No نہیں---2 Don't know/ don't remember معلوم نہیں/ یاد نہیں --- 98	
W508	Before being placed on the bare skin of your chest, was the baby wrapped up? بچے کو سینےیاچھاتی سے لگانے سے پہلے کیا بچہ کو لپیٹا گیا تھا؟	Yes ہاں---1 No نہیں---2 Don't know/ don't remember معلوم نہیں/ یاد نہیں --- 98	

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W509	How long after the birth was (name) bathed for the first time? پیدائش کے کتنے عرصے بعد بچے(نام) کو پہلی مرتبہ نہلایاگیاتھا؟ If "immediately" or less than 1 hour, record '000'. اگر پیدائش کے فوراً بعد یا ایک گھنٹہ کے اندر نہلایاگیا تو 000 ریکارڈ کریں If less than 24 hours, record hours. اگر 24 گھنٹے سے کم وقت میں نہلایا تو گھنٹے ریکارڈ کریں If "1 day" or "next day", probe: About how many hours after the delivery? اگر پہلے ایک دن یا ایک دن بعد نہلایا گیا توپوچھیں بچے کو پیدائش کے کتنے گھنٹہ بعد نہلایا؟ زچگی کے بعد سے پہلی بار نہلانے تک کا درست وقت کا پتہ لگائے If "24 hours", probe to ensure best estimate of less than 24 hours or 1 day. If 24 hours or more, record days. اور اگر 24 کھنٹوں میں ،تو کوشش کریں کہ درست وقت کا پتہ لگائیں کہ 24 گھنٹوں سے کم یا ایک دن	*Immediately/less than 1 hour* ایک گھنٹے سے بھی کم وقت میں ---------- *000* *Hours* گھنٹوں میں ---------- 1 *Days* دنوں ---------- 2 *Never bathed* کبھی نہیں ---------- 97 *Don't know/ don't remember* یاد نہیں/ معلوم نہیں ---------- *98*	
W510	After the cord was cut and until it fell off, was anything applied to the cord? ناڑوپر کٹنے کے بعد سے لے کر اس کے جھڑنے تک کیاآپ نے کچھ لگایاتھا؟	Yes ہاں ---------- 1 No نہیں ---------- 2 Don't know/ don't remember یاد نہیں/ معلوم نہیں ---------- 98	2 & 98⇨Section B5
W511	What was applied to the cord? ناڑو پر کیا لگایاگیاتھا؟ (Multiple Response)	Chlorhexidine ---------- 1 Other antiseptic (alcohol, spirit, gentian violet) کلورو ہیکزیڈن دوسری جراثیم کشی ادویات (الکوحل/اسپرٹ،جنیش وائلٹ) - 2 Mustard oil سرسو کا تیل ---------- 3 Ash راکھ ---------- 4 Animal dung گوبر ---------- 5 Other (specify) دیگر وضاحت کریں ---------- 6 Don't know / don't remember یاد نہیں / معلوم نہیں ------- 98	

SECTION W6: POST NATAL CARE (For all MWRA with at least one delivery REF B1 Q6)

S #	QUESTIONS	RESPONSES	SKIP
W601	Did anyone check on your health after delivery? کیا زچگی کے بعد کسی نے آپ کی صحت کا معائنہ کیا	*Yes* ہاں---1 *No* نہیں --- 2	2→Q6
W602	Who checked your health after delivery زچگی کے بعد کس نے آپ کی صحت کا معائنہ کیاتھا؟ [Multiple response]	Gynaecologistگائنا کولوجسٹ ---1 Other doctorکوئی اور ڈاکٹر---2 Nurse نرس ---3 CHW کمیونٹی ہیلتھ ورکر---4 LHWلیڈی ہیلتھ ورکر ---5 LHVلیڈی ہیلتھ ورکر ---6 TBA دائی---7 Other (specify) کوئی اور---96	
W603	How long after delivery did the first of these checks happen? بچے کی پیدائش کے کتنے عرصے بعد آپ کامعائنہ ہوا؟یا کیا گیا؟ If less than one day, record hours. اگر ایک دن سے کم ہے (گھنٹہ ریکارڈ بتائیں) If less than one week, record days. اگر ایک ہفتے سے کم ہے (دن ریکارڈ بتائیں) Otherwise, record weeks. دوسری صورت میں ہفتہ ریکارڈ کریں	*Hours* گھنٹے---1 *Days* دنوں---2 *Weeks* ہفتے ---3 *Don't know/ don't remember*معلوم نہیں /یاد نہیں ---98	
W604	How many times such check happen? اس طرح کا معائنہ کتنی مرتبہ ہوا ؟	Times کتنی مرتبہ ______________________	
W605	Purpose of this check اس معائنہ کا مقصد کیا تھا؟ [Multiple response]	Counselling on nutritionغذا کے بارے میں مشورہ دینا -------1 Counselling on iycf & breast feeding ماں کے دودھ اور آئی وائی سی ایف کا مشورہ دینا ---2 Counselling on family planning فیملی پلاننگ کے بارے میں مشورہ دینا ---3 Assessment for complications پیچیدگیوں کو سمجھنا---4 Referral to hfمرکز صحت بھیجنا ---5 Treatment for motherماں کے علاج کے حوالے سے --------6 Nutrition suppliesاضافی خوراک کی فراہمی ---7 Contraceptive suppliesمانع حمل کی فراہمی ---8 Others explain کچھ اور وضاحت کریں ---96	
W606	Did anyone check on (name of child) health? کیا کسی نے آپ کے بچہ کی صحت کا معائنہ کیا؟	*Yes* ہاں--- 1 *No* نہیں --- 2	2→Next Section (B6)
W607	Who checked the health after delivery کس نے آپ کے نومولود بچے کی صحت کا معائنہ کیاتھا [Multiple response]	Paediatrician بچے کے ڈاکٹرنے ---1 Other doctor کسی اور ڈاکٹر نے ---2 Nurseنرس ---3 CHW کمیونٹی ہیلتھ ورکر---4 LHWلیڈی ہیلتھ ورکر ---5 LHVلیڈی ہیلتھ ورکر ---6 TBA دائی---7 Other (specify) کوئی اور---96	
W608	How long after delivery did the first of these checks happen? بچے کی پیدائش کے کتنے عرصے بعد بچہ کامعائنہ ہوا؟ If less than one day, record hours. اگر ایک دن سے کم ہے (گھنٹہ ریکارڈ بتائیں) If less than one week, record days. اگر ایک ہفتے سے کم ہے (دن ریکارڈ بتائیں) Otherwise, record weeks. دوسری صورت میں ہفتہ ریکارڈ کریں	*Hours* گھنٹے---1 *Days* دنوں---2 *Weeks* ہفتے ---3 *Don't know/ don't remember*معلوم نہیں /یاد نہیں ---98	
W609	How many times such check happen? اس طرح کا معائنہ کتنی مرتبہ ہوا ؟	Times کتنی مرتبہ ______________________	

W610	Purpose of this check اس معائنہ کا مقصد کیاتھا [Multiple response]	Vaccination حفاظتی ٹیکے---------------------------------------1 Polio dropsپولیو سے بچاؤ کے قطرے----------------------------2 Assesment for complicationsپیچیدگیوں کو سمجھنا-----------3 Referral to hfصحت مرکز بھیجنا --------------------------------4 Treatment for child بچے کے علاج کے بارے میں ------------5 Others xplain کوئی اور---	

SECTION W7: MDD-W (For all MWRAs)

S #	QUESTIONS	RESPONSES	SKIP
W701	Now I would like to ask you about all food groups intake you had in last 24 hours اب میں آپ کی خوراک کے بارے میں پوچھنا چاہوں گی جو آپ نے پچھلے 24 گھنٹوں کے دوران کھائی تھی ؟ (Please tick all those apply) (مہربانی کر کے ہر جواب پر نشان لگائیں) Enumerators will explain the food groups to respondents and will use Job Aids. شمار کنندہ ،جواب دہندہ کو غذاؤں کے گروپ کے بارے میں وضاحت کرے گا	1. *Grains, white roots and tubers* اناج ،شلجم،چقندر -- Y/N 2. *Pulses (beans, peas, and lentils)* دالیں(لوبیا،مسور،ماش،چنے) ----------------------------- Y/N 3. *Nuts and seeds*گری دار میوے اور بیج -------------- Y/N 4. *Dairy products*دودھ کی بنی ہوئی اشیاء -------------- Y/N 5. *Meat, poultry, and fish*گوشت ،مرغی اور مچھلی --- Y/N 6. *Eggs*انڈے -- Y/N 7. *Dark green leafy vegetables* ہری پتہ والی سبزیاں ---------------------------------- Y/N 8. *Other vitamin a rich fruits and vegetables* دیگر سبزیاں اور وٹامن اےسے بھرپور پھل--------------------- Y/N 9. *Other vegetables*دیگر سبزیاں ----------------------- Y/N *96. Other fruits*دیگر پھل ---	

MODULE C
CHILD NUTRITION AND IYCF PRACTICES

Module C is for children under five years of age, specific sections will be filled as per the age of the available children in the household.

SECTION C1: UNDER 5 CHILDREN INFORMATION PANEL (CH)

Instructions: This section will be filled for all Under-2 from their caretakers/mothers. Before starting the interview, separate verbal consent to be taken from the respondent. Line number, date and time will be auto-generated from Household members list

CHILD INFORMATION		
C101. **CLUSTER NUMBER**)		C102. Household number
C103. Province: _ _ _ _ _ _ _ _ _ _ _ _ _ _	C104: District: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	
C105: Tehsil/Taluka: _ _ _ _ _ _ _ _ _ _ _ _ _ City/Village: _ _ _ _ _ _ _ _ _ _ _ _ _ _		C106. Child line number _______
	C107. Interviewer's name and number: _	C108. Team Leader's name and number: NAME
C109. Day / Month / Year of interview:		
___ ___ /___ ___ / 2 0 1 8		
C110. Record the time. HOURS: ___ MINUTES: ___	*The enumerator will read out the consent for understanding of respondent and will mention the purpose of the study and time required to complete the interviews (a separate consent sheet will be provided to the enumerators)*	
C111. **Name of Mother and Line Number**	---------------------------------------	

C112. Was consent taken?

	Yes	No
Verbal Consent	1	2
Written Consent	1	2

If verbal consent is not given STOP interview and move to last Question of this section to record the outcome of the interview

C113. *Result of child's questionnaire* *Discuss any result not completed with Team Leader.*	*COMPLETED* .... *1* *NOT AT HOME* .... *2* *REFUSED* .... *3* *PARTIALLY COMPLETED* .... *4* *INCAPACITATED* .... *5* *OTHER* (specify) .... *6* ______________________________

C114	Does *(name)* have a birth certificate? کیا (نام) کی پیدائش کا سرٹیفکیٹ بناہوا ہے *If yes, ask:* May I see it? And record age in months اگر ہاں ، تو پوچھیں کیا میں یہ سرٹیفکیٹ دیکھ سکتا ہوں اور بچہ کی عمر مہینوں میں لکھیں *If no use event calendar for age ascertainment* اگر نہیں ،تو ایونٹ کلینڈر استعمال کر کے بچے کی عمر کی شمار کریں	Yes, seen .... 1 Yes, not seen .... 2 No .... 3 DK 98	
C115	Has (*name*)'s birth been registered with ***the civil authorities***? کیا بچہ (نام) کا نادرا میں اندراج کردیاگیاہے؟	Yes .... 1 No .... 2 DK 98	
C116	Record Age in Months	_______ # of months	

SECTION C2: IYCF AND FOOD DIVERSITY (For Under 2)

سیکشن 2: نومولود اور چھوٹے بچوں کی غذا کے بارے میں

Instructions: This section will be filled for all Under-2 from their caretakers/mothers. Before starting the interview, separate verbal consent to be taken from the respondent. Line number, date and time will be auto-generated from Household members list

S #	QUESTION	RESPONSES	SKIP
C201	Child's Of Name بچے کا نام	--	
C202	Line No. of child's name بچے کالائن نمبر (FROM SECTION A2) سے دیکھ کر لکھیں A2_سیکشن	[__] [__]	
C203	Child's age? (in years) بچے کی عمر ؟(سالوں میں)	Age 0, 1, or 2 (2 اور 1،0)عمر ------------ 1 Age 3 to 5 (5 سے 3) عمر ------------ 2	2→ Section (C2)
C204	Has (**name**) ever been breastfed? کیا بچہ(نام) کو کبھی ماں کا دودھ پلایا گیا ہے ؟	Yes ہاں------------ 1 No نہیں ------------ 2 Don't knowمعلوم نہیں ------------98	2, 98 → Q12
C205	Is (**name**) still being breastfed? کیابچہ (نام) ابھی بھی ماں کا دودھ پی رہا ہے ؟	Yes ہاں------------ 1 No نہیں ------------ 2 Don't knowمعلوم نہیں------------98	2,98 → Q8
C206	Was (name) breastfed yesterday during the day or at night? کیا (بچے کا نام) نے کل دن اور رات کے دوران ماں کا دودھ پیا تھا؟	Yes ہاں------------ 1 No نہیں ------------ 2 Don't knowمعلوم نہیں ------------98	1 → Q8
C207	NOTE: Sometimes babies are fed breast milk in different ways, for example by spoon, cup or bottle. This can happen when the mother cannot always be with her baby. Sometimes babies are breastfed by another woman, or given breast milk from another woman by spoon, cup or bottle or some other way. This can happen if a mother cannot breastfeed her own baby. Did (NAME) consume breast milk in any of these ways yesterday during the day or at night? کبھی کبھی بچہ مختلف طریقوں سے ماں کا دودھ پیتا ہے؟ مثال طور: چمچ، کپ یا بوتل کے ذریعے، ایسا تب ہو تا کہ جب ماں ہر وقت بچے کے ساتھ نہیں ہوتی۔ کبھی کبھی بچے کو کوئی دوسری عورت بھی دودھ پلاتی ہے یا ماں کا دودھ چمچ ، کپ، بوتل یا کسی اور طریقے سے پلایا جاتا ہے ایسا اس وقت ہوتا ہے جب ماں دودھ پلانے کے حالت میں نہیں ہوتی۔ کیا بچے نے اوپر دےگئے طریقوں میں سے کل دن اور رات کے اس طریقے سے دودھ پیا؟	Yes ہاں------------ 1 No نہیں ------------ 2 Don't knowمعلوم نہیں ------------98	
C208	How long after birth did you first put (name) to the breast? آپ نے پیدائش کےکتنی دیر بعد پہلی دفعہ بچے کو اپنا دودھ پلایا؟	*Immediately* فوراً ------------ 1 *Within first hour after birth* پیدائش کے پہلے گھنٹے میں--- 2 *1-6 hours after the birth* پیدائش کے ایک سے چھ گھنٹہ کے اندر ------------ 3 *Over 6 hours but less than 24 hours* 6 گھنٹو ں سے زیادہ مگر 24 گھنٹوں سے پہلے ------------ 4 *24 hours or longer after birth* 24 گھنٹو ں یا اس سے زیادہ 5	
C209	Did you feed first milk (colostrum) to the child? کیا آپ نے بچے کو پہلا دودھ جو گاڑہ ہوتا ہے وہ پلایا تھا؟	Yes ہاں------------ 1 No نہیں ------------ 2 Don't knowمعلوم نہیں ------------98	1, 98→ Q11

<table>
<tr><td>C210</td><td>Why you did not feed colostrum to {name)?
بچہ(نام) کو آپ نےشروع شروع میں آنے والا گاڑہ دودھ کیو ں نہیں پلایا تھا؟</td><td colspan="4">Bad milkخراب دودھ-- 1
Fear of child illnessبچے کی بیماری کا خوف------------------ 2
Thicknessگاڑھاپن --- 3
Others (specify)دیگر وضاحت کریں
____________________</td><td></td></tr>
<tr><td>C211</td><td>Was (NAME) given anything to drink before breast milk?
کیا بچے (نام)کو ماں کا دودھ پینے سے پہلے کچھ اور پینے کے لیےدیا تھا ؟</td><td colspan="4">Yes ہاں--- 1
No نہیں -- 2</td><td>2 → Q13</td></tr>
<tr><td>C212</td><td>What was (name) given to drink?
(نام) کو کیا مشروب دیا گیا تھا؟
Probe: Anything else?
پوچھیں : کچھ اور بھی
‘Not given anything to drink’ (99) can only be recorded if no other response category is recorded.
کوئی چیز پینے کے لئے نہیں دی "99" اس صورت میں لکھا جائے گا جب بتائی گئی چیزوں میں نہیں پوچھی گئی ہو</td><td colspan="4">Milk (other than breast milk)(دودھ (ماں کےدودھ علاوہ -- 1
Plain water سادہ پانی -- 2
Sugar or glucose waterچینی یا گلوکوز کا پانی ------------- 3
Gripe water گرائپ واٹر ------------------------------------- 4
Sugar-salt-water solutionچینی نمک اور پانی ملا محلول--- 5
Fruit juiceپھل کا رس -- 6
Infant formulaفارمولا دودھ------------------------------------ 7
Tea / Infusions / Traditional herbal preparations
پانی/ ڈرپ/روایتی جڑی بوٹیوں سے بنابوا------------------------ 8
Honeyشہد -- 9
Prescribed medicineدوائیاں --------------------------------10
Other (specify)دیگر وضاحت کریں --------------------------96
Not given anything to drink پینے کے لئے کچھ بھی نہیں دیا---99</td><td></td></tr>
<tr><td>C213</td><td>Did (name) drink or eat vitamin or mineral supplements or any medicines yesterday, during the day or night?
کیا(نام) نے کل دن یا رات کے دوران کوئی وٹامن یا منرل سپلیمنٹ یا کوئی دوائی پی یاکھائی تھی؟</td><td colspan="4">Yes ہاں--- 1
No نہیں -- 2
Don’t knowمعلوم نہیں --------------------------------------- 98</td><td></td></tr>
<tr><td>C214</td><td>Did (name) <u>drink Oral Rehydration Salt solution (ORS)</u> yesterday, during the day or night?
کیا (نام) نے کل دن یا رات کے دوران نمکول(او-آر-ایس) پیاتھا؟</td><td colspan="4">Yes ہاں--- 1
No نہیں -- 2
Don’t knowمعلوم نہیں ---98</td><td></td></tr>
<tr><td>C215</td><td>Now I would like to ask you about all other liquids that (name) may have had yesterday during the day or the night.
اب میں آپ سےپوچھنا چاہونگا کے کیا (نام) نے کل دن اور رات کے دوران کوئی مائع یا مشروب دیاتھا؟

Please include liquids consumed outside of your home.
مہربانی اگر بچہ نے گھر کے باہر کوئی مشروب لیاتو اس کو شامل کریں
Did (name) drink (name of item) yesterday during the day or the night:
کیا(نام) نے کل رات یا دن کے دوران (مشروب کانام) کھایا پیاتھا؟</td><td>Items Name
اشیاء کا نام</td><td>Yes
ہاں</td><td>No
نہیں</td><td>Don’t know
معلوم نہیں</td><td></td></tr>
<tr><td></td><td>[A] Plain water?
سادہ پانی</td><td>Plain water سادہ پانی</td><td>1</td><td>2</td><td>98</td><td></td></tr>
<tr><td></td><td>[B] Infant formula, such as insert popular brands?
فارمولا ملک(برانڈ کانام کا اندراج کریں)</td><td>Infant formula
فارمولاملک</td><td>1</td><td>2</td><td>98</td><td>2,98 → Q15[C]</td></tr>
<tr><td></td><td>[B1] How many times did (name) drink infant formula?
If 7 or more times, record ‘7’.
If unknown, record ‘8’.
بچہ (نام) نے کتنی دفعہ فارمولا ملاکر پیا
اگر 7 سے زائد مرتبہ ہوتو 7 لکھے</td><td colspan="4">Number of times drank infant formula
دودھ پینے کی تعداد لکھیں--------------------------------[__][__]

Don’t knowمعلوم نہیں ---98</td><td></td></tr>
<tr><td></td><td>[C] Milk from animals, such as fresh, tinned, or powdered milk?
مویشی کا دودھ جیساکہ تازہ پاوڈریا ڈبے والا دودھ؟</td><td>Milkدودھ</td><td>1</td><td>2</td><td>98</td><td>2,98 → Q15[D]</td></tr>
</table>

	[C1] How many times did (**name**) drink milk? بچہ نے (نام) نے کتنی دفعہ دودھ پیا If 7 or more times, record '7'. If unknown, record '8'. اگر 7 سے زائد مرتبہ ہوتو 7 لکھے اگر معلوم نہیں 8 لکھیں	Number of times drank milk -------------------------- [__] دودھ پینے کی تعداد لکھیں Don't knowمعلوم نہیں --------------------------------------- 98				
	[D] Juice or juice drinks? جوس یا جوس کے مشروبات	Juice or juice drinks جوس یاجوس کے مشروبات	1	2	98	
	[E Local name for clear broth/clear soup? صاف سوپ (کسی بھی طرح کا)	Clear brothسوپ	1	2	98	
	[F] Yogurt / Lassi made from animal milk? دہی مویشی دودھ سے بنی ہوئی/ لَسّی	Yogurtدہی	1	2	98	2,98 → Q15[G]
	[F1] How many times did (**name**) eat yogurt? If 7 or more times, record '7'. If unknown, record '98'. بچہ (نام) نے کتنی دفعہ دہی کھائی تھی؟ اگر 7 دفعہ سے زیادہ تو 7 ریکارڈ کریں	Number of times ate yogurt--------------------------- [__] دہی کھانے کی تعداد لکھیں DON'T KNOWمعلوم نہیں -----------------------------------98				
	[G] Thin porridge?پتلا دلیہ		1	2	98	
	[H] Any other liquids such as [Grip Water, Tea, Rice water]? کوئی دیگر مائعات جیسے کے (گرائپ واٹر، چائے، چاول والا پانی)		1	2	98	
	[I] Any other liquids? کوئی اور مشروب /مائع	(Specify)وضاحت کریں ---- 96	1	2	98	

C216	Now I would like to ask you about <u>everything</u> that (**name**) ate yesterday during the day or the night. Please include foods consumed outside of your home. - Think about when (**name**) woke up yesterday. Did (he/she) eat anything at that time? If 'Yes' ask: Please tell me everything (**name**) ate at that time. Probe: Anything else? Record answers using the food groups below. - What did (**name**) do after that? Did (he/she) eat anything at that time? Repeat this string of questions, recording in the food groups, until the respondent tells you that the child went to sleep until the next morning. اب میں آپ سے پوچھنا چاہونگا کہ (نام) نے کل دن اور رات کے دوران جو بھی چیز کھائی ہو،برائے مہربانی ان تمام غذاؤں کو بھی شامل کریں جو بچہ نے گھر کے باہر کھائیں سوچ کر بتائیں کہ بچہ کل کس وقت بیدار ہوا ۔اور اُس وقت بچے نے کچھ کھایا؟ اگرہاں ،تو مجھے بتائیں (نام) اس وقت کیا کھایا تھا مزید پوچھیں اور کچھ کھایاتھا؟ نیچے دی گئی فوڈ گرروپس میں جواب نوٹ کریں۔اس کے بعد بچہ کیا کرتا رہا۔ کیا بچے نے اس وقت کچھ اور کھایا،فوڈ گروپس کے متعلق سوالات پوچھتے جائیں جب تک جوابدہندہ یہ نہ بتائےکہ بچے دوسرے دن صبح تک سونے کے لیے چلاگیا تھا۔				
	For each food group not mentioned after completing the above ask: Just to make sure, did (name) eat (food group items) yesterday during the day or the night تب تک کسی بھی فوڈ گروپس کا ذکر نہ کریں جب تک اوپر دئیے گئے سوالات کے جوابات نہ دیے گئے ہوں ۔ یقین دہانی کریں کہ بچہ نے (نام) نے کل دن اور رات میں (کونسے فوڈ گروپس)کھائے	Yes ہاں	No نہیں	Don't know معلوم نہیں	
	[A] Yogurt made from animal milk? دہی مویشی دودھ سے بنی ہوئی	1	2	98	2,98 →16(B)
	[A1] How many times did (**name**) eat yogurt? If 7 or more times, record '7'. بچہ (نام) نے کتنی دفعہ دہی کھائی تھی؟ اگر 7 دفعہ سے زیادہ تو 7 ریکارڈ کریں	Number of times ate yogurt............................[__] دہی کھانے کی تعداد لکھیں Don't knowمعلوم نہیں ---------98			
	[B] Any baby food, such as cerelac fortified baby food, e.g. Cerelac, NIDO or etc.? کوئی بھی بچوں کی غذا ،کمپنی یا برانڈ کانام لکھیں جیسے سریلیک،گربر،ہیرو،نیسٹم وغیرہ	1	2	98	
	[C] Bread, rice, noodles, porridge, or other foods made from grains? روٹی چاول،نوڈلس،کچھڑی،اور خوراک جو اناج سے بنی ہو	1	2	98	
	[D] Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside? کدو،گاجر،اسکوئش یامیٹھاآلو یا جو کہ اندر سے پیلا یا نارنجی ہو	1	2	98	
	[E] White potatoes, or any other foods made from roots? سفید آلو،شکر گندی یا جڑسے بنائی گئی دوسرے کھانے کے اشیاء	1	2	98	
	[F] Any dark green, leafy vegetables, vitamin A-rich dark green, leafy vegetables? کوئی بھی گہری ہری پتی دار سبزیاں جیسے مقامی طور پر دستیاب وٹامن اے سے بھرپور ہری پتے والی سبزیاں شامل کریں	1	2	98	
	[G] Ripe mangoes or ripe papayas vitamin A-rich fruits? پکاہوا آم،پکا ہو پپیتا،یہ دیگر مقامی وٹامن اے سے بھرپور پھل شامل کریں	1	2	98	
	[H] Any other fruits or vegetables? کوئی دوسرے پھل یاسبزیاں	1	2	98	
	[I] Liver, kidney, heart or other organ meats? جگر گردے،دل یا دوسرے گوشت کے اعضا	1	2	98	
	[J] Any other meat, such as beef, lamb, goat, chicken? کوئی بھی گوشت جیسے بڑےگوشت بھیڑ،بکری ،مرغی	1	2	98	
	[K] Eggs?انڈے	1	2	98	
	[L] Fish or shellfish, either fresh or dried? مچھلی یا خول والی مچھلی تازہ یا خشک	1	2	98	
	[M] Beans, peas, lentils or nuts, including any foods made from these? پھلیاں ،مٹر،دالیں، ان میں سے کسی بھی چیز بناہواکھانا شامل کریں ؟	1	2	98	
	[N] Cheese or other food made from animal milk? دودھ سے بنی ہوئی دیگر غذائیں	1	2	98	
	[X] Other solid, semi-solid, or soft food? دوسری ٹھوس ،نیم ٹھوس اور نرم غذا	1	2	98	2,98 → Q17

	[X1] Record all other solid, semi-solid, or soft food that do not fit food groups above. تمام ٹھوس نیم ٹھوس اور نرم غذا نوٹ کریں جو اوپر دئیے گئے فوڈگروپ میں موجود نہیں ہیں	(Specify)دیگروضاحت کریں ___________________	
C217	How many times did **(name)** eat any solid, semi-solid or soft foods yesterday during the day or night? بچہ نے (نام) کل دن اور رات کے دورن کتنی دفعہ ٹھوس ،نیم ٹھوس اور نرم غذا کھائی تھی؟ If Q16 [A] is 'Yes', ensure that the response here includes the number of times recorded for yogurt in Q16 [A1]. کنفرم کریں یہاں پر اگر Q16 [A] میں جواب ' ہاں' ہے تو یہاں پر یقینی بنائیں اور دہی کھانے کی تعداد لکھیں جو کہ Q16 [A1] میں لکھی گئی ہے ۔ If 7 or more times, record '7'. اگر 7 یا اس سے زیادہ ہوتو جوا ب میں 7 لکھیں	Number of times کتنی دفعہ تعداد --------------- [__] [__] Don't knowمعلوم نہیں ------------------------------------ 98	
C218	Yesterday, during the day or night, did (name) drink anything from a bottle with a nipple? بچہ(نام) نے کل، رات یا دن کے دوران کوئی چیز نپل والی بوتل کے ذریعہ پی؟	Yes ہاں -- 1 No نہیں -- 2 Don't know معلوم نہیں ---------------------------------- 98	2,98 → Q21
C219	What did (name) drink from the bottle with a nipple? بچے نے (نام) بوتل کی نپل سے کیا پیا؟	Top feed (formula milk)(فامولادودھ)بوتل کے ساتھ ----- 1 Animal milkمویشیوں کا دودھ ------------------------------ 2 Expressed milkماں کا نکلا ہوا دودھ --------------------- 3 Others (specify) دیگر وضاحت کریں ------------------ 96	
C220	Who advised you to use infant formula milk? آپ کو فارمولا دودھ استعمال کرنے کے لیے کس نے مشورہ دیا	Practitionerصحت مہیا کرنے والا------------------------ 1 Pharmacy/Pharmacistفارمیسی/فارمیسٹ----------------- 2 Relativesرشتہ دار-- 3 Others (Specify)دیگر وضاحت کریں ------------------ 96	
C221	Yesterday during day and night was (NAME) given Iron supplementation? بچہ(نام) کو کل، رات یا دن کے دوران Iron کی اضافی خوراک دی گئی ؟	Yes ہاں -- 1 No نہیں -- 2 Don't know معلوم نہیں ---------------------------------- 98	2,98 → Q23
C222	How many dosages of Iron supplementation given to (NAME)? (نام) کو کتنی Iron کی اضافی خوراکیں دی گئی؟	Dosages خوراکیں-------------------------------- [__] [__]	
C223	Yesterday during day and night was (NAME) given vitamin A supplementation? بچہ(نام) کو کل، رات یا دن کے دوران وٹامن اے کی اضافی خوراک دی گئی ؟	Yes ہاں -- 1 No نہیں -- 2 Don't know معلوم نہیں ---------------------------------- 98	2,98 → Q25
C224	How many dosages of vitamin A supplementation given to (NAME)? (نام) کو کتنی وٹامن اے کی اضافی خوراکیں دی گئی؟	Dosages خوراکیں----------------------------------- [__] [__]	
C225	Yesterday during day and night has [name] taken multi-micronutrient powder (MNP)? بچہ(نام) کو کل، رات یا دن کے دوران اضافی غذائی خوراک(MNP) دی گئی؟	Yes ہاں -- 1 No نہیں -- 2	2⇨ End of section (C3)
C226	How many dosages of multi-micronutrient powder (MNP) given to (NAME)? (نام) کو کتنی وٹامن اے کی اضافی غذائی خوراک(MNP) دی گئی؟	Dosages خوراکیں-------------------------------- [__] [__]	

Instructions: All children aged 12-23 and 24-35 months will be selected for this section

اس سیکشن میں صرف ان بچوں کا اندراج ہوگا جو 12 سے 23 مہینے کے درمیان اور 24 سے 35 مہینوں کے درمیان ہے

SECTION C3: IMMUNIZATION STATUS:

S #	QUESTION	RESPONSES	SKIP
C301	Child's age? In months بچے کی عمر مہینوں میں	Age 0-11 عمر 0 سے 11 مہینہ ---------------------------1 Age 12-23 عمر 12 سے 23 مہینہ ---------------------------2 Age 24-35 عمر 24 سے 35مہینہ ---------------------------3 Age 24-69 عمر 24 سے 69 مہینہ ---------------------------4	1,4 → Next Section

C302	Child's Of Name بچے کا نام	--	
C303	Line No. of child's name بچے کالائن نمبر (from Section A2) سیکشن A2 سے دیکھ کر لکھیں	[__] [__]	
C304	Did you have a National Child Immunisation Record or immunisation records from a private health provider for (name)? کیاآپ کے پاس قومی حفاظتی ٹیکوں کاکارڈ یا کسی نجی ادارے کی طرف سے دیاگیا حفاظتی ٹیکوں کا ریکارڈ موجود ہے ؟	Yes ہاں -- 1 No نہیں -- 2	
C305	May I see the card(s) (and/or) other document? کیا میں کارڈ یا دوسرے دستاویزات دیکھ سکتا ہوں؟	*Yes, only card(s) seen* ہاں ،صرف کارڈ دیکھاہے ------- 1 *Yes, only other document seen* ہاں ،صرف پرچہ دیکھا ہے -- 2 *Yes, card(s) and Other document seen* ہاں ،صرف کارڈ اور پرچہ دونوں دیکھاہے --- 3 *No cards and No other document seen* کوئی کارڈ یا پرچہ نہیں دیکھیں-- 4	*4→ Q6*

			Date of immunisation		
	(a) Copy dates for each vaccination from the documents. دی گئی ہر کارڈ یا پرچہ سے ویکسین کی تاریخ نوٹ کریں؟ (b) Write '44' in day column if documents show that vaccination was given but no date recorded. (c) اگردن کے کالم میں 44 لکھیں اگر کارڈ میں ویکسین دینے کی تاریخ نہ لکھی ہو		Day دن	Month مہینہ	Year سال
	At Birth پیدائش پر	BCG بی سی جی	[_]	[_] [_]	[_] [_] [_] [_]
		OPV-0 (Oral Polio Vaccine dose at birth) OPV پولیو پیدائش کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
	At age of 6 weeks 6 ہفتوں کی عمر کے وقت	OPV-1 (Oral Polio Vaccine first dose) OPV1- پولیو 6 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		Penta-1 (Pentavalent-1 (DPTHepBHib) *Pentavalent* 1-6 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		PCV-1 (Pneumococcal Conjugate Vaccine 1st dose) *Pneumococcal* 1- 6 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
	At age of 10 weeks 10 ہفتوں کی عمر کے وقت	OPV-2 (Oral Polio vaccine 2nd dose) *OPV* 2- پولیو 10 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		Penta-2 (Pentavalent-2 (DPTHepBHib) *Pentavalent*2- 10 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		PCV-2 (Pneumococcal Conjugate Vaccine 2nd dose) *Pneumococcal*2- 10 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
	At age of 14 weeks 14 ہفتوں کی عمر کے وقت	OPV-3 (Oral Polio vaccine 3rd dose) OPV 3- پولیو 14 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		Penta-3 (Pentavalent 3 (DPTHepBHib) *3-Pentavalent* 10 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		PCV 3 (Pneumococcal Conjugate Vaccine 3rd dose) *3-Pneumococcal* 10 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
		IPV (Injectable Polio Vaccine) IPV پولیو 14 ہفتوں کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
	At age of 9 months 9مہینے کی عمر کے وقت	Measles-1 (Measles vaccine first dose) *Measles-I9* مہینے کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]
	At age 15 months 15مہینے کی عمر کے وقت	Measels-2 (Measles vaccine second dose) *Measles-II 15* مہینے کی عمر کے وقت	[_]	[_] [_]	[_] [_] [_] [_]

C306	Did the child receive a BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar? کیا بچہ کو ٹی بی سے بچاؤ کے لیے بی سی جی کا ٹیکہ لگایا ،یہ ایک انجکشن ہے جو بازو پرلگایا جاتا ہےا ور عموماً ایک نشان بن جاتا ہے	Yes ہاں --1 No نہیں--2 Don't know معلوم نہیں-----------------------------------98	
C307	A DPT/PENTA vaccination, that is, an injection given in the thigh or buttocks, sometimes at the same time as polio drops? کیا بچے کو *DPT/PENTA* کے ٹیکے لگوائے جو کہ انجکشن کی صورت میں ران یا کولھوں میں لگائےجاتے ہیں اور اکثرپولیو کے قطروں کے ساتھ دئے جاتے ہیں	Yes ہاں --1 No نہیں--2 Don't know معلوم نہیں-----------------------------------98	2→Q9
C308	How many times was the DPT/PENTA vaccination given? *DPT/PENTA* کے ٹیکے کتنی دفعہ لگوائے تھے ؟	Number of times: تعداد ----------------------- [__] [__]	
C309	How many times was the PCV vaccination given? *PCV* کے ٹیکے کتنی دفعہ لگوائے تھے ؟		
C310	Did [name] received polio drops/vaccine during last polio campaign? کیابچے (نام) کو پچھلے پولیو مہم میں پولیو کے قطرے پلائے گئے تھے؟	Yes ہاں--1 No نہیں--2	
C311	Polio vaccine, that is, drops in the mouth? پولیو کے قطرے جو کہ منہ کے ذریعے پلائے جاتے ہیں ؟	Yes ہاں --1 No نہیں--2 Don't know معلوم نہیں-----------------------------------98	2→Q12
C312	Was the first polio vaccine given in the first two weeks after birth or later? کیا پولیو کے پہلے قطرے بچے کی پیدائش کے بعدپہلے 2 ہفتوں میں دئے گئے تھےیابعد میں ؟	First two weeks پہلے دو ہفتے ---------------------------1 Later بعد میں --2 Don't know معلوم نہیں ----------------------------------98	
C313	A hepatitis HBV vaccination that is an injection given in the thigh or buttocks, sometimes at the same time as polio drops? کیابچے (نام) کو ہیپاٹائٹس بی سے بچاؤ کے ٹیکے لگوایا جو کہ ران یا کولہے پر لگایا جاتا ہے یہ ٹیکہ کبھی کبھی پولیو کے قطرے پلاتے وقت بھی لگایا جاتا ہے ۔	Yes ہاں --1 No نہیں--2 Don't know معلوم نہیں-----------------------------------98	
C314	A measles injection or an MMR injection—that is, a shot in the arm at the age of 9 months or older—to prevent him/her from getting measles? کیابچے (نام) کو Measles یا MMRکا انجکشن لگوایا جو خسرہ سے بچاؤ کے لیے ہوتا ہے جو کہ بازو میں 9 مہینے یا اس سے بڑی عمر میں لگایا جاتا ہے	Yes ہاں --1 No نہیں--2 Don't know معلوم نہیں-----------------------------------98	2→Next Section
C315	How many times was the measles injection or an MMR vaccination given? Measles یا MMRکے ٹیکے کتنی دفعہ لگوائے تھے ؟	Number of times: تعداد .... [__] [__]	
C316	Did [name] ever received Inactivated Polio Vaccine (IPV)? کیا بچہ(نام) کو کبھی پولیو ا نجکشن لگایا؟		

SECTION C4: MORBIDITY & CARE SEEKING BEHAVIOUR

s #	question	responses	skip
C401	بچے کا نامCHILD'S OF NAME	....	
C402	Line No. of child's name بچے کالائن نمبر سیکشن A2سے دیکھ کر لکھیں (from Section A2)	[__] [__]	
DIARRHEA			
C403	Did the child had diarrhea in last two weeks? کیا (نام) کو گزشتہ دو ہفتوں کے دوران اسہال(دست) ہوئے؟	Yes ہاں ---1 No نہیں---2	2 →Q6
C404	Did The Child Seek Treatment for diarrhea? کیا آپ نے (نام)کا اسہال(دست) کی بیماری کا علاج کروایا ؟	Yes ہاں ---1 No نہیں---2	2 → Q5
C405	From Where The Treatment Was Sought for Diarrhea آپ نے (نام)کا اسہال(دست) کی بیماری کا علاج کہاں سے کروایا؟	***Public medical sector*** پبلک میڈیکل سیکٹر government hospitalسرکاری ہسپتال -------------------------1 government health centre سرکاری صحت سینٹر ------------2 government health postسرکاری صحت پوسٹ --------------3 community health workerکمیونٹی ہیلتھ ورکر ---------------4 mobile / outreach clinicموبائل / دوسرے کلینک -------------5 other public medical دوسرے عوامی طبی مرکز (specify*)* وضاحت کریں --- **Private medical sector** نجی ہسپتال/سیکٹر private hospital / clinicنجی ہسپتال /کلینک ------------------6 private physician نجی ڈاکٹر ----------------------------------7 private pharmacyنجی دواخانہ --------------------------------8 community health worker (non-government*)*غیرسرکاری عوامی صحت کارکن -------9 mobile clinic موبائل کلینک------------------------------------ 10 other private medical دوسرے نجی دواخانہ *(*specify*)* دیگر وضاحت کریں ------------------------------------- ***Other source***دیگر زرائع relative / friendرشتہ دار /صحت ---------------------------- 11 shop / market / streetدوکان /بازار/گلی ------------------- 12 traditional practitioner رِوایتی ---------------------------- 13 Other (specify*)* دیگر وضاحت کریں --------------------------- 96	
C406	What Was Given To Treat Diarrhea (نام)کو اسہال(دست) کی بیماری کے علاج کے لئے کون کونسی دواء دی گئی؟ [multiple response]	**Ors**(او آر ایس) نمکول --- 1 **Pill or syrup**گولیاں یا شربت antibioticاینٹی بائیوٹک--2 antimotility (anti-diarrhoea) دست روکنے والی ادویات -----3 zinc زنک --4 unknown pill or syrupنامعلوم گولیاں/شربت ------------------7 **Injection**انجکشن antibiotic اینٹی بائیوٹک--8 non-antibiotic اینٹی بائیوٹک کے علاوہ -------------------------9 unknown injectionنامعلوم انجکشن-------------------------- 10 Intravenous (iv)نس کے ذریعہ ------------------------------- 11 Home remedy / herbal medicineگھر یلو ادویات یا ہربل ادویات --------------- 12 **Other (specify)** کچھ اور -------------------------------------- *96*	

ARI			
C407	Did the child had ARI in last two weeks? کیا (نام) کو گزشتہ دو ہفتوں کے دوران نمونیہ *(ARI)* ہوا؟	Yes ہاں ---------- 1 No نہیں ---------- 2	2 → Q10
C408	Did The Child Seek Treatment for ARI? کیا آپ نے (نام)کا نمونیہ (ARI)کی بیماری کا علاج کروایا ؟	Yes ہاں ---------- 1 No نہیں ---------- 2	2 → Q9
C409	From Where The Treatment Was Sought for ARI? آپ نے (نام)کا نمونیہ *(ari)*کی بیماری کا علاج کہاں سے کروایا؟	***Public medical sector*** بپلک میڈیکل سیکٹر government hospital سرکاری ہسپتال ---------- 1 government health centre سرکاری صحت سینٹر ---------- 2 government health post سرکاری صحت پوسٹ ---------- 3 community health worker کمیونٹی ہیلتھ ورکر ---------- 4 mobile / outreach clinic موبائل / دوسرے کلینک ---------- 5 other public medical دوسرے عوامی طبی مرکز (specify*)* وضاحت کریں ---------- **Private medical sector** نجی ہسپتال/سیکٹر private hospital / clinic نجی ہسپتال /کلینک ---------- 6 private physician نجی ڈاکٹر ---------- 7 private pharmacy نجی دواخانہ ---------- 8 community health worker (non-government*)* غیرسرکاری عوامی صحت کارکن ---------- 9 mobile clinic موبائل کلینک ---------- 10 other private medical دوسرے نجی دواخانہ *(*specify*)* دیگر وضاحت کریں ---------- ***Other source*** دیگر زرائع relative / friend رشتہ دار /صحت ---------- 11 shop / market / street دوکان /بازار/گلی ---------- 12 traditional practitioner روایتی ---------- 13 Other (specify*)* دیگر وضاحت کریں ---------- 96	
C410	What Was Given To Treat ARI? (نام)کونمونیہ (ari)کی بیماری کے علاج کے لئے کون کونسی دواء دی گئی؟ [multiple response]	**Pill or syrup** گولیاں یا شربت antibiotic اینٹی بائیوٹک ---------- 1 antimotility (anti-diarrhoea) دست روکنے والی ادویات ---------- 2 zinc زنگ ---------- 3 unknown pill or syrup نامعلوم گولیاں/شربت ---------- 4 **Injection** انجکشن antibiotic اینٹی بائیوٹک ---------- 5 non-antibiotic اینٹی بائیوٹک کے علاوہ ---------- 6 unknown injection نامعلوم انجکش ---------- 7 Intravenous (iv) نس کے ذریعہ ---------- 8 Home remedy / herbal medicine گھر یلو ادویات یا ہربل ادویات ---------- 9 **Other (specify)** کچھ اور ---------- *96*	

FEVER			
C411	Did the child had Fever in last two weeks? کیا (نام) کو گزشتہ دو ہفتوں کے دوران بخارہوا؟	Yes ہاں ---1 No نہیں---2	2 →Q14
C412	Did The Child Seek Treatment for Fever? کیا آپ نے (نام)کا بخار کا علاج کروایا ؟	Yes ہاں ---1 No نہیں---2	2 → Q13
C413	From Where The Treatment Was Sought for Fever? آپ نے (نام)کا بخار کا علاج کہاں سے کروایا؟	***Public medical sector*** پبلک میڈیکل سیکٹر government hospital سرکاری ہسپتال ---1 government health centre سرکاری صحت سینٹر ---2 government health post سرکاری صحت پوسٹ ---3 community health worker کمیونٹی ہیلتھ ورکر ---4 mobile / outreach clinic موبائل / دوسرے کلینک ---5 other public medical دوسرے عوامی طبی مرکز (specify) وضاحت کریں --- **Private medical sector** نجی ہسپتال/سیکٹر private hospital / clinic نجی ہسپتال /کلینک ---6 private physician نجی ڈاکٹر ---7 private pharmacy نجی دواخانہ ---8 community health worker (non-government) غیرسرکاری عوامی صحت کارکن ---9 mobile clinic موبائل کلینک--- 10 other private medical دوسرے نجی دواخانہ *(specify)* دیگر وضاحت کریں --- ***Other source*** دیگر زرائع relative / friend رشتہ دار /صحت--- 11 shop / market / street دوکان /بازار/گلی --- 12 traditional practitioner روایتی --- 13 Other (specify) دیگر وضاحت کریں --- 96	
C414	What Was Given To Treat Fever? (نام)کوبخارکے علاج کے لئے کون کونسی دواء دی گئی؟ [multiple response]	**Ors**(او آر ایس) نمکول --- 1 **Pill or syrup** گولیاں یا شربت antibiotic اینٹی بائیوٹک---2 antimotility (anti-diarrhoea) دست روکنے والی ادویات ---3 zinc زنگ ---4 unknown pill or syrup نامعلوم گولیاں/شربت ---7 **Injection** انجکشن antibiotic اینٹی بائیوٹک---8 non-antibiotic اینٹی بائیوٹک کے علاوہ ---9 unknown injection نامعلوم انجکش--- 10 Intravenous (iv) نس کے ذریعہ --- 11 Home remedy / herbal medicine گھر یلو ادویات یا ہربل ادویات --- 12 **Other (specify)** کچھ اور --- *96*	
C415	Was (NAME) given any drug for intestinal worms in the last six months? کیا بچہ (نام) کوگزشتہ چھ مہینوں میں پیٹ کے کیڑے مارنے والی دوا دی گئی تھیں؟	Yes ہاں ---1 No نہیں---2 Don't know معلوم نہیں--- 98	
C416	Was (NAME) had night blindness (difficulty in seeing clearly in dusk) during your last six months? کیا بچہ (نام) کو گزشتہ چھ مہینے کے دوران رات میں کم نظر آتا ہے	Yes ہاں ---1 No نہیں---2 Don't know معلوم نہیں--- 98	

SECTION C5: CHILD DISABILITY)To be asked from mother of children aged 24-59 months) سیکشن 5: بچہ میں معذوری(59-24 مہینے کے بچوں کے لیے)

S.13 No.	Questions	Responses	Skip
C501	Child's Of Name بچے کا نام	--	
C502	Line No. of child's name بچے کالائن نمبر (from Section A2) سیکشن A2 سے دیکھ کر لکھیں	[__] [__]	
C503	Does the child have difficulty seeing, even if wearing glasses? کیا آپ کےبچےکو دیکھنے میں مشکل پیش آتی ہے یہا ں تک کے چشمہ بھی پہنا ہو؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے------------------------4	
C504	Does the child have difficulty hearing, even if using a hearing aid? کیا آپ کےبچےکو سننےمیں مشکل پیش آتی ہیں یہاں تک کے کانوں والی مشین لگی ہوئی ہو؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے---------------------- 4	
C505	Does the child have difficulty walking or climbing steps? کیا آپ کےبچےکو چلنے یا چڑھنے کے دوران کوئی مشکلات پیش آتی ہے؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے---------------------- 4	
C506	Does the child have difficulty remembering or concentrating? کیا آپ کےبچےکو یاد رکھنے اور توجہ دینے میں کوئی مشکلات پیش آتی ہے؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے------------------------4	
C507	Does the child have difficulty (with self-care such as) washing all over or dressing? کیا آپ کےبچےکو اپنے دیکھ بھال(مثلاً: ہاتھ منہ دھونا ،وغیرہ) میں مشکل پیش آتی ہے؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے------------------------4	
C508	Using your usual language, does the child have difficulty communicating, (for example understanding or being understood by others)? کیااپنی روز مرہ کی زبان استعمال کرتے ہوئے آپ کےبچےکو بات چیت میں (مثلاً کسی کو بات سمجھاتے وقت یا کسی کی بات سمجھتے وقت) دشواری پیش آتی ہے ؟	No difficulty سنائی دینے میں کوئی مشکل نہیں--------------------1 Some difficulty کچھ مشکل سے سنائی دیتا ہے--------------------2 A lot of difficulty بہت مشکل سے سنائی دیتا ہے-----------------3 Cannot do at all بلکل نہیں سنائی دیتاہے------------------------4	

MODULE D
ANTHROPOMETRY AND EXAMINATION

Instructions: Among available members; Children under 5, MWRA (15 to <60) and Adolescent (10 to <20) (Boys and Girls are eligible for this section)

گھر میں موجود پانچ سال سے کم عمر بچے ،شادی شدہ خواتین ،اور نوعمر مرد اورخواتین کے لیے

A101.Line # لائن نمبر	**A102.Weight (Kg)** وزن(سینٹی میٹر)	**A103.Height/length (cm)** لمبائی (سینٹی میٹر)	**A104.MUAC (cm)** (سینٹی میٹر)	**A105.BCG Scar** **1] yes 2] no** (for u-5)	**A106.Goiter** **1] yes 2] no** (for MWRA and Adolescent)	**A107.Clinical Anemia** **1] yes 2] no** (for MWRA and Adolescent)	**A108.Odeama** **1] yes 2] no** (for MWRA)

ANNEX I

Qualitative study background and context

National Nutrition Survey 2018

1 Annex 2: Provincial and Regional Historical, Cultural and Administrative Details

1.1 Section 2.1: Focus Group Discussions in Punjab

The history of the Punjab concerns the history of the Punjab region the Northern area of the Indian Subcontinent that is split between the modern day countries of Pakistan and India. Punjab historically known as *Sapta Sindhava,* the land of seven rivers; only two rivers Sutlej and Beas flow through Punjab in India. All these five rivers finally merge into Indus River directly or indirectly. The name Punjab was given by later Muslim Invaders. Ancient Punjab region was the primary geographical extent of the Indus Valley Civilization.

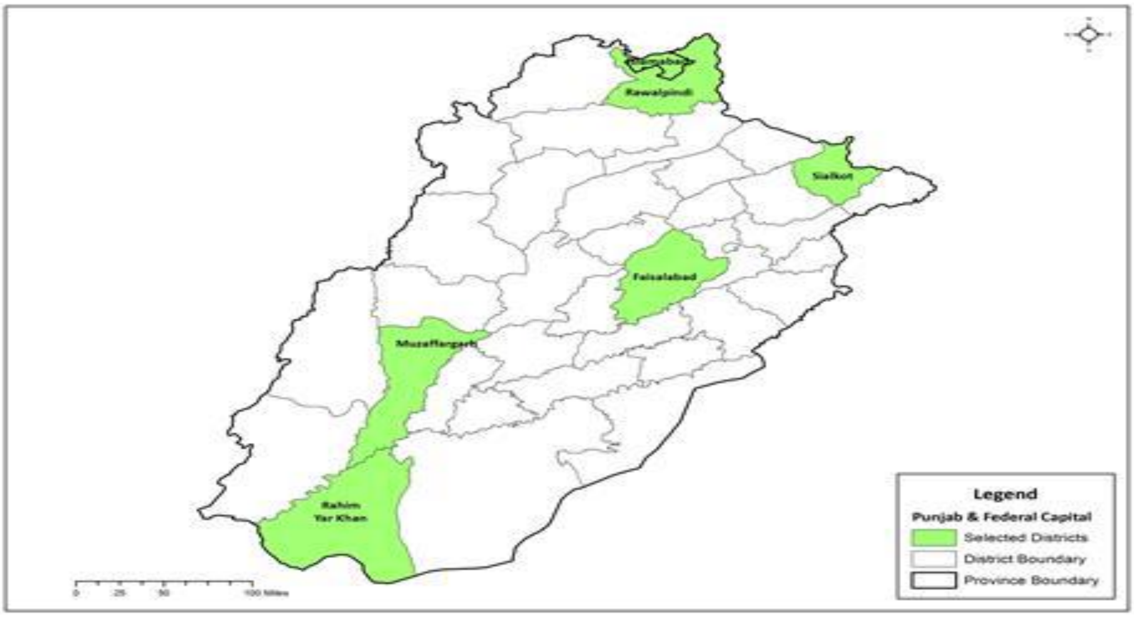
Ethnically, linguistically and culturally Punjab is one of the most diverse regions in Pakistan, home to three major non Punjabi indigenous languages and cultures, the biggest of them being are *Saraikis* which form up the majority in most of the south and then that of *Potaharis* and *Hazarawals*. Studies have shown that Punjabis themselves are drastically different in looks, skin and color. From the costume, customs to music every group of people has its unique style. The province of Punjab is consists of 9 divisions, 36 districts and 145 tehsils. To include logical spread of people in FGDs; Rahimyar Khan, Muzaffargarh, Faisalabad, Sialkot, Rawalpindi and Islamabad as the capital territory were selected.

In spite of extensive network of health care facilities, health status of the people of Punjab as a whole is below the desired level. Infant mortality rate is 77 per 1000 live births, child mortality (<5 years) rate is 112 per 1000 live births. Maternal mortality ratio is estimated to be 300 per 100,000 live births, lower than the national figure 350. Total fertility rate in the province is estimated to be 4.7. Still 42 percent of the population has no access to sanitation. Currently there are about four million malnourished children in Punjab, and about a third of all pregnant women are estimated to have iron deficiency anemia. Over 34 percent of children under the age of five years are short for their age (stunted); over 10 percent are under weight for their age (wasted) and over half anemic. Malnutrition is a major contributor to infant and maternal deaths.[85]

Table 1-1: Number of FGDs in Punjab

Province/ Region	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys / Girls	
Punjab	Rahimyar Khan, Muzaffargarh, Faisalabad, Sialkot, Rawalpindi, Islamabad	12	12	12	12	24	72

Figure 1-1: Punjab



Characteristics of Participants

The participation of 54% women in FGDs somehow shows the women active involvement in all walks of life. More than half (53%) of the participants were in the age group of 11 – 29 years. Education level of participant was so high, 90% have attended school from Matric to Masters while 0nly 5% never went to school. Thirty-one percent housewives and 21% lady heath workers attended FGDs. Unemployed participants were also 19% which shows frustration among the educated men and women. Details about gender, age, education and profession of all participants are given in the following table.

Table 1-2: FGDs Participants Punjab: Gender, Age, Education and profession

Social Statistics	**N=747**
Gender	
Male	342 (46%)
Female	405 (54%)
Age in years	
11-19	253 (34%)
20-29	143 (19%)
30-39	157 (21%)

40-49	119 (16%)
50 and above	75 (10%)
Education	
No schooling	35 (5%)
Primary	39 (5%)
Secondary	445 (60%)
Intermediate	78 (10%)
Higher Education	149 (20%)
Profession	
Housewife	234 (31%)
Teacher	28 (4%)
Lady Heath Worker / Lady Health Supervisor	160 (21%)
Private Employee	30 (4%)
Government Employee	22 (3%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	28 (4%)
Daily Wage Worker	105 (14%)
Unemployed	140 (19%)

1.2 Section 2.2 Focus Group Discussions in Sindh

The history of Sindh is intertwined with the history of the broader Indian subcontinent and surrounding regions. Sindh was at the center of the Indus valley civilization, one of the cradle of civilization; and currently a province of modern-day Pakistan.

The province of Sindh consists of 6 divisions, 29 districts and 138 talukas/tehsils and culturally divided into three historic regions: Utter or Siro (the upper region, centered on Jacobabad), Wicholo (the middle region, centered on Benazirabad), and Lar (the lower region, centered on Karachi).[86] Therefore keeping in view of cultural and historical distribution Karachi, Tharparkar, Benazirabad and Kamber were selected for FGDs.

According to MICS – Sindh 2014,[87] Sindh lags behind the rest of the country across most measures of child malnutrition, with almost half of children being stunted (48%). The level of stunting is about 10% and underweight is about 20% higher than the national average, based on PDHS 2018 data,[88] and the level of wasting also is higher by 8% in Sindh.

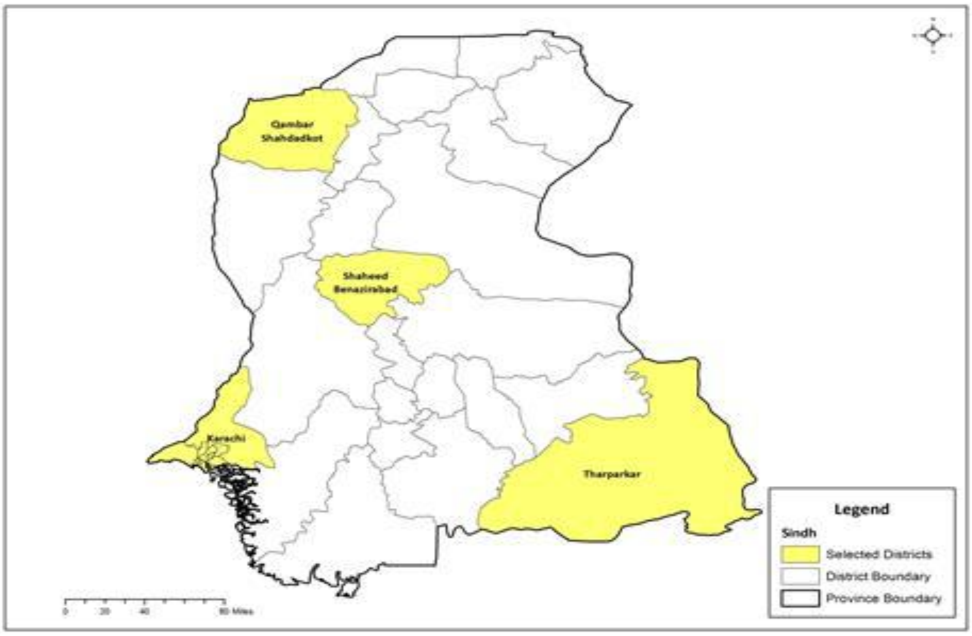
FGDs' Distribution by Category of Participants

Altogether 48 FGDs; 8 each of mothers, lady health workers, community leaders, fathers, adolescent boys and adolescent girls were conducted both in urban and rural areas of Karachi, Tharparkar, Benazirabad and Kamber.

Table 1-3: Number of FGDs

Province /Region	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys / Girls	
Sindh	Karachi, Shaheed Benazirabad, Kamber , Tharparkar	8	8	8	8	16	48

Figure 1-2: Sindh



Characteristics of Participants

Overall, 492 participants attended the FGDs in Sindh which comes to around 10 participants in one FGD. Among all participants, 45% were male and 55% female. Adolescent, both boys and girls (11 – 19 years) were dominated (34%) because 16 FGDs were separately conducted for them, followed by the age group of 30 – 39 years (26%). Seventy-nine percent of participant studied from matric and higher education while 14% never went to school. Thirty-three percent housewives attended the FGDs while next higher attendance was of lady heath workers (19%). Details about gender, age, education and profession of all participants are given in the following table.

Table 1-4: FGDs Participants Sindh: Gender, Age, Education and Profession

Social Statistics	N=492

Gender	
Male	223 (45%)
Female	269 (55%)
Age in years	
11-19	166 (34%)
20-29	79 (16%)
30-39	130 (26%)
40-49	75 (15%)
50 and above	42 (9%)
Education	
No schooling	71 (14%)
Primary	33 (7%)
Secondary	222 (45%)
Intermediate	93 (19%)
Higher Education	73 (15%)
Profession	
Housewife	164 (33%)
Teacher	23 (5%)
Lady Heath Worker / Lady Health Supervisor	95 (19%)
Private Employee	16 (3%)
Government Employee	16 (3%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	27 (6%)
Daily Wage Worker	65 (13%)
Unemployed	86 (18%)

1.3 Section 2.3 Focus Group Discussions in Khyber Pakhtunkhwa Including Ex-FATA

Khyber Pakhtunkhwa formerly known as North-West Frontier Province is one of the four provinces of Pakistan located in the north western region along the international border with Afghanistan. KP is the third-largest province of Pakistan by the size though it is geographically the smallest of four. The province is the site of the ancient kingdom Gandhara, including the ruins of its capital Pushkalavati near modern-day Charsadda. Originally a stronghold of Buddhism, the history of the region was characterized by frequent invasions under various Empires due to its geographical proximity to the Khyber-Pass. The major languages spoken are Pashto, Hindko and Saraiki. After merging of Ex. FATA the administrative structure of Khyber Pakhtunkhwa consists of 7 divisions, 25 districts, 7 merging districts, 6 sub-divisions, 113 tehsils from which districts of Mardan, Dera Ismail Khan, Mansehra, Chitral, Upper Dir and Orakzai from merging districts were selected for conducting the FGDs.

In Khyber Pakhtunkhwa, more than 85% children aged six to 23 months do not receive the recommended amount and quality of diet, mainly due to ignorance. Khyber Pakhtunkhwa in specific has a huge burden of all forms of malnutrition. Every second child (an estimated 800,000 children under the age of five years) in the province is stunted (having low average height for a given age) and every sixth child (an estimated 100,000 children) is wasted. The situation of micronutrient deficiencies is alarmingly high in children under the age of five years, with 68.5 percent having vitamin A deficiency, 49 percent pc being anemic and 45.4 percent having zinc deficiency. Only 40.5 percent of newborn babies receive mother's milk within one hour of birth while 38 percent infants less than six months of age receive exclusively mother's milk, which means that more than 60 percent of children under six months receive mixed feeding.[88]

FGDs' Distribution by Category of Participants

Altogether 72 FGDs; 12 each of mothers, lady health workers, community leaders, fathers, adolescent boys and adolescent girls were conducted both in urban and rural areas of Mardan, Dera Ismail Khan, Mansehra, Chitral, Upper Dir and Orakzai Agency.

Table 1-5: Number of FGDs

Province	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys/Girls	
Khyber Pakhtunkhwa	Mardan, Dera Ismail Khan, Mansehra, Chitral, Upper Dir and Orakzai Agency	12	12	12	12	24	72

Figure 1-3: Khyber Pakhtunkhwa

Characteristics of Participants

In all, 731 participants took part in 72 FGDs in KP; among them 55% were male and 45% female. Relatively, young age group (11-39 years) overwhelming participation (81%) shows the proactive attitude youths towards understanding of nutrition problems across the KP. It was also heartening to note that 94% these youths studied from matric to university level however unemployment (22%) is alarming. Other details about FGDs participants are given in the following table.

Table 1-6: FGD's Participants in Khyber Pakhtunkhwa

Social Statistics	N=731
Gender	
Male	403 (55%)
Female	328 (45%)
Age in years	
11-19	252 (35%)
20-29	151 (20%)
30-39	193 (26%)
40-49	87 (12%)
50 and above	48 (7%)
Education	

No schooling	62 (7%)
Primary	Nil
Secondary	425 (58%)
Intermediate	127 (19%)
Higher Education	117 (17%)
Profession	
Housewife	206 (28%)
Teacher	23 (2%)
Lady Heath Worker / Lady Health Supervisor	119 (17%)
Private Employee	28 (4%)
Government Employee	31 (5%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	78 (11%)
Daily Wage Worker	88 (11%)
Unemployed	157 (22%)

1.4 Section 2.4: Focus Group Discussions in Balochistan

A number of tribes constitute to make people of Balochistan, the largest province of Pakistan in terms of land (44%) which is 347190²km or 134050² miles). Three major tribes are Baloch (Baloch & Brahui) and Pashtun. 20 Baloch majority districts have population of 6,607,263 and 9 Pashtun majority districts have a population of 3,111,524. Analysis of the district wise population figures of 6th population census show that population balance of Baloch and Pashtun districts is same as it was in last census. Based on the assumptions 61% population of province comprises of Baloch and 33% Pashtun. The same ratio based on the aforementioned assumptions was 63:33 in 1998 census.[89] There are 6 administrative divisions, 34 districts and 137 Tehsils in Balochistan.

The situation of child malnutrition in Balochistan is worse as compared to other provinces where thousands of children and women die due to food insecurity. Like other social, economic and political issues, women and children malnutrition is one of the major problems in the province. Despite the several efforts, the situation of malnutrition is abysmal in Balochistan. National Nutrition Cell conducted a survey that 49 percent of the women are suffering from malnutrition and 49 percent were affected by maternal anemia. On the other hand, 57 percent of children (<5 years) were the victim of anemia and 29 percent of women had iodine deficiency in the province. Fifty-two percent children have reportedly become the victim of stunting as a result of severe undernourishment.[90]

FGDs' Distribution by Category of Participants

In Balochistan, 60 FGDs; 10 each of mothers, lady health workers, community leaders, fathers, adolescent boys and adolescent girls were conducted both in urban and rural areas of Quetta, Pishin, Khuzdar, Turbat and Jaffarabad.

Table 1-7: FGDs distribution

Province/ Region	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys / Girls	
Balochistan	Quetta, Pishin, Khuzdar, Turbat , Jaffarabad	10	10	10	10	20	60

Characteristics of Participants

Among the participants (597) who were participated in 60 FGDs in Balochistan, male and female participant were equally (50:50) attended. Eighty-five percent participants, the highest in all provinces and region were from the young age groups (11 – 39 years). However the highest ratio of illiterate participants was also from Balochistan (21%) while 37% were studied up to matric level and only 18% reached at the university level which shows the sorry-state of educational development in this poorest province of Pakistan where 29% participant employed by the public and private sector. Daily wage workers were 14% and jobless percentage was 19.

Figure 1-4: Balochistan

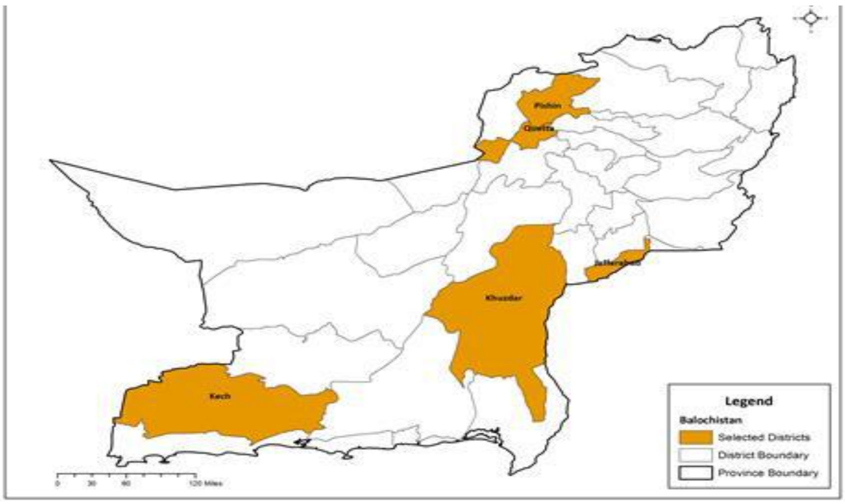


Table 1-8: FGDs Participants Balochistan

Social Statistics	N=597
Gender	
Male	297 (50%)
Female	300 (50%)
Age in years	
11-19	189 (32%)
20-29	123 (21%)
30-39	192 (32%)
40-49	71 (12%)
50 and above	22 (4%)
Education	
No schooling	124 (21%)
Primary	21 (4%)
Secondary	220 (37%)
Intermediate	126 (21%)
Higher Education	106 (18%)
Profession	
Housewife	187 (31%)
Teacher	34 (6%)
Lady Heath Worker / Lady Health Supervisor	94 (16%)
Private Employee	17 (3%)
Government Employee	28 (4%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	41 (7%)
Daily Wage Worker	83 (14%)
Unemployed	113 (19%)

1.5 Section 2.5: Focus Group Discussions in Gilgit-Baltistan

Though small in terms of population, the lingual diversity of Gilgit-Baltistan is amazingly rich. The region is home to nine languages – Shina, Balti, Burushaski, Wakhi, Khowar, Domaki, Gojri, Uighur and Pashtu. Thus, the linguistic diversity makes the region a mosaic of languages.[91] There is no denying the fact that Gilgit Baltistan's multi-ethnic, multilingual and multi-sectional composition is a rare example of "unity in diversity." The ethno-linguistic situation in the Gilgit Baltistan province shows a clear cut variation on language and ethnic lines. Ghizer is dominated (87 percent) by Brusho tribe and speak Shina, Khowar and Brushashki. Gilgit and Hunza have a heterogeneous population with (54 percent) having Brusho, Shina and Yashkun identities and they speak Shina, Brushashki and Wakhi languages.[92] In Gilgit there is a cultural-mix due to migrations and economic pursuits. Diamar and Astore are known for Shin, Yashkun and Kohistani who speak Shina as major language[93] (Hilali, 1995: 87-89). In Baltistan, 97% belong to Mongol tribes in majority and 3% Mon, Brokpa, Hor and Pakhtuns as minorities with Balti as a major language. However, Kashmiris, Kohistanis, Gujars, Pakhtuns, Punjabis, Hazaras and Afghanis are also seen in small numbers in the whole region as migrants, laborers and businessmen.[94] Gilgit Baltistan province consists of 3 divisions, 10 districts and 25 tehsils. Gilgit and Skardu were selected for conducting the FGDs.

About two out of ten children under the age of five in GB are underweight (19.4%) while 5.6 percent are severely underweight. Almost half of children under five (46.2%) are stunted or short for their age and just over one in five (22.2%) children are severely stunted. The results recent MICS 2016-17 show that 3.8 percent of the children are wasted or thin for their height and only 2.9 percent of children are overweight or too heavy for their height.[95]

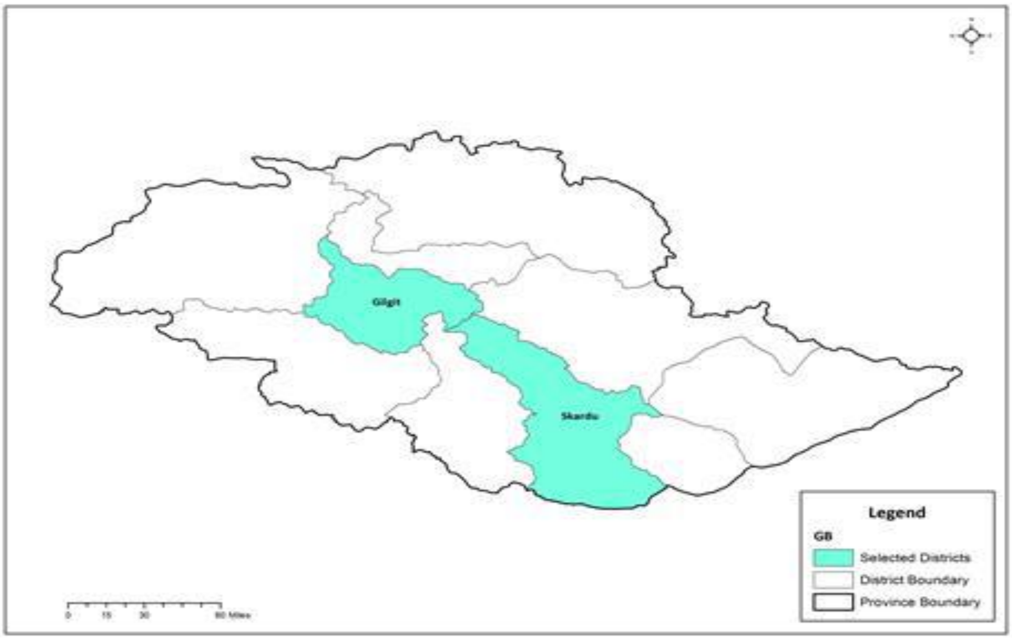
FGDs' Distribution by Category of Participants

In Gilgit-Baltistan, 24 FGDs; 4 each of mothers, LHWs, community leaders, fathers, adolescent boys and adolescent girls were conducted both in urban and rural areas of Gilgit and Skardu.

Table 1-9: Number of FGDs in GB

Province	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys/Girls	
Gilgit-Baltistan	Gilgit, Skardu	4	4	4	4	8	24

Figure 1-5: Gilgit Baltistan



Characteristics of Participants

Participation of male and female in all FGDs of Gilgit-Baltistan was 47% and 53% respectively. Highest (36%) participants were of the age group 11 – 19 years followed by 30 – 39 years (23%). Fifty-seven percent participants studied up to secondary school level (10 years schooling). Housewives representation was 30% while 21% participants were jobless. Other details are given in following table.

Table 1-10: FGDs Participants in Gilgit- Baltistan

Social Statistics	N=232
Gender	
Male	109 (47%)
Female	123 (53%)
Age in years	
11-19	83 (36%)
20-29	31 (13%)
30-39	53 (23%)
40-49	39 (17%)
50 and above	26 (11%)

Education	
No schooling	10 (4%)
Primary	12 (5%)
Secondary	133 (57%)
Intermediate	42 (18%)
Higher Education	35 (15%)
Profession	
Housewife	68 (30%)
Teacher	12 (5%)
Lady Heath Worker / Lady Health Supervisor	42 (18%)
Private Employee	18 (9%)
Government Employee	22 (8%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	9 (2%)
Daily Wage Worker	10 (4%)
Unemployed	48 (21%)

1.6 Section 2.6: Focus Group Discussions in Azad Jammu and Kashmir Region

The population of Azad Jammu and Kashmir (AJK) is almost entirely Muslim. The people of this region culturally differ from the Kashmiris living in the Kashmir Valley and are closer to the culture of Jammu. Mirpur, Kotli and Bhimber are all old towns of the Jammu region.[96] The culture of Azad Kashmir has many similarities to that of northern Punjab (Potohar) culture. The foremost among these is Pahari-Pothwari, with its various dialects. There are also sizeable communities speaking Gujari and Kashmiri, as well as pockets of speakers of Shina, Pashtu and Kundal Shahi. In AJK, there are 3 administrative divisions, 10 districts and 32 tehsils. For conducting FGDs, Mirpur and Rawalakot were selected.

In AJK, the available data on malnutrition situation in AJK show that 32 percent of children under five years of age in AJK were stunted, 18 percent wasted and about 26 percent underweight.

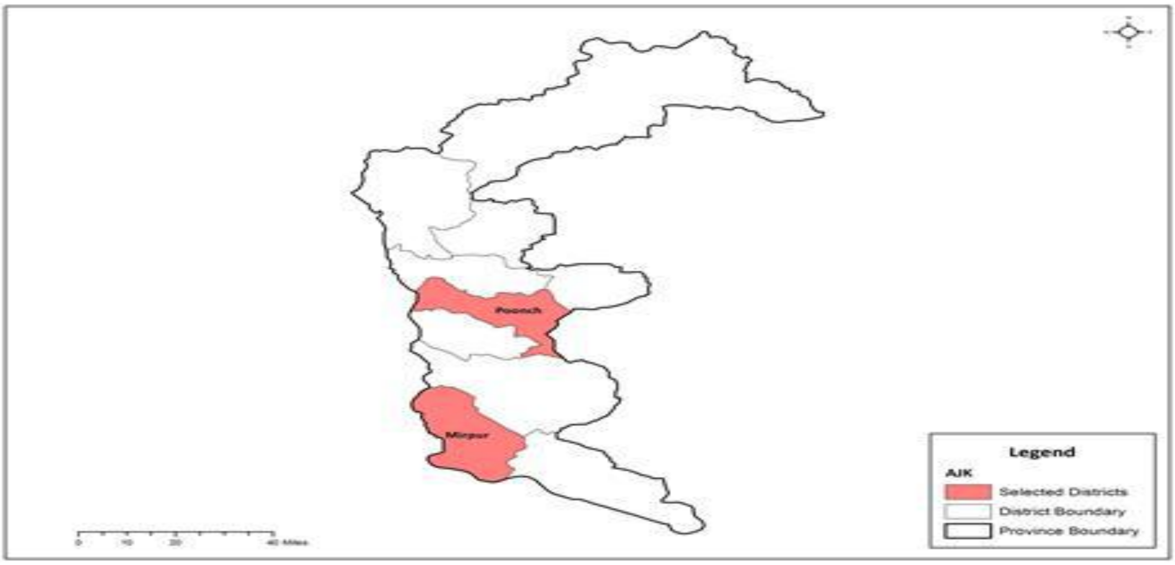
FGDs' Distribution by Category of Participants

Altogether 24 FGDs; 4 each of mothers, lady health workers, community leaders, fathers, adolescent boys and adolescent girls were conducted both in urban and rural areas of Mirpur and Rawalakot.

Table 1-11: Number of FGDs in AJK

Province/ Region	Districts	Number of FGDs (One each at Urban and Rural Area)					Total
		Mothers	LHWs	Community Leaders	Fathers	Adolescent Boys / Girls	
Azad Jamu & Kashmir	Mirpur, Rawalakot	4	4	4	4	8	24

Figure 1-6: Azad Jammu and Kashmir



Characteristics of Participants

In all 24 FGDs, 240 participants took part in the discussions, out of them 45% were male and 55% were female. Thirty-eight participants were of age-group 11-19. Details are given in the following table.

Table 1-12: FGDs Participants AJK

Social Statistics	N=240
Gender	
Male	109 (45%)
Female	131 (55%)
Age in years	

11-19	91 (38%)
20-29	42 (18%)
30-39	39 (16%)
40-49	39 (16%)
50 and above	29 (12%)
Education	
No schooling	6 (3%)
Primary	6 (3%)
Secondary	157 (65%)
Intermediate	33 (14%)
Higher Education	38 (16%)
Profession	
Housewife	87 (36%)
Teacher	4 (2%)
Lady Heath Worker / Lady Health Supervisor	40 (17%)
Private Employee	6 (3%)
Government Employee	12 (5%)
Community Leader (Moulvi, social worker, doctor, influential, etc.)	15 (6%)
Daily Wage Worker	26 (11%)
Unemployed	50 (21%)

ANNEX J1

Focus group discussion guide:

Community leaders

National Nutrition Survey 2018

Government of Pakistan

NATIONAL NUTRITION SURVEY 2018 - PAKISTAN

Focus Group Discussion Guide
(Community Leaders Views on Maternal, Infant and Young Child Feeding Practices - MIYCN)

Date	Province	District	Tehsil	City	Mohallah	Union Council

Moderator:	**Observer:**
Note Taker 1:	**Note Taker 2:**

Participants (8 – 12):	**Time started:**	**Time ended:**

Introductory note and Informed Consent

I am (Name) from the Government of Pakistan. You are cordially invited to participate in this Focus Group Discussion. If you have decided to participate then with your permission we will ask you a series of questions about your views on Maternal, Infant and Young Child Feeding Practices - MIYCN). I would be the moderator/facilitator for this Focus Group and Ms. (Name) assisting me as the Observer. Ms. (Name) and Ms. (Name) shall be taking written notes during this discussion. Now, I request the participants to please introduce you with your name and area.

Statement of purpose

The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food security and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.

Consent for Recording and statement of confidentiality

I would like to take your permission for recording our conversation because we don't want to miss any

of your comments. You know, people often say very helpful things in these discussions and we can't write fast enough to catch it all. Besides, written notes will also be taken by the note- takers. I would like to inform you that the provided information will be kept confidential and your name will not be identifiable. In addition, you are also requested to not discuss anything or relate anybody outside this focus group discussion.
Statement of norms for this session
In order to promote group cohesion and giving everybody equal chance to speak, we shall take care of certain norms, which are as follow: o Everybody should put the mobile phones on silent mode o Everybody will have chance to participate and speak equally o Everybody will wait for their possible turn to speak o Everybody will respect each other point of view o Nobody will make cross comment in between the talk of person **Let we start asking questions**

Theme 1: Maternal Nutrition
First I'd like us to talk about maternal nutrition.

1. What nutrition challenges do you see in your community as a whole?

Probes: Nutrition challenges: awareness, myths, unequal distribution of food, and food security (access, availability, affordability and acceptability)

2. What types of food do pregnant women usually eat in your community?

Probes: What types of food are good for pregnant women to eat? What are the reasons these foods are good? What types are bad for pregnant women to eat? What are the reasons these foods are bad? What types of food do pregnant women avoid eating? What are the reasons they avoid these foods? Do you eat these foods (good and bad) for a certain amount of time? Who advises pregnant women about what to eat?

3. In your opinion, what types of food, generally, do breastfeeding women usually eat?

Probes: What types of food are good for breastfeeding women to eat? What are the reasons these foods are good? What types of food are bad or should be avoided by breastfeeding women? What are the reasons these foods are bad or should be avoided? Who helps choose what foods breastfeeding women should eat?

4. Do your women take iron and folic acid supplementation during pregnancy?

Probes: If yes, ask why? For example, Maintain a good health, healthy baby will be born, Child will grow properly, safe from anemia. If no, ask why not? Free list the reasons why not.

Theme 2: Infant and Young Child Nutrition

Let's now talk about infant and young child feeding practices

5. Thinking more specifically about infants and young children below the age of 2, what issues or problems come to mind related to health and nutrition?

Probes: child suffer from illnesses, child growth and development, vaccination, children need more nutrients, lack of attention cause anemia, bad health

6. What do you see as the best way to feed an infant during their first six months of life?

Probes: early initiation of breastfeeding; exclusive breastfeeding for the first 6 months life,

7. For how many months does a mother usually breastfeed exclusively? (Exclusive means only breast milk nothing else, not even water) and why?

Probes: probes according to given months

8. What are the barriers/reasons why mothers do not exclusively breastfed their child for the first six months?

Probes: Mother over burden like (field work, house work), family doesn't support, poor knowledge, myths, fear like if child doesn't eat anything will be weak.

9. What are the boosters, which influence mothers to exclusively breastfed to their child for the first six months?

Probes: Free listing; reasons behind positive behaviors related to exclusively breastfeeding

10. Is anything (other than breast milk) given to the newborn during the first 6 months? What and Why?

Probes: free listing, and then ask what foods start at first? (List as many as the respondent can remember spontaneously) Do not probe.

11. When do women in your community usually start giving other foods besides breast milk?

Probes: What types of foods do they give? What are the reasons for giving other foods? What are the norms?

12. Does the mother or any other family member prepare any food separately for child? If yes, why and what? If no, why and what?

Probes: Free listing the probe for reasons

13. Can you tell us what foods are nutritious and appropriate to give to children 6-12 months of age? And why?

Probes: any food, cereals (rice…), meat, chicken, fish, eggs, fruits (banana…), vegetable (green leafy, tomato, potato…), liquids like herbal liquid. Reasons: delicious, good-looking, nutritious, and easy to prepare, easy to cook and tasty

14. It is recommended that for optimal growth of a young child, a variety of food groups (i.e. grains, legumes and nuts, eggs, dairy products, vitamin A rich fruits and vegetables, iron rich fruits and vegetables, meat products, etc.) should be given to the child regularly. Are parents in the community able to practice this?

Probes: If yes, why? If not, why not? For example, poverty, awareness about food diversity, lack of resources, and lack of awareness regarding nutritional needs, etc.

15. Who do you see as the most influential factor in a mother's decision on maternal diet during pregnancy, breastfeed her child and provide appropriate complementary feeding to her children under 2 years of age?

Probes: religious leaders, community leaders, families, husbands, etc.

16. What are the boosters, which influence a mother's decision on maternal diet during pregnancy, breastfeed her child and provide appropriate complementary feeding to her children less than 2 years of age?

Probes: Maternal diet: healthy pregnancy, lower risk of illness, etc.
Breastfeeding: health benefits; decrease the risk of child illness, etc.
Complementary Feeding: health benefits, growing up strong, etc.

17. What are the challenges, which influence a mother's decision on maternal diet during pregnancy, breastfeed her child and provide appropriate complementary feeding to her children less than 2 years of age??

Probes: Milk supply, pain, mother illness, lack of facilitation/encouragement from family, working women/field work, overburden

18. How is nutrition information on maternal, infant and young child feeding practices shared in your community?

Probes: Health programs, LHWs, community support groups, family elders, relatives, Dai, gynecologist, doctors, electronic media/internet, etc.

<u>Recommendations, Wrap up and Thanks Giving</u> What role a community should play to ensure good maternal, infant and young child feeding practices which ensure good nutrition for mother and child? ***Probes:*** What do you think the community can and should do? What roles can you play to address the issue of stunting in the community? Role of civil society, political and religious leadership
Thanks Giving: On behalf of Government of Pakistan and my colleagues here I am very thankful to all of you for your time spared for participating in this discussion. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX J2

Focus group discussion guide:

LHWs

National Nutrition Survey 2018

Government of Pakistan

NATIONAL NUTRITION SURVEY 2018 - PAKISTAN

Focus Group Discussion Guide
(Lady Health Workers/Community Health Workers/Community Midwives On IYCF Practices)

Date	Province	District	Tehsil	City	Mohallah	Union Council

Moderator:	**Observer:**
Note Taker 1:	**Note Taker 2:**

Participants (8 – 12):	**Time started:**	**Time ended:**

Introductory note and Informed Consent

I am (Name) from the Government of Pakistan. You are cordially invited to participate in this Focus Group Discussion. If you have decided to participate then with your permission we will ask you a series of questions about infant and young child feeding practices in your community. I would be the moderator/facilitator for this Focus Group and Ms. (Name) assisting me as the Observer. Ms. (Name) and Ms. (Name) shall be taking written notes during this discussion. Now, I request the participants to please introduce you with your name and area.

Statement of purpose

The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food security and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.

Consent for Recording and statement of confidentiality

I would like to take your permission for recording our conversation because we don't want to miss any of your comments. You know, people often say very helpful things in these discussions and we can't write fast enough to catch it all. Besides, written notes will also be taken by the note- takers. I would like to inform you that the provided information will be kept confidential and your name will not be identifiable. In addition, you are also requested to not discuss anything or relate anybody outside this focus group discussion.

Statement of norms for this session

In order to promote group cohesion and giving everybody equal chance to speak, we shall take care of certain norms, which are as follow:

- Everybody should put the mobile phones on silent mode
- Everybody will have chance to participate and speak equally
- Everybody will wait for their possible turn to speak
- Everybody will respect each other point of view
- Nobody will make cross comment in between the talk of person

Let we start asking questions

1. Can you tell me about the kind of work you are involved in related to breastfeeding and infant and young child feeding? ***Probes:*** Free listing

2. What are some of the challenges that you face during your community work? How do you overcome these challenges? ***Probes:*** Free listing

3. Have you participated in nutrition specific trainings? If yes ***probe for*** any training specific to breast feeding or IYCF and have such trainings helped you in job performance? Needs for trainings/refreshers

4. What type of nutrition information do you tell pregnant women when she comes to the clinic?
Probes: breastfeeding, early initiation, exclusive breastfeeding, maternal nutrition counseling, iron and folic acid supplementation, MNPs, etc.

5. Can you elaborate a little on what kind of counseling you give to mothers about breastfeeding?
Probes: Free listing

6. When do you talk about breastfeeding with pregnant women and her family members?
Probes: During ANC, onset of delivery, PNC

7. What are the positives practices related to breastfeeding do you hear from women in the community during counseling sessions?
Probes: Free listing

8. What are the negative practices related to breastfeeding do you hear from women in the community during counseling sessions?
Probes: Free listing

9. In your opinion, what are the existing breastfeeding practices in your community?
Probes: Still considering colostrum as ‘dirty’ or ‘curdled milk’, a fear of the ‘evil eye’ when breastfeeding in public, breastfeeding is being associated with sagging breasts, intellectual development of child, good child health

10. Can you elaborate a little on what kind of counseling you give to mothers about feeding complementary food for children? When do you start discussing complementary foods?

11. Can you tell me about the practices in the community regarding complementary food for children?
    Probe for what age do they typically start on instant feeding? What is the most common complementary food for children? How is it prepared?

12. What are the motivating factors (Boosters) for mothers to practice appropriate complementary feeding? ***Free listing***

13. What are the constraints (Barriers) for mothers to practice appropriate complementary feeding? ***Free listing***

14. Do you have access to micronutrients in the health facility? If so, do you distribute them to mothers at the appropriate time?
    Probe for type and availability, if not, do you recommend them to an NGO or medical store

Recommendations, Wrap up and Thanks Giving Can you recommend how to improve IYCF practices in your community?
Thanks Giving: On behalf of Government of Pakistan and my colleagues here I am very thankful to all of you for your time spared for participating in this discussion. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX J3

Focus group discussion guide:

Fathers

National Nutrition Survey 2018

Government of Pakistan

NATIONAL NUTRITION SURVEY 2018 - PAKISTAN
Focus Group Discussion Guide
(Groups: Social and Behavioral Aspects of Household Food Security)

Date	Province	District	Tehsil	City	Mohallah	Union Council

Moderator:	**Observer:**
Note Taker 1:	**Note Taker 2:**

# of Participants (Min. 8 – Max. 12):	**Time started:**	**Time ended:**

Introductory note and Informed Consent

I am (Name) from the Ministry of National Health Services, Regulation and Coordination. I welcome you in this Focus Group Discussion. If you have decided to participate then with your permission we will ask you a series of questions regarding food security situation in your households. I would be the moderator/facilitator for this Focus Group and Ms. (Name) assisting me as the Observer. Ms. (Name) and Ms. (Name) shall be taking written notes during this discussion. Now, I request the participants to please introduce you with your name and area.

Statement of purpose

The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food security and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.

Consent for Recording and statement of confidentiality

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Statement of norms for this session
In order to promote group cohesion and giving everybody equal chance to speak, we shall take care of certain norms, which are as follow: o Everybody should put the mobile phones on silent mode o Everybody will have chance to participate and speak equally o Everybody will wait for their possible turn to speak o Everybody will respect each other point of view o Nobody will make cross comment in between the talk of person **Let we start asking questions**

Information need

- Food availability
- Food affordability
- Food accessibility
- Food acceptability
- Coping strategy

Warmup Question

1. What are the major challenges to the well-being of people in the vicinity where you live? How are these challenges managed?
   Probes: Free listing

2. How many people would say that they either ran out or worried about running out of food during the past year (last 12 months from the date of interview)?

Probes: Staple foods – Rice, roti, lentils, grains, wheat, maize, roots and tubers, etc.; Non-staple foods – eggs, meat, vegetables, fruits, etc.
Probes: Food types – Fruits, vegetables, dairy products, grain products, meat and alternatives (lentils, beans and legumes), etc.
Probes: Frequency – I am wondering about the frequency of these things happening. How many people would say that they either ran out or worried about running out of food every month? Did these things happen at specific times of the month or seasonally?
Probes: Patterns – Do these events (running out of food or worrying about it) follow any pattern? That is, does something else happen regularly that causes you to run out of food or to worry about it? Examples: medical emergencies, utility bills, helping family members with their needs, changes in job, earning status, etc.

3. Are there any other reasons that you think might be responsible for not being able to make your food last for the entire month?

4. Tell me about the locations where you live – is food available and accessible?
   Probe for accessibility: Is public or personal transportation available? What type of transportation do you use when you go grocery shopping? How often are you able to go grocery shopping?

5. Are you usually able to buy food for your household?
   Probes: Prices of food items, purchasing power of household, etc.

6. Are there any other factors, which affect food accessibility and affordability for you?
Probes: Lack of transportation, not enough stores available near you, insufficient food offered (low quality food items, limited selection of food items), unreasonable prices, etc.

7. Let's start by discussing the things you might do to make food in your household last longer. What are some of these things?
Probes: Limit the amounts of food items use, limit the size of meals, skip meals, add extra water to dishes, eat more less expensive foods like potatoes or tomatoes, etc.

8. What are the types of food items you prefer to feed your children less than 2 years of age?
Probes: Free listing

9. How often do you buy meat, eggs, milk, fruits and vegetables from the market for your children less than 2 years of age?
Probes: Frequency (# times per week per food item); what portion of the purchased food items is given to the child under 2? If none of the purchased food items are given to the child <2, why?

Recommendations, Wrap up and Thanks Giving What would you say is the most important in helping you to cope with times when food or food concerns are a major problem?
Thanks Giving: On behalf of Government of Pakistan and my colleagues here I am very thankful to all of you for your time spared for participating in this discussion. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX J4

Focus group discussion guide: Adolescents

National Nutrition Survey 2018

Government of Pakistan

NATIONAL NUTRITION SURVEY 2018 - PAKISTAN

Focus Group Discussion Guide
(Groups: Adolescent Nutrition 15-19 Years Boys and Girls)

Date	Province	District	Tehsil	City	Mohallah	Union Council

Moderator:	**Observer:**
Note Taker 1:	**Note Taker 2:**

Participants (8 – 12):	**Time started:**	**Time ended:**

Introductory note and Informed Consent

I am (Name) from the Government of Pakistan. You are cordially invited to participate in this Focus Group Discussion. If you have decided to participate then with your permission we will ask you a series of questions about your knowledge on nutrition? what is your understanding about Junk Food? Identify your dietary behaviors and patterns and also on channels of communication best suited for and points of engagement with adolescent. I would be the moderator/facilitator for this Focus Group and Ms. (Name) assisting me as the Observer. Ms. (Name) and Ms. (Name) shall be taking written notes during this discussion. Now, I request the participants to please introduce you with your name and area.

Statement of purpose

The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food security and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.

Consent for Recording and statement of confidentiality

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identifiable. In addition, you are also requested to not discuss anything or relate anybody outside this focus group discussion.
Statement of norms for this session
In order to promote group cohesion and giving everybody equal chance to speak, we shall take care of certain norms, which are as follow: o Everybody should put the mobile phones on silent mode o Everybody will have chance to participate and speak equally o Everybody will wait for their possible turn to speak o Everybody will respect each other point of view o Nobody will make cross comment in between the talk of person **Let we start asking questions**

Objectives of Adolescent FGDs:

- Do they have knowledge on nutrition?
- What is their understanding about Junk Food?
- Identify their dietary behaviours and patterns (qualitative info on dietary diversity).

1. When you hear the word "nutrition", what comes to your mind? What nutrition issues girls / boys of your age think about the most? What nutrition issues have you seen among your friends?

Probes: Food items (fruits and vegetables, etc.), body image; looking fit and trim, concept of dieting in young girls

2. When we say "eating right" or "eating healthy foods" what comes to your mind?

Probes: Explore participants' definitions of eating right. ***Probe*** for knowledge including questions like: --What does eating "more fruits and vegetables" mean to you? And, how many fruits and vegetables should someone like you eat? What does eating "less fat" mean to you? How much less? If something is "fat-free," how does it fit into a healthy diet?"

3. What do you mean by junk foods? Are fast foods considered junk foods? What are your preferences or likes in junk foods?

Probes: Preference fast food, ideas about junk foods, replace meals with fast food, is fast food consumption habit have increased when you left the home, is it increasing day by day (If so, why?), are your parents aware about your diet behavior (in terms you have to eat fast food frequently)

4. Are junk foods a good alternative to nutritious food? If yes, why? If no, why not?

Probes: Free listing

5. There are many reasons why adolescent choose the foods that they eat, what are the most important reasons that influence on your choice of foods?

Probes: Quality or freshness of food, habit or routine, price of food, what my family, parents, friends say, taste and textures' of food, value for money, convenience, slimming, limited pocket money, special eating habits, health/medical reasons, content of additives or preservatives or colors, cultural or religious or ethnic background, availability in the shops I usually visit, advertisements, television/radio programs, articles about food and recipes in newspapers / magazines, parents, elder sibling, friends/classmates, I decide on my own

6. What type of snacks/food you usually brought from home to school/college?

Probes: Yogurt/chocolate, soft drink (Pepsi, Coke, Fanta, Sprite etc.), packaged fruit juice, Fruits (orange, banana, apple), cake, roll, ice cream, cooked food (chicken peace, bread slice with jam, omelet, rice, etc.), egg, vegetable salad preparation, preparation of chicken/meat, biscuit, creamy sandwiched biscuits/wafer, bread, cooked rice, butter or jam on bread, milo/cocoa beverage

7. What snacks/food do you usually buy at school / college during break time?

Probes: Yogurt/chocolate, soft drink (Pepsi, Coke, Fanta, Sprite etc.), packaged fruit juice, Fruits (orange, banana, apple), cake, roll, ice cream, cooked food (chicken peace, bread slice with jam, omelet, rice, etc.), egg, vegetable salad preparation, preparation of chicken/meat, biscuit, creamy sandwiched biscuits/wafer, bread, cooked rice, butter or jam on bread, milo/cocoa beverage

8. Here are some things which might discourage adolescent from eating more healthy foods. Which do you think might PREVENT you from eating more healthy foods?

Probes: Family discouraging or unsupportive, friends discouraging or unsupportive, people around discouraging or unsupportive, not knowing what changes to make, limited choice of healthy foods in canteens and restaurants, healthy foods are too expensive, healthy foods too boring, lack of will-power, don't like the taste and textures of healthy foods

9. What are some of the barriers that keep you from making changes in your eating habits?

Probes: Important: Probe for both internal barriers (e.g., feelings, beliefs, personal traits) and external barriers (e.g., influence of family, children, friends, coworkers, community, and availability of resources). Moderator's note: Probe for any underlying causes for answers like "no willpower," "it's in my mind," or "laziness."

10. What are some of the enablers that could help you make changes in your eating habits?

Important: Again, probe for both internal suggestions (e.g., feelings, beliefs, personal traits) and external suggestions (e.g., influence of family, children, friends, coworkers, community and availability of resources).

Probes: Peer pressure (if you are eating with your friends), availability of healthy food at school, preference of the family, affordability, access to healthy food,

11. How interested are you in learning more about nutritious foods and healthy eating? From whom?

Probes: parents' advice, peer groups, school and college curriculum, social and electronic media, doctors, friends

12. Can the group list the food items you ate in the last 24 hours?

Probes: Free listing

Recommendations, Wrap up and Thanks Giving If you could make one suggestion to improve the health of students what would it be?
Thanks Giving: On behalf of Government of Pakistan and my colleagues here I am very thankful to all of you for your time spared for participating in this discussion. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX J5

Focus group discussion guide: Mothers

National Nutrition Survey 2018

Government of Pakistan

NATIONAL NUTRITION SURVEY 2018 - PAKISTAN

Focus Group Discussion Guide
(Group: Mothers having a Child <2 Years for Breastfeeding Practices)

Date	Province	District	Tehsil	City	Mohallah	Union Council

Moderator:	**Observer:**
Note Taker 1:	**Note Taker 2:**

# of Participants (Min. 8 – Max. 12):	**Time started:**	**Time ended:**

Introductory note and Informed Consent

I am (Name) from the Government of Pakistan. You are cordially invited to participate in this Focus Group Discussion. If you have decided to participate then with your permission we will ask you a series of questions about your attitudes, views and practices, barriers, boosters and influencers on breastfeeding, role/influence of the family members on decision making of the mother to breastfeeding, support provided by family members to the mother especially during the first six months after birth and also on channels of communication best suited for and points of engagement with mothers for IYCF promotion. I would be the moderator/facilitator for this Focus Group and Ms. (Name) assisting me as the Observer. Ms. (Name) and Ms. (Name) shall be taking written notes during this discussion. Now, I request the participants to please introduce you with your name and area.

Statement of purpose

The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food security and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.

Consent for Recording and statement of confidentiality

I would like to take your permission for recording our conversation because we don't want to miss any of your comments. You know, people often say very helpful things in these discussions and we can't write fast enough to catch it all. Besides, written notes will also be taken by the note- takers. I would like to inform you that the provided information will be kept confidential and your name will not be identifiable. In addition, you are also requested to not discuss anything or relate anybody outside this focus group discussion.

Statement of norms for this session

In order to promote group cohesion and giving everybody equal chance to speak, we shall take care of certain norms, which are as follow:

- Everybody should put the mobile phones on silent mode
- Everybody will have chance to participate and speak equally
- Everybody will wait for their possible turn to speak
- Everybody will respect each other point of view
- Nobody will make cross comment in between the talk of person

Let we start asking questions

Introductory Questions

1. What comes to your mind when you hear the word child nutrition?

Probes: healthy child, no frequent illnesses

2. How do you know a child is well-nourished? What do you think you need to do for them to remain well-nourished?

(Note: Free listing, brainstorming. Listens and try to see if women have understanding of healthy child and his/her behavior, do they list nutrition. Write the answers in order they were given.)

Probe: What are some of the woman's worries related to the nutrition of their babies?

Probe: Who do they go to for advice related to the baby's nutrition (health care provider, mother /mother in laws etc.)?

Probe: How can they enhance their knowledge (by talking to someone, by reading about it or by following the cultural beliefs and practices or through media?

3. What are some of the challenges that mothers in your community have in keeping their baby well-nourished and healthy?
   Instruction for enumerator (Listen to the answers and then ask: What about…?)

Probe:

- Supplementation (Micronutrient)
- Dietary Intake (fruits and vegetables)
- Maternal health and nutrition
- Working mother
- Number of children

Theme I: Breastfeeding: Attitudes, Practices, Barriers, Boosters and Influencers
Sub-Theme A: Counseling on Breastfeeding

4. During your pregnancy who usually gives advice to mothers for breastfeeding?
   Probes:
   - Who advises the mother? (LHWs, CMWs, TBAs, Mother-in-law, other family members, friends, etc.)
   - When do they advise the mother? (ANC, at the time of delivery, PNC)
   - Where? (Health facility, home, community session, mother support groups, etc.)

- What do they tell mothers to do? (Focus on early initiation and exclusive breastfeeding, Time period of exclusive breastfeeding?)
- How many times were they told to breastfeed their baby? (Ex: 8-12 times per day, etc.)
- For how long were they told to breastfeed their baby? (Ex: 15 minutes, 30 minutes, etc.)

Sub-Theme B: Early Initiation of BF

5. In your opinion, what do women in your community usually feed their newborn right after birth?

   Probe**s:**

   - Breastfeeding right away after birth?
   - Giving colostrum/yellow milk (if so, probe what they think of the colostrum)
   - Other liquids (water, juices, tea)
   - Pre-lacteal feeds (butter, honey, *ghutti*)
   - Gender (boys vs girls); is it same for boys and girls?
   - Breast conditions (engorgement, redness, sore nipples, etc.)

Sub-Theme C: Exclusive Breastfeeding

6. "Exclusive breastfeeding" means only giving the baby breast milk, and no water, no tea, no porridge. In your community, how do women usually feed infants who are less than six months?

   Probe s:

   - Breastfeeding only on demand
   - Breastfeeding and liquids (tea, water, etc.)
   - Breastfeeding and other milks (animal milks/ formula milk)
   - Breastfeeding and cereals (processed and packaged vs homemade)
   - Is behavior same for both gender?
   - Duration of EBF (practice of the group on EBF)
   - Number of children in the family
   - Birth Order
   - Gender (parental preference for male child, wage-earner (*Kamao poot*), care-taker, honor and pride, norms and beliefs)

7. What are the benefits to starting breastfeeding immediately after birth?

   Probes:

   - Baby-led initiation of breastfeeding
   - Body system regulation
   - Decrease hypothermia in child
   - Promotes mother-baby attachment
   - Improves breastfeeding success rates
   - Promotes placental separation
   - Boost baby's immunity naturally

8. In your opinion, what do you think are some of the major problems (barriers) women like you face when they want to exclusively breastfeed their children until 6 months of age?

   Probes:

   - Do you have free time?
   - Use the Clock Method - Schedule of activities/chores (management of time)
   - Employment
   - Self-perception of health (illness, tiredness, etc…)
   - Family support (sharing chores; Is there anyone who can help with the chores?)

- Women's perception on cosmetic (ie. body, etc…)
- Perception of not having enough milk
  - Probe: Why do they believe this?
- Adequacy of breast milk (i.e. Baby is older now, so milk is not sufficient for the baby)
- Breast conditions (engorgement, redness, sore nipples, etc.)

9. What do working mothers do for their children while at work?

Probes:

- Take child with her (day care; field)
- Infant formula
- Mixed feeding (other milk – animal)

10. In your opinion what are the boosters that enhance / promote exclusive breastfeeding?

Probes: Dietary habits, peer support, family pressure, LHWs/CHWs/CMWs, Doctors, Media, etc.

11. What are some of the challenges that mothers in your community have in breastfeeding infants (0-6 months)?
    Probe: Are there times of the year/different seasons that are more difficult to feed children or families in the community?
    Probe: Can you list some of the problems or issues (access to foods, access to markets, and access to health center for counseling, hygiene and sanitation, etc.)

12. Can the group name of ways in which mothers in other parts of Pakistan feed their children who are 6 months old?
    Probe:
    - Breastfeeding their babies frequently throughout the day and night.
    - Feeding their children rice porridge twice a day
    - Giving food from the mother's plate every time she ate
    - Only breast milk

Theme 2: Role /influence of the family members on breastfeeding decision making

13. Who in a woman's family has the role and influence on decision making regarding the breastfeeding practices of the infants?

Probes: Husband, mother, mother-in-law, others: how do they influence? What happens if mother disagrees?

14. How much say does a mother have in breastfeeding her child?

Probe: Decision on breastfeeding,
Probe: Reasons she was unable to breastfeed when she/baby wanted to breastfeed (must complete chore before breastfeeding)

15. When your child is sick, how do you breastfeed your child? Do your practices change? Why? Why not?

Probe: Number of times she breastfeeds, Increased, decrease or not change volume of breast milk given, resumed the same BF practices as before illness

Theme III: Support provided by family members to the mother especially during the first six months of child birth

16. What support other family members extend to mothers during the first 6 months after child birth? ***Free listing and then probe for:*** Who support? What type of support?

- Take care of the child
- Instruct mothers how to breastfeed
- Demonstrate how to breastfeed
- Look after the child when the mother sleeping
- Do household chores (Wash clothes, carry the child, prepare and cook the meal for the mother)
- Prepare and cook for the mother, etc…
- Who else in the family supports (grandfather, the father of the child, aunt, cousin….)

Theme IV: Channels of communication best suited for and points of engagement with mothers

17. Who do you often talk to get information about nutrition issues?

Probes: Mother, mother-in-law, daughter-in-law, friends, neighbors, community health and nutrition sessions, health care providers (CHWs/CMWs/LHWs/Doctors)

18. Do you have other valuable sources where you receive information on nutrition?

Probes: newspaper/magazine, cable, technology, TV shows, FM Radio, internet, mobile phones – texting

19. Who do you believe/feel are the most reliable sources for good information on nutrition issues?

Probes: Role of LHW, TBA or any other out reach workers providing information on BF and Nutrition; Do you trust the information provided by the person?; Anyone else?)

Recommendations, Wrap up and Thanks Giving Do the women in the group have any recommendations on how to improve BF practices in their community? In what ways do BF practices need to improved and how?
Thanks Giving: On behalf of Government of Pakistan and my colleagues here I am very thankful to all of you for your time spared for participating in this discussion. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX J6

Key informant interview guide

National Nutrition Survey 2018

Government of Pakistan		
National Nutrition Survey 2018 **Key Informant Interview Guide for Provincial and Regional Nutrition Focal Persons**		
Interviewer:		**Facilitator:**
Province / Region:		**City:**
Date:	**Time started:**	**Time ended:**
Introductory note and Inform Consent		
I am (Name) and I am here on behalf of the Government of Pakistan. We welcome you in this interview session. If you have kindly decided to be interviewed then with your permission we will ask you a series of questions about the challenges, gaps and opportunities to implementing nutrition policies and strategies, the way forward, solutions and views on stunting. With me Ms. (Name) assisting me during the interview. I welcome you in this interview session.		
Statement of purpose		
The nutrition surveys conducted in the past few decades show serious level of under-nutrition among women and children in Pakistan. The National Nutrition Survey 2011 shows a very high prevalence of stunting (43.7 percent), underweight (31.5 percent) and wasting (15.1 percent) among children less than five years of age. Almost 50 percent of women are suffering from anemia and 15 percent of women are suffering from energy /caloric deficiency. Under-nutrition contributes to high neonatal (55/1000 Live-births) and infant mortality (74/1000 Live-births) in Pakistan. High under five morbidity and mortality are directly attributed to under-nutrition, lack of access to clean water and inadequate sanitation practices, food insecurity and poverty. Suboptimal and inadequate infant and young child feeding (IYCF) practices, such as late initiation of breastfeeding, low prevalence of exclusive breast feeding and inadequate complementary feeding also significantly contributes to poor nutritional status of the children. Pakistan needs more updated and robust district level data that can track the nutritional status of population in Pakistan. The NNS 2018 will help to monitor and evaluate the impact of direct and indirect nutrition actions and will provide district specific information on key nutrition indicators. Although focus group data may not be generalized to larger populations yet it is the best reasonable alternative to conducting a large-scale field study of identified individuals. We aim to collect qualitative data about nutrition knowledge, attitudes, and dietary intake patterns among the general population such as types of foods consumed, beliefs about the health and nutritional value of foods, and reasons for eating certain foods.		
Recording interview and statement of confidentiality		
I would like to take your permission for recording our conversation because we don't want to miss any of your comments. The provided information will be kept confidential and your name will not be identifiable. In addition, you are also requested to not discuss anything or relate anybody outside this interview.		
With your kind permission and consent let we start asking questions		

Participant's Information

Name of Respondent: ____

Designation: ____________________________ Organization: _____________________________

Gender: _________________ Age: ______________ Education: ___________________________

Total years of experience: _____________ Nutrition specific years of experience: _____________

Interview Date: ____________________ Time started: ____________ Time ended: ___________

How long have you been working on the current position? ___________ Years

1. What are the "Nutrition Specific" and "Nutrition Sensitive" schemes / interventions you had prepared and implemented?

Nutrition Schemes /Interventions		Planned	Implemented
SENSITIVE			
SPECIFIC			

2. What are the major gaps and challenges for planning and implementing nutrition interventions in your province/region?
   Probes: What are the barriers to uptake of nutrition interventions? What are the boosters that enable uptake of nutrition interventions? Explain with specific reference for:
   - Policy
   - Governance
   - Program
   - Human resource
   - Health system strengthening

3. Based on your experience do you think there are solutions to these nutrition challenges?
   Probes: nutrition specific and sensitive programs, gender equality, nutrition should be included in school curricula, school feeding programs, nutrition experts at all level, formation of nutrition cell, create awareness, mass campaign

4. Which policies have been made for formulating or advocating for improving nutrition programming and supporting the nutrition agenda in your province/region?
   Probes: Multi-Sectoral Integrated Nutrition Strategy (MSINS), proposed set of activities lay out by MSINS, how many are currently being implemented? Which ones are they?

5. What are the initiatives and programs related to nutrition that you are CURRENTLY leading or supporting?
   Probes: For each program/initiative ask the following:
   - Describe their activities and the role of other agencies/departments you are partner with?
   - How is this program funded?
   - What has been the impact of such program on the community?
   - Do you see any challenge and gaps that hinder the success of this program (i.e. capacity, budgetary, policy, other).
   - What was the most successful aspect of this program? And lessons learnt?
   - In the future, how could this program be improved (i.e. partnership with another department, increase line budget, political support) either to enhance success or scalability?
   - Would you recommend that other provinces adopt similar versions of this program? If so, what advice would you give them?

6. To what extent have nutrition programs increased government ownership?
   Probes: Budgets, policies, protocols, HMIS and capacity of health workers. Also ask:
   - For nutrition policies, have costed plans been developed, and what are the gaps? How will Government of (------------) and development partners fill the gaps?
   - How will the Government of (------------) increase financing for nutrition activities?

7. How are these nutrition interventions going to address stunting and wasting in the Province/Region? How?
   Probes: Change stunting and wasting over what period of time? Strengthening and nurturing of coordination mechanisms, ownership towards nutrition initiatives, public awareness, holistic BCC strategy, and sustainability of interventions once the donors stop funding?

8. What steps you have taken or wish to take to address the issue of stunting and wasting? Who do you think should be actively engaged in addressing stunting and wasting? What roles do you think other federal and regional authorities should play?
   Probes: Free listing

9. What are some programs and polices you feel could be considered a success story for your province /region?
   Probes: What makes this program/policy so effective? What were the proven impacts?

10. How is nutrition information shared? For example, how do communities learn about good nutrition practices? How do new mothers learn about them?
    Probes: Mass media, by gynecologist, community support groups, BCC, through IYCF communication strategies

11. How do you personally get information about nutrition issues? What or who are your most trusted or reliable sources of information?
    Probes: internal meetings, reports, NNS or other surveys, nutrition specific programs, stakeholders (ACF, Save the Children, UNICEF, WFP, etc.)

Recommendations, Wrap up and Thanks Giving Do you kindly want to say anything additional?
Thanks Giving: On behalf of Government of Pakistan and my colleague I am very thankful to you for your time spared for giving this interview. Your comments are very important to guide us for planning better nutrition interventions and programs!

ANNEX K

Additional tables

National Nutrition Survey 2018

Table Annex K-1: Background characteristics of household heads

Percent and frequency distribution of household head by selected background characteristics, Pakistan NNS 2018			
		Weighted percent	Number of HH
Total		100.0	100304
Urban		37.6	29858
Rural		62.4	70446
Province/ region			
Punjab	Urban	37.3	12016
	Rural	62.7	25070
	Total	53.6	37086
Sindh	Urban	52.2	9003
	Rural	47.8	8153
	Total	24.8	17156
KP	Urban	19.7	2464
	Rural	80.3	9758
	Total	10.5	12222
Balochistan	Urban	27.4	3495
	Rural	72.6	12820
	Total	5.9	16315
ICT	Urban	52.2	582
	Rural	47.8	623
	Total	1.0	1205
KP-NMD	Total	1.7	3355
AJK	Urban	13.5	1417
	Rural	86.5	6162
	Total	1.9	7579
GB	Urban	20.2	693
	Rural	79.8	4693
	Total	0.5	5386
Age			
15-19		0.4	389
20-24		2.4	2380
25-29		8.0	7939
30-34		12.1	12020
35-39		15.9	15247
40-44		12.3	12915
45-49		12.5	12205
50-54		12.4	12431
55-59		7.4	7629
60+		16.3	16662
Missing/DK		0.2	487

Percent and frequency distribution of household head by selected background characteristics, Pakistan NNS 2018		
	Weighted percent	Number of HH
Wealth index quintile		
Poorest	20.0	26840
Second	20.0	23206
Middle	20.0	19770
Fourth	20.0	16649
Richest	20.0	13839

Table Annex K-2: Time to source of drinking water

Percent distribution of household population according to time to go to source of drinking water, get water and return, for users of improved and unimproved drinking water sources, Pakistan NNS 2018											
		Time to source of drinking water								Total	Number of household members
		Users of improved drinking water sources				Users of unimproved drinking water sources					
		Water on premises	Less than 30 minutes	30 minutes or more	Missing/DK	Water on premises	Less than 30 minutes	30 minutes or more	Missing/DK		
Total		76.7	10.4	2.7	2.8	2.8	1.8	1.5	1.3	100	100304
Urban		77.0	12.4	2.0	2.4	3.2	1.1	0.5	1.4	100	29858
Rural		76.5	9.2	3.1	3.0	2.5	2.2	2.1	1.2	100	70446
Province/ region											
Punjab	Urban	72.1	18.4	2.4	2.5	3.3	0.9	0.1	0.3	100	12016
	Rural	82.0	9.9	1.8	2.4	2.1	1.0	0.4	0.2	100	25070
	Total	78.3	13.1	2.0	2.4	2.6	1.0	0.3	0.2	100	37086
Sindh	Urban	84.4	4.9	1.8	2.0	3.6	1.3	0.7	1.2	100	9003
	Rural	74.5	7.3	6.1	1.5	2.2	3.4	4.0	1.0	100	8153
	Total	79.7	6.1	3.8	1.7	3.0	2.3	2.3	1.1	100	17156
KP	Urban	92.9	2.4	0.4	2.1	1.0	0.3	0.7	0.2	100	2464
	Rural	83.0	4.6	1.4	1.7	3.9	1.7	2.6	1.0	100	9758
	Total	85.0	4.2	1.2	1.8	3.3	1.4	2.2	0.9	100	12222
Balochistan	Urban	66.4	3.9	1.1	3.3	4.1	1.8	2.3	17.2	100	3495
	Rural	51.9	9.6	6.1	8.0	4.9	5.6	7.0	6.8	100	12820
	Total	55.8	8.0	4.7	6.7	4.7	4.6	5.7	9.7	100	16315
ICT	Urban	65.8	23.9	2.9	4.3	1.0	1.0	0.7	0.4	100	582
	Rural	70.6	18.6	2.1	1.3	4.6	2.5	0.0	0.2	100	623
	Total	68.1	21.3	2.5	2.9	2.7	1.7	0.4	0.3	100	1205
KP-NMD	Total	49.6	12.8	4.8	14.7	1.2	3.6	3.7	9.6	100	3355
AJK	Urban	43.1	28.5	4.9	8.6	0.6	5.8	2.0	6.5	100	1417
	Rural	40.2	23.5	7.6	9.0	0.8	10.1	6.3	2.5	100	6162
	Total	40.6	24.2	7.2	8.9	0.8	9.6	5.7	3.1	100	7579

Percent distribution of household population according to time to go to source of drinking water, get water and return, for users of improved and unimproved drinking water sources, Pakistan NNS 2018

		Time to source of drinking water								Total	Number of household members
		Users of improved drinking water sources				Users of unimproved drinking water sources					
		Water on premises	Less than 30 minutes	30 minutes or more	Missing/DK	Water on premises	Less than 30 minutes	30 minutes or more	Missing/DK		
GB	Urban	89.0	7.0	0.3	1.0	0.0	2.1	0.5	0.0	100	693
	Rural	76.5	14.0	2.0	1.0	0.0	4.3	1.7	0.5	100	4693
	Total	79.0	12.6	1.6	1.0	0.0	3.9	1.5	0.4	100	5386
Education of household head											
None		77.0	8.7	3.2	3.1	2.6	2.1	1.9	1.5	100	50545
Primary		76.7	11.4	3.0	2.1	2.9	1.8	1.6	0.6	100	10280
Middle		76.0	12.6	2.3	2.4	3.1	1.7	1.2	0.8	100	10616
Secondary		76.6	12.8	1.9	2.4	3.2	1.5	0.9	0.7	100	14951
Higher		76.7	11.2	2.0	3.2	2.7	1.4	0.9	2.0	100	13912
Wealth index quintile											
Poorest		68.9	8.1	5.9	3.7	2.0	4.3	4.9	2.1	100	26840
Second		82.9	6.3	2.3	2.2	2.3	1.5	1.1	1.4	100	23206
Middle		81.0	8.3	1.7	2.7	3.0	1.4	0.7	1.3	100	19770
Fourth		78.2	11.6	1.6	2.5	3.6	1.1	0.4	0.9	100	16649
Richest		72.6	17.7	1.9	3.0	3.1	0.7	0.3	0.8	100	13839

Table Annex K-3: Use and sharing of sanitation facilities

Percent distribution of household population by use of private and public sanitation facilities and use of shared facilities, by users of improved and unimproved sanitation facilities, Pakistan NNS 2018												
		Users of improved sanitation facilities				Users of unimproved sanitation facilities				Open defecation (no facility, bush field)	Total	Number of household members
		Not shared	Shared by: 5 households or less	Shared by: More than 5 households	Missing/DK	Not shared	Shared by: 5 households or less	Shared by: More than 5 households	Missing/DK			
Total		80.0	4.3	0.4	0.0	5.9	0.5	0.1	0.0	8.8	100.0	100304
Urban		92.2	3.4	0.3	0.0	2.5	0.2	0.0	0.0	1.4	100.0	29858
Rural		72.6	4.8	0.5	0.0	8.0	0.6	0.1	0.0	13.3	100.0	70446
Province/ region												
Punjab	Urban	94.0	3.8	0.3	0.0	1.4	0.1	0.0	0.0	0.4	100.0	12016
	Rural	84.1	4.8	0.6	0.0	3.9	0.3	0.0	0.0	6.3	100.0	25070
	Total	87.8	4.4	0.5	0.0	3.0	0.2	0.0	0.0	4.1	100.0	37086
Sindh	Urban	90.6	2.9	0.1	0.0	2.6	0.5	0.1	0.0	3.2	100.0	9003
	Rural	40.8	6.0	1.0	0.0	10.6	2.0	0.4	0.0	39.3	100.0	8153
	Total	66.8	4.4	0.5	0.0	6.4	1.2	0.2	0.0	20.5	100.0	17156
KP	Urban	88.2	6.2	0.9	0.0	3.8	0.2	0.0	0.0	0.7	100.0	2464
	Rural	79.2	6.8	0.3	0.0	8.0	0.3	0.0	0.0	5.4	100.0	9758
	Total	81.0	6.7	0.4	0.0	7.2	0.3	0.0	0.0	4.4	100.0	12222
Balochistan	Urban	85.3	0.4	0.1	0.0	12.7	0.0	0.0	0.0	1.5	100.0	3495
	Rural	58.6	1.1	0.2	0.0	20.5	0.3	0.1	0.0	19.0	100.0	12820
	Total	65.9	0.9	0.2	0.0	18.4	0.3	0.1	0.0	14.2	100.0	16315
ICT	Urban	98.0	0.4	0.0	0.0	1.3	0.1	0.0	0.0	0.1	100.0	582
	Rural	97.0	1.1	0.0	0.0	1.6	0.0	0.0	0.0	0.3	100.0	623
	Total	97.5	0.7	0.0	0.0	1.5	0.1	0.0	0.0	0.2	100.0	1205
KP-NMD	Total	55.7	2.0	0.2	0.0	31.7	0.4	0.0	0.0	9.9	100.0	3355
AJK	Urban	94.9	1.2	0.1	0.0	3.6	0.0	0.0	0.0	0.3	100.0	1417
	Rural	80.1	2.3	0.0	0.0	14.0	0.2	0.0	0.0	3.3	100.0	6162
	Total	82.1	2.2	0.0	0.0	12.6	0.2	0.0	0.0	2.9	100.0	7579
GB	Urban	92.3	0.3	0.0	0.0	7.3	0.1	0.0	0.0	0.0	100.0	693
	Rural	74.9	1.5	0.0	0.0	20.8	1.1	0.0	0.0	1.6	100.0	4693
	Total	78.4	1.3	0.0	0.0	18.1	0.9	0.0	0.0	1.3	100.0	5386

Percent distribution of household population by use of private and public sanitation facilities and use of shared facilities, by users of improved and unimproved sanitation facilities, Pakistan NNS 2018

	Users of improved sanitation facilities				Users of unimproved sanitation facilities				Open def-ecation (no facility, bush field	Total	Number of household members
	Not shared	Shared by: 5 households or less	Shared by: More than 5 households	Missing/DK	Not shared	Shared by: 5 households or less	Shared by: More than 5 households	Missing/DK			
Education of household head											
None	72.7	4.2	0.5	0.0	8.0	0.6	0.1	0.0	14.0	100.0	50545
Primary	78.2	5.7	0.5	0.0	5.6	0.6	0.2	0.0	9.2	100.0	10280
Middle	86.3	4.8	0.4	0.0	3.9	0.3	0.1	0.0	4.1	100.0	10616
Secondary	89.2	3.9	0.5	0.0	3.8	0.3	0.0	0.0	2.4	100.0	14951
Higher	90.7	3.7	0.3	0.0	3.1	0.3	0.0	0.0	1.8	100.0	13912
Wealth index quintile											
Poorest	39.5	3.1	0.5	0.0	15.5	1.6	0.2	0.0	39.5	100.0	26840
Second	80.9	5.4	0.7	0.0	8.2	0.6	0.1	0.0	4.2	100.0	23206
Middle	90.7	5.0	0.4	0.0	3.4	0.1	0.0	0.0	0.4	100.0	19770
Fourth	93.4	4.4	0.3	0.0	1.8	0.1	0.0	0.0	0.1	100.0	16649
Richest	95.4	3.7	0.2	0.0	0.7	0.0	0.0	0.0	0.0	100	13839

Table Annex K-4: Water and soap at place for handwashing

Percentage of households where place for handwashing was observed, percentage with no specific place for handwashing, and percent distribution of households by availability of water and soap at specific place for handwashing, Pakistan NNS 2018

		Percentage of households:			Place for handwashing observed									
		Where place for handwashing was observed	With no specific place for handwashing in the dwelling, yard, or plot	Number of households	Water is available and: Soap present	Water is available and: No soap: Ash, mud, or sand present	Water is available and: No soap: No other cleansing agent present	Water is not available and: Soap present	Water is not available and: No soap: Ash, mud, or sand present	Water is not available and: No soap: No other cleansing agent present	No specific place for handwashing in the dwelling, yard, or plot	Total	Percentage of households with a specific place for handwashing where water and soap or other cleansing agent are present [1]	Number of households where place for handwashing was observed or with no specific place for handwashing
Total		94.6	2.9	100304	84.8	0.7	6.1	2.1	0.3	3.0	2.9	100.0	85.5	97170
Urban		95.2	1.5	29858	92.4	0.2	3.1	1.5	0.1	1.2	1.5	100.0	92.6	28886
Rural		94.2	3.7	70446	80.3	1.0	7.9	2.5	0.5	4.1	3.8	100.0	81.3	68284
Province/ region														
Punjab	Urban	96.5	0.5	12016	95.9	0.0	1.9	1.4	0.0	0.3	0.5	100.0	95.9	11705
	Rural	98.2	0.9	25070	89.1	0.3	6.5	1.4	0.1	1.6	0.9	100.0	89.4	24788
	Total	97.5	0.8	37086	91.6	0.2	4.8	1.4	0.1	1.1	0.8	100.0	91.8	36493
Sindh	Urban	93.8	2.4	9003	88.8	0.4	4.6	1.5	0.1	2.1	2.5	100.0	89.2	8673
	Rural	89.3	8.0	8153	58.1	3.3	14.6	4.9	1.4	9.6	8.3	100.0	61.4	7929
	Total	91.7	5.1	17156	74.0	1.8	9.4	3.1	0.7	5.7	5.3	100.0	75.8	16602
KP	Urban	96.6	1.7	2464	90.4	0.0	5.6	1.2	0.1	1.0	1.7	100.0	90.4	2420
	Rural	94.0	3.6	9758	85.0	0.3	6.3	1.9	0.1	2.6	3.7	100.0	85.4	9566
	Total	94.5	3.2	12222	86.1	0.3	6.2	1.7	0.1	2.3	3.3	100.0	86.4	11986
Balochistan	Urban	88.5	5.8	3495	80.2	0.7	3.2	3.8	0.5	5.4	6.2	100.0	81.0	3271
	Rural	78.8	11.6	12820	59.5	2.5	5.2	5.7	1.8	12.4	12.9	100.0	62.1	11579
	Total	81.4	10.0	16315	65.4	2.0	4.6	5.2	1.4	10.5	11.0	100.0	67.4	14850
ICT	Urban	92.5	0.9	582	90.1	0.0	5.3	0.5	0.0	3.2	1.0	100.0	90.1	551
	Rural	98.6	0.1	623	89.7	0.0	8.0	1.5	0.0	0.8	0.1	100.0	89.7	616
	Total	95.4	0.5	1205	89.9	0.0	6.6	0.9	0.0	2.0	0.6	100.0	89.9	1167
KP-NMD	Total	90.5	6.1	3355	74.3	2.1	7.5	3.8	0.5	5.5	6.3	100.0	76.4	3259

Percentage of households where place for handwashing was observed, percentage with no specific place for handwashing, and percent distribution of households by availability of water and soap at specific place for handwashing, Pakistan NNS 2018

		Percentage of households:			Place for handwashing observed									
		Where place for hand-washing was observed	With no specific place for hand-washing in the dwelling, yard, or plot	Number of households	Water is available and: Soap present	Water is available and: No soap: Ash, mud, or sand present	Water is available and: No soap: No other cleansing agent present	Water is not available and: Soap present	Water is not available and: No soap: Ash, mud, or sand present	Water is not available and: No soap: No other cleansing agent present	No specific place for handwashing in the dwelling, yard, or plot	Total	Percentage of households with a specific place for handwashing where water and soap or other cleansing agent are present [1]	Number of households where place for hand-washing was observed or with no specific place for handwashing
AJK	Urban	96.0	3.4	1417	94.6	0.1	0.7	1.1	0.0	0.1	3.4	100.0	94.7	1408
	Rural	92.4	7.2	6162	85.8	0.0	2.8	1.7	0.1	2.4	7.2	100.0	85.8	6134
	Total	92.9	6.7	7579	87.0	0.0	2.5	1.6	0.1	2.1	6.7	100.0	87.0	7542
GB	Urban	98.0	0.9	693	92.9	0.0	3.6	1.1	0.0	1.4	0.9	100.0	92.9	682
	Rural	92.8	5.1	4693	81.2	0.1	7.0	2.2	0.1	4.2	5.2	100.0	81.3	4589
	Total	93.9	4.2	5386	83.6	0.1	6.3	2.0	0.1	3.6	4.3	100.0	83.7	5271
Education of household head														
None		93.2	4.2	50545	78.2	1.2	8.4	2.8	0.5	4.7	4.3	100.0	79.3	48701
Primary		95.8	2.4	10280	85.4	0.7	6.7	1.6	0.3	2.8	2.4	100.0	86.1	10058
Middle		96.2	1.8	10616	90.0	0.3	4.4	1.7	0.2	1.6	1.9	100.0	90.3	10376
Secondary		96.4	1.5	14951	92.6	0.2	3.4	1.2	0.1	0.9	1.5	100.0	92.9	14620
Higher		94.9	1.3	13912	93.8	0.1	2.3	1.5	0.0	0.9	1.3	100.0	94.0	13415
Wealth index quintile														
Poorest		87.7	8.8	26840	55.9	3.1	14.7	4.5	1.3	11.3	9.1	100.0	59.0	25491
Second		94.9	2.8	23206	82.3	0.4	9.0	2.5	0.2	2.7	2.8	100.0	82.8	22520
Middle		97.0	1.3	19770	91.8	0.1	4.4	1.5	0.1	0.9	1.3	100.0	91.9	19403
Fourth		97.3	0.9	16649	95.4	0.0	2.0	1.5	0.0	0.2	0.9	100.0	95.4	16343
Richest		95.9	0.6	13839	98.3	0.0	0.5	0.6	0.0	0.0	0.6	100.0	98.3	13413

Table Annex K-5: Availability of soap or other cleansing agent

Percent distribution of households by availability of soap or other cleansing agent in the dwelling, Pakistan NNS 2018											
		Place for handwashing observed				Place for handwashing not observed			Total	Percentage of house-holds with soap or other cleansing agent any-where in the dwelling [1]	Number of households
		Soap or other cleansing agent observed	Soap or other cleansing agent not observed: Soap or other cleansing agent shown	Soap or other cleansing agent not observed at place for handwashing: No soap or other cleansing agent in household	Soap or other cleansing agent not observed at place for handwashing: Not able/Does not want to show cleansing agent	Soap or other cleansing agent not observed: Soap or other cleansing agent shown	Soap or other cleansing agent not observed at place for handwashing: No soap or other cleansing agent in household	Soap or other cleansing agent not observed at place for handwashing: Not able/Does not want to show cleansing agent			
Total		85.7	4.0	4.7	0.3	3.4	2.0	0.0	100.0	93.0	100304
Urban		90.9	2.1	2.0	0.1	3.6	1.2	0.1	100.0	96.6	29858
Rural		82.5	5.1	6.3	0.3	3.2	2.5	0.0	100.0	90.8	70446
Province/ region											
Punjab	Urban	94.3	1.1	0.9	0.1	2.7	0.8	0.0	100.0	98.1	12016
	Rural	90.1	3.4	4.4	0.3	1.1	0.7	0.0	100.0	94.6	25070
	Total	91.7	2.5	3.1	0.2	1.7	0.8	0.0	100.0	95.9	37086
Sindh	Urban	87.4	3.4	3.0	0.1	4.7	1.3	0.1	100.0	95.4	9003
	Rural	65.8	11.2	11.9	0.4	5.7	5.0	0.1	100.0	82.7	8153
	Total	77.0	7.1	7.2	0.3	5.2	3.1	0.1	100.0	89.3	17156
KP	Urban	90.2	4.2	2.2	0.1	2.4	1.0	0.0	100.0	96.7	2464
	Rural	85.2	5.1	3.3	0.3	4.2	1.8	0.1	100.0	94.5	9758
	Total	86.2	5.0	3.1	0.3	3.8	1.6	0.0	100.0	95.0	12222
Balochistan	Urban	80.4	1.1	6.9	0.1	6.1	5.4	0.0	100.0	87.6	3495
	Rural	62.8	2.7	13.0	0.3	9.1	12.0	0.1	100.0	74.6	12820
	Total	67.7	2.3	11.3	0.2	8.3	10.2	0.1	100.0	78.2	16315
ICT	Urban	84.6	2.6	5.2	0.2	4.7	2.1	0.6	100.0	91.9	582
	Rural	90.0	3.6	4.9	0.1	1.3	0.1	0.0	100.0	94.9	623
	Total	87.2	3.0	5.1	0.2	3.1	1.1	0.3	100.0	93.3	1205
KP-NMD	Total	78.0	5.1	6.8	0.5	5.9	3.4	0.2	100.0	89.1	3355
AJK	Urban	95.2	0.2	0.5	0.1	3.4	0.5	0.1	100.0	98.8	1417
	Rural	87.3	2.4	2.4	0.4	6.4	1.1	0.1	100.0	96.0	6162
	Total	88.3	2.1	2.2	0.3	6.0	1.1	0.1	100.0	96.4	7579

Percent distribution of households by availability of soap or other cleansing agent in the dwelling, Pakistan NNS 2018

		Place for handwashing observed				Place for handwashing not observed			Total	Percentage of households with soap or other cleansing agent anywhere in the dwelling [1]	Number of households
		Soap or other cleansing agent observed	Soap or other cleansing agent not observed: Soap or other cleansing agent shown	Soap or other cleansing agent not observed at place for handwashing: No soap or other cleansing agent in household	Soap or other cleansing agent not observed at place for handwashing: Not able/Does not want to show cleansing agent	Soap or other cleansing agent not observed: Soap or other cleansing agent shown	Soap or other cleansing agent not observed at place for handwashing: No soap or other cleansing agent in household	Soap or other cleansing agent not observed at place for handwashing: Not able/Does not want to show cleansing agent			
GB	Urban	93.0	2.2	2.7	0.1	0.6	1.2	0.2	100.0	95.8	693
	Rural	81.9	5.1	5.3	0.4	5.0	2.0	0.2	100.0	92.0	4693
	Total	84.2	4.5	4.8	0.4	4.1	1.8	0.2	100.0	92.8	5386
Education of household head											
None		80.4	5.1	7.3	0.4	3.7	3.1	0.1	100.0	89.2	50545
Primary		86.5	5.1	4.0	0.2	2.8	1.3	0.0	100.0	94.4	10280
Middle		90.4	3.0	2.7	0.1	2.7	1.1	0.0	100.0	96.1	10616
Secondary		92.2	2.3	1.8	0.1	2.8	0.7	0.0	100.0	97.3	14951
Higher		91.8	1.8	1.2	0.1	3.8	1.3	0.1	100.0	97.4	13912
Wealth index quintile											
Poorest		62.5	9.8	14.6	0.7	6.2	6.0	0.1	100.0	78.6	26840
Second		83.5	5.8	5.3	0.4	3.2	1.8	0.0	100.0	92.5	23206
Middle		91.8	2.7	2.5	0.1	2.1	0.8	0.0	100.0	96.6	19770
Fourth		95.1	1.3	0.9	0.0	2.1	0.6	0.0	100.0	98.4	16649
Richest		95.4	0.3	0.2	0.0	3.2	0.9	0.0	100.0	98.8	13839

[1] Availability of soap or other cleansing agent (observed or unobserved)

Table Annex K-6: Safety nets (social protection)

Percentage of households benefiting from government social protection schemes in last 12 month and percent distribution of type of source, Pakistan NNS 2018																		
		Number of households	Percentage of households benefited from government social protection schemes	Average number of persons per HH benefited from government social protection schemes	Percentage of households benefited from government social protection schemes by type of source:											Average amount received	Average amount spent in food purchasing	Number of households getting benefits
					Unconditional cash transfer	Waseela-e-haq	Waseela-e-taleem	Waseela-e-rozgar	Waseela-e-sehat	Bait-ul-Maal	EOBI	Benazir Income Support Programme (BISP)	Workers welfare fund	National income support programme	Other			
Total		100304	4.9	1.1	0.8	0.4	1.4	0.6	0.5	0.6	0.1	94.3	0.6	0.2	1.5	16208.8	8095.1	4862
Urban		29858	2.9	1.1	1.0	0.6	2.8	0.7	0.0	0.8	0.2	91.6	0.4	0.2	2.2	15046.5	6751.8	981
Rural		70446	6.2	1.1	0.8	0.4	1.1	0.6	0.7	0.5	0.1	95.0	0.6	0.2	1.3	16538.2	8475.8	3881
Province/ region																		
Punjab	Urban	12016	0.9	1.1	1.3	1.1	2.8	0.0	0.0	2.9	0.7	78.5	0.5	0.8	6.2	13599.5	6391.7	103
	Rural	25070	2.3	1.1	1.9	0.5	1.6	0.4	2.2	1.0	0.0	89.8	0.2	0.3	3.5	16226.4	7662.8	514
	Total	37086	1.8	1.1	1.8	0.6	1.8	0.3	1.8	1.4	0.1	87.7	0.3	0.4	4.0	15720.8	7418.2	617
Sindh	Urban	9003	6.2	1.1	0.4	0.4	2.9	0.8	0.0	0.3	0.1	95.6	0.0	0.1	1.5	15374.3	6754.3	646
	Rural	8153	19.8	1.1	0.3	0.1	1.2	0.2	0.2	0.3	0.1	98.0	0.2	0.1	0.3	16677.9	8321.8	1643
	Total	17156	12.7	1.1	0.3	0.2	1.6	0.4	0.2	0.3	0.1	97.4	0.2	0.1	0.6	16344.7	7921.2	2289
KP	Urban	2464	3.5	1.1	0.0	1.6	2.5	1.6	0.0	0.0	0.0	86.6	2.6	0.4	1.1	16095.3	7038.4	92
	Rural	9758	5.5	1.1	0.7	1.4	0.0	3.0	0.7	0.4	0.0	93.4	1.0	0.1	0.9	16306.6	9513.1	474
	Total	12222	5.1	1.1	0.6	1.5	0.3	2.8	0.6	0.3	0.0	92.5	1.2	0.1	0.9	16278.5	9184.6	566
Balochistan	Urban	3495	0.9	1.2	29.5	0.0	0.0	2.7	0.0	0.0	0.0	72.9	0.0	0.0	0.0	9016.3	5554.3	54
	Rural	12820	1.0	1.1	4.7	0.3	0.8	0.0	0.4	0.9	0.0	89.9	0.0	0.2	1.2	12703.1	5464.8	192
	Total	16315	0.9	1.1	10.9	0.2	0.6	0.7	0.3	0.6	0.0	85.7	0.0	0.2	0.9	11779.2	5487.2	246
ICT	Urban	582	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	3000.0	2000.0	1
	Rural	623	0.5	1.0	0.0	0.0	0.0	0.0	0.0	41.1	0.0	28.6	0.0	0.0	30.3	20848.9	2988.3	4
	Total	1205	0.3	1.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	47.8	0.0	0.0	22.1	16033.5	2721.7	5
KP-NMD	Total	3355	4.6	1.1	0.8	1.2	0.0	0.4	0.0	0.0	0.0	97.1	2.5	0.0	0.6	12662.7	7228.8	190
AJK	Urban	1417	2.1	1.3	13.0	0.0	2.7	0.0	0.0	3.6	0.0	72.0	9.5	0.4	3.2	18650.0	14059.7	39
	Rural	6162	5.3	1.3	2.4	0.9	0.9	0.7	0.0	0.8	0.9	77.5	7.3	0.2	8.4	22592.4	16430.4	370
	Total	7579	4.9	1.3	3.0	0.8	1.0	0.6	0.0	0.9	0.8	77.1	7.4	0.2	8.1	22359.6	16290.4	409

Percentage of households benefiting from government social protection schemes in last 12 month and percent distribution of type of source, Pakistan NNS 2018

		Number of households	Percentage of households benefited from government social protection schemes	Average number of persons per HH benefited from government social protection schemes	Percentage of households benefited from government social protection schemes by type of source:											Average amount received	Average amount spent in food purchasing	Number of households getting benefits
					Unconditional cash transfer	Waseela-e-haq	Waseela-e-taleem	Waseela-e-rozgar	Waseela-e-sehat	Bait-ul-Maal	EOBI	Benazir Income Support Programme (BISP)	Workers welfare fund	National income support programme	Other			
GB	Urban	693	6.7	1.1	0.0	0.0	0.0	0.0	0.0	5.6	2.3	83.7	8.4	0.0	0.0	16091.1	10737.5	45
	Rural	4693	11.2	1.1	0.2	0.1	0.6	0.1	0.0	0.8	0.4	85.6	12.0	0.1	1.3	15611.4	9993.1	495
	Total	5386	10.3	1.1	0.2	0.1	0.5	0.1	0.0	1.4	0.6	85.3	11.5	0.1	1.2	15674.9	10091.8	540
Education of household head																		
None		50545	6.8	1.1	0.7	0.3	1.2	0.3	0.6	0.6	0.1	95.2	0.5	0.2	1.2	16210.4	8159.0	3114
Primary		10280	6.7	1.1	0.9	0.3	0.6	0.6	0.6	0.4	0.0	95.5	0.6	0.2	0.8	15953.3	7594.6	673
Middle		10616	2.9	1.1	1.1	0.8	3.1	0.3	0.5	0.6	0.0	91.4	0.4	0.1	1.9	15444.3	7815.6	395
Secondary		14951	2.5	1.1	1.5	1.1	2.2	1.2	0.0	0.8	0.3	89.4	0.6	0.1	4.8	16686.7	8914.3	408
Higher		13912	1.8	1.1	0.1	1.7	3.5	4.8	0.3	0.7	0.5	89.9	1.7	0.2	2.0	17105.1	7847.0	272
Wealth index quintile																		
Poorest		26840	12.6	1.1	0.6	0.3	1.1	0.2	0.5	0.5	0.1	96.8	0.4	0.2	0.8	16153.2	8654.4	2370
Second		23206	6.5	1.1	1.2	0.4	1.8	0.8	0.9	0.2	0.1	94.9	0.7	0.1	1.2	16602.2	8065.9	1501
Middle		19770	3.5	1.1	0.6	0.5	0.8	0.7	0.3	0.3	0.0	91.4	0.9	0.3	1.5	15418.9	6706.1	651
Fourth		16649	1.6	1.1	1.5	0.8	1.9	1.1	0.0	0.6	0.0	89.1	0.7	0.1	3.3	16258.2	7094.3	254
Richest		13839	0.6	1.1	0.7	3.7	5.8	6.1	0.0	6.1	1.1	65.2	0.8	0.1	14.0	17526.4	7348.2	86

Table Annex K-7: Nutritional status of children

Percentage of children 6-59 months by nutritional status according to MUAC indices: SAM, MAM, and GAM,Pakistan NNS 2018

		Malnutrition				Number of children 6-59 months
		<115mm	>=115mm & <125mm	<125mm		
Total		8.7	11.3	20.0	14.1	55142
Urban		7.7	10.5	18.1	14.2	15680
Rural		9.3	11.7	21.0	14.0	39462
Province/ region						
Punjab	Urban	7.9	9.2	17.1	14.4	5976
	Rural	8.7	9.8	18.5	14.2	12970
	Total	8.4	9.6	18.0	14.3	18946
Sindh	Urban	6.4	12.2	18.6	13.9	4900
	Rural	5.8	12.7	18.5	13.9	5627
	Total	6.1	12.5	18.6	13.9	10527
KP	Urban	7.7	11.8	19.5	14.2	1272
	Rural	10.8	11.6	22.4	14.1	5246
	Total	10.1	11.6	21.8	14.1	6518
Balochistan	Urban	14.0	11.5	25.5	14.4	2041
	Rural	18.9	17.9	36.8	13.5	7665
	Total	17.5	16.1	33.6	13.8	9706
ICT	Urban	1.9	6.1	8.0	14.6	346
	Rural	2.7	8.4	11.1	14.3	350
	Total	2.3	7.2	9.5	14.5	696
KP-NMD	Total	14.9	19.9	34.8	13.4	1611
AJK	Urban	15.5	9.7	25.3	13.9	695
	Rural	14.3	15.0	29.3	13.6	3069
	Total	14.5	14.3	28.8	13.6	3764
GB	Urban	2.1	4.7	6.8	15.3	383
	Rural	3.0	6.6	9.6	14.8	2991
	Total	2.8	6.3	9.1	14.9	3374
Gender						
Male		8.2	10.9	19.1	14.2	28167
Female		9.2	11.7	20.9	14.0	26975
Age						
6-11 months		19.6	20.1	39.7	13.0	5495
12-17 months		13.4	16.8	30.2	13.4	5732
18-23 months		11.7	14.1	25.7	13.6	5475
24-35 months		8.4	11.1	19.5	14.0	13411
36-47 months		5.3	8.2	13.5	14.6	13274
48-59 months		3.7	6.3	10.0	14.9	11755
Mother's education						
None		9.3	12.3	21.6	14.0	32712
Primary		7.3	11.3	18.6	14.1	5562
Middle		8.3	10.7	19.0	14.2	4630
Secondary		8.2	9.0	17.3	14.3	5710

Percentage of children 6-59 months by nutritional status according to MUAC indices: SAM, MAM, and GAM,Pakistan NNS 2018					
	Malnutrition				Number of children 6-59 months
	<115mm	>=115mm & <125mm	<125mm		
Higher	8.1	8.7	16.8	14.4	5510
Wealth index quintile					
Poorest	10.4	14.1	24.5	13.8	16268
Second	10.1	11.8	21.8	14.0	12955
Middle	8.4	10.4	18.8	14.2	10746
Fourth	7.1	10.2	17.3	14.3	8795
Richest	6.9	9.0	15.9	14.5	6378

Table Annex K-8: Duration of breastfeeding

Median duration of any breastfeeding, exclusive breastfeeding, and predominant breastfeeding among children age 0-35 months, Pakistan NNS 2018				
	Median duration (in months) of			Number of children age 0-35 months
	Any breastfeeding	Exclusive breastfeeding	Predominant breastfeeding	
Median	20.8	2.3	5.0	38643
Urban	21.0	2.2	4.6	11248
Rural	20.7	2.3	5.2	27395
Total	20.8	2.2	4.9	19322
Province/ region				
Punjab	18.5	1.6	4.3	13898
Sindh	21.5	2.8	5.4	7235
KP	21.7	4.6	6.3	4572
Balochistan	21.0	.7	7.5	6453
ICT	20.8	3.3	6.3	467
KP-NMD	21.2	4.1	6.2	1048
AJK	18.5	.7	3.6	2726
GB	19.9	3.2	4.4	2244
Sex				
Male	20.8	2.2	4.8	19679
Female	20.8	2.3	5.1	18964
Mother's education				
None	21.1	2.6	5.6	21944
Primary	18.5	1.4	4.4	4050
Secondary	20.7	1.9	5.0	3458
Higher	20.4	1.6	4.3	4387
Don't know	19.6	1.5	4.0	4280
Wealth index quintile				
Poorest	21.3	2.5	6.0	10837
Second	20.9	2.2	5.0	8895
Middle	20.6	2.5	5.1	7691
Fourth	20.6	1.7	4.7	6366
Richest	20.6	2.0	4.1	4854
Mean				
	15.3	4.6	7.4	38643

Table Annex K-9: Bottle feeding

Percentage of children age 0-23 months who were fed with a bottle with a nipple during the previous day, Pakistan NNS 2018																					
		Percentage of children age 0-6 months fed with a bottle with a nipple	Number of children age 0-6 months who have fed with a bottle with a nipple:	Type of milk drunk from the bottle with a nipple				Advised to use infant formula milk by:				Number of children age 0-6 months	Percentage of children age 0-23 months fed with a bottle with a nipple	Number of children age 0-23 months who have fed with a bottle with a nipple	Type of milk drunk from the bottle with a nipple				Advised to use infant formula milk by:				Number of children age 0-23 months:
				Top feed (formula milk)	Animal milk	Expressed milk	Other	Practitioner	Pharmacy/ pharmacist	Relatives	Other				Top feed (formula milk)	Animal milk	Expressed milk	Other	Practitioner	Pharmacy/ pharmacist	Relatives	Other	
Total		19.5	1147	39.9	55.0	2.7	2.4	62.3	16.7	14.9	6.1	6735	28.5	6897	29.2	68.0	1.6	1.2	59.5	13.5	21.4	5.6	24209
Urban		22.3	367	51.0	42.3	2.5	4.1	66.9	14.3	13.3	5.6	1846	32.8	2325	38.1	58.5	1.5	1.9	61.5	11.4	22.1	5.0	7082
Rural		18.0	780	32.7	63.2	2.8	1.3	57.6	19.2	16.6	6.6	4889	26.0	4445	22.7	75.0	1.7	0.6	57.0	16.1	20.6	6.3	17127
Province/ region																							
Punjab	Urban	26.8	192	46.7	50.1	2.8	0.4	69.8	17.9	8.4	3.9	745	39.0	1107	26.9	72.1	0.9	0.1	67.6	12.2	17.8	2.3	2839
	Rural	23.1	396	25.5	70.2	3.2	1.0	61.6	23.2	10.2	5.1	1739	34.5	2096	17.4	81.2	1.3	0.2	58.5	18.3	15.7	7.5	6072
	Total	24.4	588	33.8	62.4	3.1	0.8	66.0	20.3	9.2	4.4	2484	36.2	3227	21.3	77.5	1.1	0.2	63.2	15.2	16.8	4.8	8911
Sindh	Urban	18.3	95	60.6	27.2	1.7	10.5	64.8	7.7	18.3	9.2	551	27.4	594	59.9	31.9	3.0	5.3	57.8	10.7	23.4	8.2	2169
	Rural	14.0	104	41.0	55.9	1.4	1.7	71.4	3.5	20.4	4.7	710	19.1	438	33.8	64.5	0.7	1.0	67.3	7.9	22.9	2.0	2294
	Total	15.9	199	50.7	41.6	1.6	6.1	67.5	6.0	19.1	7.4	1261	23.1	1029	48.6	46.0	2.0	3.4	60.6	9.8	23.2	6.4	4463
KP	Urban	13.2	22	54.0	22.4	1.3	22.3	42.6	18.8	38.6	0.0	178	19.1	117	52.3	34.9	2.4	10.4	57.5	11.3	26.3	4.9	613
	Rural	10.0	68	63.9	31.1	2.4	2.6	26.5	33.8	25.8	13.9	602	14.4	325	32.2	58.5	6.2	3.2	41.9	28.8	19.9	9.4	2259
	Total	10.7	90	61.2	28.7	2.1	8.0	30.4	30.2	28.9	10.5	780	15.4	441	37.3	52.4	5.2	5.0	47.5	22.6	22.2	7.8	2872
Balochistan	Urban	7.5	20	75.9	5.1	6.0	13.0	59.6	9.2	31.2	0.0	202	9.7	75	74.7	20.5	1.5	3.3	47.8	2.4	49.8	0.0	769
	Rural	6.0	54	52.8	39.6	0.0	7.7	56.5	8.6	34.9	0.0	822	7.9	234	52.6	41.4	4.1	1.9	37.5	7.2	55.4	0.0	2969
	Total	6.4	74	59.2	29.9	1.7	9.1	57.6	8.8	33.6	0.0	1024	8.3	311	59.1	35.3	3.4	2.3	41.3	5.4	53.3	0.0	3738
ICT	Urban	12.1	5	64.5	35.5	0.0	0.0	71.8	0.0	28.2	0.0	41	40.4	64	67.0	33.0	0.0	0.0	45.1	13.0	42.0	0.0	158
	Rural	44.7	18	76.7	23.3	0.0	0.0	45.0	24.6	30.4	0.0	40	40.1	59	66.6	30.8	2.0	0.7	38.1	19.6	39.8	2.5	148
	Total	26.7	23	73.6	26.4	0.0	0.0	50.9	19.2	30.0	0.0	81	40.2	123	66.8	32.0	0.9	0.3	42.0	16.0	41.0	1.1	306
KP-NMD	Total	3.2	8	61.3	31.1	7.6	0.0	45.4	0.0	54.6	0.0	177	7.6	52	26.8	68.6	4.6	0.0	57.0	0.0	43.0	0.0	684
AJK	Urban	29.0	20	47.9	50.9	0.0	1.2	79.8	0.0	0.0	20.2	70	35.8	121	21.6	77.7	0.0	0.7	43.6	41.6	5.2	9.6	337
	Rural	21.5	82	30.2	64.4	5.2	0.3	51.7	13.8	13.3	21.3	440	29.7	437	24.3	71.2	2.7	1.8	60.3	15.7	8.0	15.9	1472
	Total	22.1	102	32.1	63.0	4.6	0.4	56.1	11.6	11.2	21.1	510	30.4	551	23.9	72.2	2.3	1.6	58.1	19.1	7.7	15.1	1809
GB	Urban	25.0	12	41.3	51.9	0.0	6.8	16.2	0.0	0.0	83.8	52	25.1	41	47.3	50.5	0.0	2.2	29.9	0.0	21.3	48.9	165
	Rural	12.1	51	50.0	48.0	2.0	0.0	41.8	0.0	17.8	40.4	366	19.9	251	38.2	59.9	1.7	0.2	41.3	3.3	29.1	26.3	1261
	Total	14.5	63	47.1	49.3	1.3	2.2	34.5	0.0	12.7	52.8	418	20.8	297	40.1	57.9	1.4	0.6	38.4	2.4	27.1	32.0	1426

Percentage of children age 0-23 months who were fed with a bottle with a nipple during the previous day, Pakistan NNS 2018																					
	Percentage of children age 0-6 months fed with a bottle with a nipple	Number of children age 0-6 months who have fed with a bottle with a nipple:	Type of milk drunk from the bottle with a nipple				Advised to use infant formula milk by:				Number of children age 0-6 months	Percentage of children age 0-23 months fed with a bottle with a nipple	Number of children age 0-23 months who have fed with a bottle with a nipple	Type of milk drunk from the bottle with a nipple				Advised to use infant formula milk by:				Number of children age 0-23 months:
			Top feed (formula milk)	Animal milk	Expressed milk	Other	Practitioner	Pharmacy/ pharmacist	Relatives	Other				Top feed (formula milk)	Animal milk	Expressed milk	Other	Practitioner	Pharmacy/ pharmacist	Relatives	Other	
Gender																					
Male	20.5	600	41.0	55.6	2.0	1.4	63.9	17.2	12.4	6.5	3390	29.0	3540	29.8	67.7	1.6	0.9	60.3	13.2	20.1	6.5	12216
Female	18.4	547	38.6	54.3	3.5	3.6	60.4	16.1	18.0	5.5	3345	28.0	3357	28.6	68.4	1.6	1.4	58.7	13.9	22.8	4.6	11993
Age																					
0-5 months	18.7	954	41.9	52.9	2.5	2.6	61.7	17.8	13.7	6.8	5840	18.7	1094	41.9	52.9	2.5	2.6	61.7	17.8	13.7	6.8	5840
6-11 months	24.0	193	30.0	65.1	3.5	1.4	66.5	9.6	23.0	0.9	895	28.5	1729	32.5	64.8	1.6	1.1	58.3	11.7	24.2	5.7	6075
12-23 months	.	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	33.2	4082	24.3	73.5	1.4	0.8	59.2	12.6	23.3	4.9	12294
Mother's education																					
None	15.7	505	31.5	63.9	2.9	1.7	56.5	21.1	17.0	5.4	3793	21.8	2933	26.0	71.0	1.9	1.1	56.7	13.0	24.6	5.6	13436
Primary	24.1	149	38.7	54.6	3.5	3.1	61.6	11.2	15.7	11.5	697	34.7	894	22.9	74.6	1.6	1.0	58.7	7.2	25.3	8.9	2578
Middle	20.3	114	41.9	53.6	2.0	2.5	62.3	14.7	15.6	7.4	596	33.8	754	26.5	70.7	1.5	1.3	55.8	13.6	25.6	5.1	2229
Secondary	26.9	178	46.8	49.5	2.8	0.8	66.0	13.5	14.0	6.6	759	37.3	1034	35.3	62.3	1.5	0.9	59.9	17.6	16.1	6.5	2770
Higher	24.0	188	55.5	37.4	1.4	5.7	66.9	18.3	12.1	2.7	807	36.9	1061	38.4	58.6	1.2	1.7	65.6	14.2	16.7	3.5	2879
Wealth index quintile																					
Poorest	13.4	217	26.8	69.6	1.9	1.7	57.1	15.1	20.0	7.9	1906	16.0	1048	22.0	74.6	1.9	1.5	63.0	8.6	24.9	3.5	6573
Second	17.0	235	32.9	63.5	2.9	0.8	56.3	17.4	24.4	1.9	1590	23.7	1324	22.9	74.3	1.9	0.9	47.8	13.8	33.4	5.0	5581
Middle	20.7	251	41.5	50.1	4.0	4.5	61.4	17.7	12.3	8.6	1305	31.0	1482	26.9	70.0	2.0	1.2	53.9	15.5	23.4	7.2	4777
Fourth	23.4	241	42.3	52.9	2.9	1.9	62.2	15.8	13.3	8.6	1093	35.3	1471	30.4	66.3	1.9	1.4	58.8	13.7	19.7	7.7	4168
Richest	24.3	203	51.2	44.2	1.6	3.0	68.2	17.1	11.3	3.4	841	37.2	1157	37.9	60.5	0.6	1.0	67.5	13.4	15.6	3.5	3110

Table Annex K-10: Texture and packaging of iodized salt

Percent distribution of households by salt textute and packaging of iodized salt, Pakistan NNS 2018									
		Texture of salt			Salt packet observed with handi logo				Number of households within which salt was tested
		Powder	Grain	Raw	Yes	No	Not observed	Salt in jar	
Total		54.3	39.9	5.9	20.4	27.1	4.0	48.5	99084
Urban		45.8	50.9	3.3	23.7	23.2	5.4	47.7	29529
Rural		59.4	33.2	7.4	18.3	29.5	3.2	48.9	69555
Province/ region									
Punjab	Urban	47.5	49.5	2.9	23.9	25.8	7.6	42.7	11917
	Rural	67.2	28.2	4.6	18.1	24.0	4.0	53.9	24900
	Total	59.9	36.2	4.0	20.3	24.7	5.4	49.7	36817
Sindh	Urban	39.1	57.8	3.0	22.6	17.7	3.1	56.6	8910
	Rural	38.2	50.8	11.0	10.6	33.7	1.1	54.7	8083
	Total	38.7	54.5	6.9	16.8	25.3	2.2	55.7	16993
KP	Urban	62.9	31.5	5.6	25.2	23.9	2.3	48.6	2448
	Rural	64.4	24.7	10.9	25.1	35.3	2.5	37.0	9669
	Total	64.1	26.1	9.8	25.1	33.1	2.4	39.3	12117
Balochistan	Urban	59.6	32.6	7.8	15.7	39.8	1.6	42.8	3414
	Rural	62.4	27.6	10.0	14.6	50.1	3.3	32.0	12418
	Total	61.6	29.0	9.4	14.9	47.2	2.9	35.0	15832
ICT	Urban	42.4	57.4	.2	46.4	10.1	2.8	40.7	570
	Rural	48.5	50.5	1.1	31.7	18.3	5.8	44.1	615
	Total	45.3	54.1	.6	39.3	14.1	4.3	42.4	1185
KP-NMD	Total	66.3	11.2	22.5	22.3	50.3	5.5	22.0	3306
AJK	Urban	20.8	77.0	2.2	46.0	15.4	1.3	37.3	1398
	Rural	22.5	75.4	2.1	39.7	15.7	2.2	42.4	6081
	Total	22.3	75.6	2.1	40.6	15.7	2.0	41.7	7479
GB	Urban	34.8	62.9	2.4	49.2	3.7	3.8	43.3	692
	Rural	26.9	66.3	6.8	52.8	6.3	4.8	36.2	4663
	Total	28.5	65.6	5.9	52.0	5.8	4.6	37.6	5355
Wealth index quintile									
Poorest		56.0	32.4	11.6	13.4	37.1	3.0	46.6	26267
Second		64.6	28.6	6.8	16.1	31.3	3.5	49.1	22931
Middle		59.3	35.4	5.3	18.5	26.4	3.2	51.9	19608
Fourth		52.3	44.1	3.6	22.1	22.1	4.4	51.4	16532
Richest		39.2	58.7	2.1	31.6	18.9	6.1	43.4	13746

Table Annex K-11: Consumption of fortified products

Percent distribution of households by consumption of fortified products, Pakistan NNS 2018						
		Household consumed fortified:				Number of households
		Flour	Oil/ghee	Both	Any one	
Total		69.5	70.4	63.4	76.5	100304
Urban		67.7	69.6	62.6	74.7	29858
Rural		70.6	70.8	63.8	77.6	70446
Province/ region						
Punjab	Urban	76.6	80.5	70.8	86.4	12016
	Rural	77.0	81.2	70.6	87.5	25070
	Total	76.8	80.9	70.7	87.1	37086
Sindh	Urban	56.6	56.0	52.3	60.2	9003
	Rural	71.9	65.3	63.7	73.5	8153
	Total	63.9	60.5	57.8	66.6	17156
KP	Urban	59.3	59.9	55.8	63.4	2464
	Rural	62.3	59.9	57.3	64.8	9758
	Total	61.7	59.9	57.0	64.6	12222
Balochistan	Urban	56.6	53.9	52.1	58.5	3495
	Rural	53.1	46.9	44.9	55.0	12820
	Total	54.0	48.8	46.9	56.0	16315
ICT	Urban	87.9	93.4	86.4	94.9	582
	Rural	80.1	92.7	77.5	95.3	623
	Total	84.2	93.1	82.1	95.1	1205
KP-NMD	Urban	52.0	45.3	40.8	56.5	188
	Rural	60.9	56.2	50.8	66.3	3167
	Total	60.6	55.9	50.5	66.0	3355
AJK	Urban	23.5	32.9	17.6	38.9	1417
	Rural	22.2	23.1	15.3	30.0	6162
	Total	22.4	24.4	15.6	31.2	7579
GB	Urban	85.2	80.4	77.5	88.2	693
	Rural	86.0	77.0	74.6	88.4	4693
	Total	85.8	77.7	75.1	88.4	5386
Wealth index quintile						
Poorest		64.5	59.6	55.9	68.2	26840
Second		68.6	68.5	61.6	75.4	23206
Middle		67.0	69.6	61.1	75.5	19770
Fourth		70.6	73.9	65.5	79.0	16649
Richest		76.8	80.2	72.8	84.2	13839

Table Annex K-12: Goitre and clinical anaemia

Percentage of children under age 6-59 months of age by physical examination: goitre and clinical anaemia, Pakistan NNS 2018							
		Percentage of children who have goitre by physical examination	Number of children age 0-59 months	Percentage of children who have clinical anaemia by physical examination	Number of children age 0-59 months	Percentage of children who have oedema by physical examination	Number of children age 0-59 months
Total		1.7	61560	7.4	61560	1.8	61560
Urban		1.2	17465	5.7	17465	1.0	17465
Rural		2.0	44095	8.4	44095	2.2	44095
Province/ region							
Punjab	Urban	0.8	6691	6.6	6691	1.1	6691
	Rural	1.6	14644	9.0	14644	2.3	14644
	Total	1.3	21335	8.1	21335	1.8	21335
Sindh	Urban	1.5	5412	4.2	5412	0.5	5412
	Rural	1.9	6293	9.0	6293	0.9	6293
	Total	1.7	11705	6.8	11705	0.7	11705
KP	Urban	2.6	1441	7.8	1441	1.7	1441
	Rural	3.6	5801	5.5	5801	1.9	5801
	Total	3.4	7242	6.0	7242	1.8	7242
Balochistan	Urban	3.4	2264	6.2	2264	2.0	2264
	Rural	2.8	8500	12.0	8500	4.8	8500
	Total	3.0	10764	10.3	10764	4.0	10764
ICT	Urban	0.2	384	0.7	384	0.0	384
	Rural	0.1	394	2.3	394	0.3	394
	Total	0.2	778	1.5	778	0.2	778
KP-NMD	Total	0.3	1794	2.1	1794	3.3	1794
AJK	Urban	0.8	764	5.9	764	6.3	764
	Rural	1.0	3431	5.9	3431	6.1	3431
	Total	1.0	4195	5.9	4195	6.1	4195
GB	Urban	0.7	433	1.0	433	2.3	433
	Rural	0.7	3314	2.1	3314	2.8	3314
	Total	0.7	3747	1.9	3747	2.7	3747
Gender							
Male		1.6	31387	7.5	31387	1.8	31387
Female		1.8	30173	7.4	30173	1.8	30173
Age							
0-5 months		1.2	5160	4.9	5160	1.5	5160
6-11 months		1.6	5495	7.1	5495	1.7	5495
12-17 months		1.9	5732	8.0	5732	1.8	5732
18-23 months		2.0	5475	7.8	5475	1.7	5475

Percentage of children under age 6-59 months of age by physical examination: goitre and clinical anaemia, Pakistan NNS 2018	Percentage of children who have goitre by physical examination	Number of children age 0-59 months	Percentage of children who have clinical anaemia by physical examination	Number of children age 0-59 months	Percentage of children who have oedema by physical examination	Number of children age 0-59 months
24-35 months	1.7	13411	9.0	13411	2.0	13411
36-47 months	1.6	13274	7.0	13274	1.8	13274
48-59 months	1.9	13013	7.1	13013	1.8	13013
Mother's education						
None	1.9	36427	8.5	36427	1.9	36427
Primary	1.9	6222	7.2	6222	2.0	6222
Middle	1.3	5177	7.4	5177	1.9	5177
Secondary	1.5	6406	5.9	6406	1.2	6406
Higher	1.0	6230	4.5	6230	1.4	6230
Wealth index quintile						
Poorest	2.2	18093	10.3	18093	2.4	18093
Second	1.8	14495	7.8	14495	1.9	14495
Middle	1.7	11981	7.3	11981	1.8	11981
Fourth	1.6	9827	6.2	9827	1.6	9827
Richest	1.0	7164	4.8	7164	1.1	7164

Table Annex K-13: Purpose of post-natal health checks for mothers

Percentage of women age 15-49 years with a live birth in the last two years whose last live birth received health checks by purpose, Pakistan NNS 2108											
		Counselling on nutrition	Counselling on IYCF & breastfeeding	Counselling on family planning	Assessment for complications	Referral to health facility	Treatment for mother	Nutrition supplies	Contraceptive supplies	Other	Number of last live births in the last two years
Total		12.9	7.5	5.7	19.1	3.5	8.8	2.3	0.7	0.3	23284
Urban		16.0	10.1	7.1	23.9	3.5	9.3	2.4	0.6	0.5	6734
Rural		11.1	6.0	4.8	16.3	3.5	8.6	2.3	0.7	0.2	16550
Province/ region											
Punjab	Urban	17.3	10.3	7.8	23.2	4.3	8.6	3.0	0.7	0.1	2723
	Rural	14.5	6.8	6.3	21.5	5.3	10.6	3.5	1.0	0.2	5795
	Total	15.5	8.1	6.9	22.1	4.9	9.9	3.3	0.9	0.2	8518
Sindh	Urban	17.3	11.9	7.3	28.8	2.9	11.9	1.8	0.4	1.3	1989
	Rural	10.6	7.0	4.1	15.0	1.6	8.8	0.8	0.1	0.4	2183
	Total	13.8	9.3	5.7	21.6	2.2	10.3	1.3	0.3	0.8	4172
KP	Urban	6.2	3.9	3.6	11.1	1.6	4.3	0.9	0.8	0.0	606
	Rural	4.0	3.1	1.8	5.7	0.9	4.0	0.5	0.1	0.0	2220
	Total	4.5	3.3	2.2	6.8	1.0	4.1	0.6	0.3	0.0	2826
Balochistan	Urban	7.3	5.0	3.0	15.2	1.4	3.3	1.1	0.7	0.0	764
	Rural	4.2	3.2	3.5	3.7	1.8	4.1	2.1	1.5	0.1	2930
	Total	4.9	3.7	3.4	6.5	1.7	3.9	1.9	1.3	0.1	3694
ICT	Urban	5.9	4.9	5.0	19.5	1.6	5.1	1.5	1.1	0.0	145
	Rural	17.4	12.5	6.3	25.2	2.4	4.7	3.4	2.2	0.0	145
	Total	11.1	8.4	5.6	22.1	1.9	4.9	2.4	1.6	0.0	290
KP-NMD	Total	4.8	3.4	2.6	6.0	0.9	2.3	1.3	0.3	0.2	703
AJK	Urban	9.0	2.4	2.7	24.9	2.0	11.2	1.1	0.0	0.0	314
	Rural	8.5	3.1	1.0	15.2	1.5	7.5	0.4	0.5	0.1	1358
	Total	8.6	3.0	1.2	16.4	1.6	8.0	0.5	0.5	0.1	1672
GB	Urban	3.7	0.7	0.0	7.3	3.5	17.1	2.3	0.0	0.0	157
	Rural	2.9	1.3	1.2	10.9	1.7	8.6	1.2	0.0	0.6	1252
	Total	3.1	1.2	1.0	10.2	2.0	10.1	1.4	0.0	0.5	1409

Percentage of women age 15-49 years with a live birth in the last two years whose last live birth received health checks by purpose, Pakistan NNS 2108

	Counselling on nutrition	Counselling on IYCF & breastfeeding	Counselling on family planning	Assessment for complications	Referral to health facility	Treatment for mother	Nutrition supplies	Contraceptive supplies	Other	Number of last live births in the last two years
Mother's age at birth										
Less than 20	10.2	3.9	2.4	16.5	1.8	6.1	1.0	0.3	0.2	846
20-34	13.6	7.2	4.8	20.1	2.6	8.4	2.4	0.8	0.4	12498
35-49	10.6	5.8	4.8	15.8	1.6	7.5	2.5	0.6	0.3	2921
Missing	12.9	8.6	7.3	18.8	5.2	9.9	2.3	0.6	0.3	7019
Place of delivery										
Home	6.4	4.0	3.8	7.5	2.2	4.1	1.4	0.5	0.1	10348
Health facility	17.3	9.8	6.9	26.8	4.3	12.0	3.0	0.8	0.4	12795
- Public	16.2	9.1	6.3	20.3	4.2	9.3	2.7	0.8	0.3	7055
- Private	18.3	10.4	7.5	32.9	4.5	14.5	3.2	0.8	0.6	5740
Other/DK/Missing	6.6	4.7	1.2	10.0	4.3	4.3	0.2	0.8	3.2	128
Education										
None	9.0	5.2	4.0	13.0	2.5	6.8	1.8	0.5	0.3	13157
Primary	15.0	7.2	7.0	22.9	4.6	9.6	3.1	1.0	0.2	2527
Middle	16.1	9.6	7.1	21.1	3.9	11.1	3.4	1.2	0.4	2170
Secondary	17.3	10.0	7.1	27.2	3.6	10.4	2.0	0.5	0.3	2642
Higher	20.5	12.8	8.6	30.8	6.2	13.3	3.2	0.9	0.6	2788
Wealth index quintile										
Poorest	7.1	4.8	3.3	10.3	1.8	5.1	1.3	0.4	0.3	6398
Second	10.0	4.9	4.5	14.9	2.8	7.6	2.1	0.7	0.2	5382
Middle	13.0	7.3	5.7	18.6	4.0	9.4	2.8	0.7	0.5	4569
Fourth	16.3	9.2	7.4	24.5	4.6	11.2	2.7	0.7	0.3	3985
Richest	18.8	11.3	7.5	27.7	4.4	11.0	3.0	0.8	0.3	2950

Table Annex K-14: Post-natal care visits for newborns within one week of birth

Percent distribution of women age 15-49 years with a live birth in the last two years whose last live birth received a post-natal care (PNC) visit within one week of birth, by location and provider of the first PNC visit, Pakistan NNS 2018										
		Provider of first PNC visit for newborns								Number of last live births in the last two years with a PNC visit within the first week of life
		Paediatrician	Other doctor	Nurse	Community midwife (CMW)	Community health worker	Lady health visitor (LHV)	Traditional birth attendant	Total	
Total		77.4	9.0	6.4	0.7	2.0	0.8	3.6	100.0	4611
Urban		85.5	7.4	3.6	0.5	0.7	0.8	1.5	100.0	1673
Rural		71.3	10.3	8.5	0.9	2.9	0.9	5.2	100.0	2938
Province/ region										
Punjab	Urban	82.6	6.9	6.4	0.6	1.2	1.5	0.8	100.0	675
	Rural	69.7	8.3	11.2	1.0	3.9	0.9	5.1	100.0	1434
	Total	74.4	7.8	9.4	0.8	2.9	1.1	3.5	100.0	2109
Sindh	Urban	90.4	6.3	0.6	0.3	0.1	0.0	2.3	100.0	676
	Rural	79.5	10.9	3.5	0.3	0.4	0.0	5.4	100.0	491
	Total	85.9	8.2	1.8	0.3	0.2	0.0	3.6	100.0	1167
KP	Urban	66.4	28.0	0.9	0.4	3.2	1.0	0.0	100.0	72
	Rural	58.8	25.5	5.2	0.0	2.4	4.3	3.7	100.0	227
	Total	60.5	26.1	4.3	0.1	2.6	3.5	2.9	100.0	299
Balochistan	Urban	75.5	11.5	7.8	1.2	0.0	0.0	4.1	100.0	70
	Rural	45.1	10.9	5.0	12.6	1.2	1.0	24.2	100.0	161
	Total	61.7	11.2	6.5	6.3	0.6	0.5	13.2	100.0	231
ICT	Urban	93.0	3.2	3.9	0.0	0.0	0.0	0.0	100.0	28
	Rural	84.8	15.2	0.0	0.0	0.0	0.0	0.0	100.0	45
	Total	88.4	9.9	1.7	0.0	0.0	0.0	0.0	100.0	73
KP-NMD	Total	59.8	11.5	8.9	1.7	8.2	0.0	10.0	100.0	55
AJK	Urban	75.1	20.2	0.0	1.4	3.3	0.0	0.0	100.0	101
	Rural	83.3	9.5	2.3	0.1	4.4	0.2	0.1	100.0	277
	Total	81.8	11.5	1.9	0.4	4.2	0.2	0.1	100.0	378
GB	Urban	77.9	9.5	12.6	0.0	0.0	0.0	0.0	100.0	41
	Rural	69.2	12.3	14.0	1.1	1.6	1.7	0.0	100.0	258
	Total	71.2	11.7	13.7	0.9	1.2	1.4	0.0	100.0	299

Percent distribution of women age 15-49 years with a live birth in the last two years whose last live birth received a post-natal care (PNC) visit within one week of birth, by location and provider of the first PNC visit, Pakistan NNS 2018

	Provider of first PNC visit for newborns								Number of last live births in the last two years with a PNC visit within the first week of life
	Paediatrician	Other doctor	Nurse	Community midwife (CMW)	Community health worker	Lady health visitor (LHV)	Traditional birth attendant	Total	
Mother's age at birth									
Less than 20	75.0	10.3	6.8	1.5	0.7	2.1	3.5	100.0	142
20-34	77.6	8.7	6.6	0.8	1.8	1.2	3.3	100.0	2583
35-49	74.3	9.2	8.4	0.3	2.5	0.3	5.0	100.0	483
Missing	78.0	9.4	5.7	0.5	2.2	0.5	3.7	100.0	1403
Place of delivery									
Home	51.4	7.9	11.3	1.6	7.3	1.8	18.6	100.0	943
Health facility	83.2	9.3	5.4	0.5	0.8	0.6	0.3	100.0	3657
- Public	81.9	8.0	6.2	0.8	1.6	1.0	0.4	100.0	1733
- Private	84.0	10.1	4.8	0.3	0.3	0.4	0.2	100.0	1924
Other/DK/Missing	74.5	22.8	2.6	0.0	0.0	0.0	0.0	100.0	11
Education									
None	71.5	10.4	6.6	1.1	2.2	1.6	6.7	100.0	1833
Primary	73.2	9.6	8.3	0.7	3.9	0.4	3.8	100.0	583
Middle	78.2	8.3	8.0	0.0	2.7	0.2	2.6	100.0	516
Secondary	83.5	8.1	5.8	0.1	1.1	0.5	1.0	100.0	760
Higher	86.3	7.1	4.6	0.8	0.6	0.4	0.2	100.0	919
Wealth index quintile									
Poorest	68.4	12.4	4.6	1.6	2.2	0.9	10.0	100.0	713
Second	69.0	10.0	10.2	1.1	3.2	1.0	5.5	100.0	890
Middle	75.2	8.9	7.2	0.3	2.8	1.4	4.3	100.0	1018
Fourth	80.4	9.7	5.7	0.3	1.7	0.8	1.3	100.0	1063

Table Annex K-15: Attended health and nutrition sessions

Percentage of ever married women with a live birth in the last two years who ever attended a health and nutrition session, Pakistan NNS 2018								
		Percent distribution of women who ever attended health and nutrition sessions	Number of ever married women with a live birth in the last two years	Frequency of attending sessions				
				Every month	Once a quarter	In 6 months	Once a year	Number of women who ever attended health and nutrition sessions
Total		4.9	23284	44.0	24.9	18.9	12.2	1342
Urban		3.5	6734	49.6	18.5	22.5	9.5	304
Rural		5.7	16550	42.1	27.1	17.7	13.1	1038
Province/ region								
Punjab	Urban	3.5	2723	49.5	20.1	24.1	6.3	117
	Rural	6.1	5795	43.9	23.7	18.3	14.1	359
	Total	5.1	8518	45.3	22.8	19.8	12.1	476
Sindh	Urban	3.0	1989	53.7	17.0	21.5	7.8	68
	Rural	4.7	2183	39.7	32.9	14.8	12.6	103
	Total	3.9	4172	44.9	27.0	17.3	10.8	171
KP	Urban	5.6	606	44.4	3.5	25.3	26.7	36
	Rural	6.0	2220	43.1	30.6	18.9	7.4	137
	Total	5.9	2826	43.3	25.3	20.2	11.2	173
Balochistan	Urban	4.2	764	38.7	37.0	8.6	15.8	44
	Rural	4.1	2930	33.9	41.8	12.8	11.5	119
	Total	4.1	3694	35.1	40.6	11.7	12.5	163
ICT	Urban	0.6	145	100.0	0.0	0.0	0.0	1
	Rural	5.2	145	54.9	23.8	0.0	21.3	5
	Total	2.7	290	60.1	21.0	0.0	18.9	6
KP-NMD	Total	2.1	703	19.6	7.9	49.3	23.2	17
AJK	Urban	9.5	314	33.2	26.3	9.6	30.8	30
	Rural	10.4	1358	42.2	29.3	16.1	12.4	121
	Total	10.3	1672	41.1	28.9	15.3	14.6	151
GB	Urban	3.4	157	68.1	31.9	0.0	0.0	6
	Rural	12.4	1252	24.9	20.8	22.6	31.7	179
	Total	10.8	1409	27.3	21.4	21.4	29.9	185
Education								
None		4.3	13157	41.0	27.6	20.0	11.3	608
Primary		5.4	2527	51.1	23.4	13.9	11.5	158
Middle		5.6	2170	40.8	24.8	17.9	16.5	164
Secondary		6.1	2642	45.0	17.7	22.3	15.0	213
Higher		5.2	2788	48.7	25.5	17.1	8.8	199
Wealth index quintile								
Poorest		4.1	6398	46.3	27.1	14.7	11.9	271
Second		5.3	5382	32.6	31.2	24.5	11.7	359
Middle		5.7	4569	41.7	23.1	19.7	15.4	328
Fourth		5.0	3985	48.9	22.1	17.3	11.7	236
Richest		4.3	2950	53.6	20.3	17.2	8.9	148

Table Annex K-16: Goitre and clinical anaemia for women of reproductive age (WRA) and adolescent girls

Percentage of WRA and adolescent girls by physical examination: Goitre and clinical anaemia, Pakistan NNS 2018									
		Percentage of WRA who have goitre by physical examination	Number of WRA age 15-49 years	Percentage of WRA who have clinical anaemia by physical examination	Number of WRA age 15-49 years	Percentage of adolscent girls who have goitre by physical examination	Number of adolescent girls age 10-19 years	Percentage of adolescent girls who have clinical anaemia by physical examination	Number of adolescent girls age 10-19 years
Total		2.4	113139	7.7	113139	1.9	38988	6.8	38988
Urban		2.2	34203	6.0	34203	1.6	11593	5.5	11593
Rural		2.6	78936	8.7	78936	2.0	27395	7.5	27395
Province/ region									
Punjab	Urban	1.1	12976	6.3	12976	.7	4281	5.4	4281
	Rural	1.7	26938	8.5	26938	1.4	9678	7.4	9678
	Total	1.5	39914	7.7	39914	1.2	13959	6.7	13959
Sindh	Urban	3.5	10628	4.9	10628	2.4	3748	4.5	3748
	Rural	3.2	9428	10.5	9428	2.1	3816	7.6	3816
	Total	3.3	20056	7.5	20056	2.2	7564	6.1	7564
KP	Urban	4.3	2999	9.2	2999	2.9	977	8.4	977
	Rural	4.6	11584	7.7	11584	4.4	3698	7.4	3698
	Total	4.6	14583	8.0	14583	4.0	4675	7.6	4675
Balochistan	Urban	2.2	4268	7.2	4268	3.6	1428	10.8	1428
	Rural	3.6	14264	10.6	14264	2.7	4559	10.3	4559
	Total	3.2	18532	9.6	18532	2.9	5987	10.5	5987
ICT	Urban	.4	582	5.5	582	.0	211	5.2	211
	Rural	1.7	735	7.6	735	.9	239	6.6	239
	Total	1.1	1317	6.5	1317	.4	450	5.8	450
KP-NMD	Total	1.1	3729	3.2	3729	.8	990	3.1	990
AJK	Urban	3.2	1687	8.2	1687	2.4	505	7.5	505
	Rural	3.9	6998	8.9	6998	2.6	2203	7.3	2203
	Total	3.8	8685	8.8	8685	2.5	2708	7.3	2708
GB	Urban	.2	842	1.9	842	.0	372	1.7	372
	Rural	1.5	5481	3.9	5481	.6	2283	3.4	2283
	Total	1.2	6323	3.5	6323	.5	2655	3.0	2655

Percentage of WRA and adolescent girls by physical examination: Goitre and clinical anaemia, Pakistan NNS 2018								
	Percentage of WRA who have goitre by physical examination	Number of WRA age 15-49 years	Percentage of WRA who have clinical anaemia by physical examination	Number of WRA age 15-49 years	Percentage of adolscent girls who have goitre by physical examination	Number of adolescent girls age 10-19 years	Percentage of adolescent girls who have clinical anaemia by physical examination	Number of adolescent girls age 10-19 years
Education								
None	2.9	61181	9.2	61181	2.9	7324	8.6	7324
Primary	2.4	11807	7.8	11807	2.1	2405	8.8	2405
Middle	1.7	10980	6.3	10980	1.3	3047	6.2	3047
Secondary	1.9	14666	5.9	14666	1.5	4356	5.4	4356
Higher	1.9	14505	5.1	14505	1.7	2955	6.7	2955
Wealth index quintile								
Poorest	3.3	28453	12.0	28453	2.6	10441	9.5	10441
Second	2.6	26157	8.8	26157	2.1	9602	7.3	9602
Middle	2.5	22964	7.0	22964	1.7	7917	6.5	7917
Fourth	2.3	19818	5.8	19818	1.7	6473	5.3	6473
Richest	1.7	15747	5.5	15747	1.1	4555	4.8	4555

ANNEX L

Steering committee notification

National Nutrition Survey 2018

No.1-2/2016-Dir(Nut)-NHSRC
GOVERNMENT OF PAKISTAN
Ministry of National Health Services, Regulations and Coordination
Telephone: +92 51 9255096; Fax: +92 51 9255214
****

Islamabad the 28th April, 2016

OFFICE ORDER

Subject: **Constitution of National Steering Committee for the National Nutrition Survey (NNS) 2017**

With the approval of the competent authority, Ministry of National Health Services, Regulations & Coordination Government of Pakistan is pleased to constitute the National steering Committee to conduct of National Nutrition Survey 2017. Following are the members of the committee and their terms of references:

i.	Federal Secretary, MoNHSR&C	- **Chairperson**
ii.	Director/ Nutrition Focal Person M/o NHSR&C	- **Secretary**
iii.	Director General M/o NHSR&C	- **Member**
iv.	Executive Director, NIPS	- **Member**
v.	Provincial Director General Health Services (Punjab, Sindh, KP, Balochistan)	- **Members**
vi.	Director Program M/o NHSR&C	- **Member**
vii.	Director General, Bureau of Statistics	- **Member**
viii.	Chief Health (Planning Commission)	- **Member**
ix.	Chief Nutrition (Planning Commission)	- **Member**
x.	Executive Director PMRC	- **Member**
xi.	Head of Mission DFID	- **Member**
xii.	Head of Mission AusAID	- **Member**
xiii.	Representative of World Bank	- **Member**
xiv.	Representative of UNICEF	- **Member**
xv.	Representative of WHO	- **Member**
xvi.	Representative of WFP	- **Member**
xvii.	Country Director, Micronutrient Initiative	- **Member**
xviii.	Any member co-opted by the Secretary M/o NHSR&C	

Objective:-

To provide guidance to the technical committees and provincial committees and the research institutes/firms for effective and timely implementation/ completion of the national nutrition survey

Responsibilities:-

1. Provide strategic guidance to NNS 2017
2. Endorse the TORs of Technical and Provincial Committees
3. Approve the proposal for NNS, as appraised by Technical Committee
4. Review progress of the survey through Technical Committees andProvincial Committees

Director (Programs)
Ministry of NHSR&C
28.4-16

Copy to:-

i. SPS to the Secretary Mo NHSR&C
ii. PS to the Director General, Mo NHSR&C
iii. The Distribution List attached

ANNEX M

Technical committee notification

National Nutrition Survey 2018

No.1-2/2016-Dir(Nut)-NHSRC
GOVERNMENT OF PAKISTAN
Ministry of National Health Services, Regulations and Coordination
Telephone: +92 51 9255096; Fax: +92 51 9255214
****

Islamabad the 28th April, 2016

OFFICE ORDER

Subject: **Constitution of National Technical Committee for National Nutrition Survey (NNS) 2017.**

With the approval of the competent authority, Ministry of National Health Services, Regulations & Coordination Government of Pakistan is pleased to constitute the Technical Committee to conduct of National Nutrition Survey 2017. Following are the members of the committee and their terms of references:

i.	Director General M/o NHSR&C:	- **Chairperson**
ii.	Director/ Nutrition Focal Person M/o NHSR&C	- **Secretary**
iii.	Executive Director NIPS	- **Member**
iv.	DG Bureau of Statistics	- **Member**
v.	Chief Nutrition (Planning Commission)	- **Member**
vi.	Executive Director PMRC	- **Member**
vii.	Director Program M/o NHSR&C	- **Member**
viii.	Nutrition Program Managers all the Provinces (Punjab, Sindh, KP, Balochistan)	- **Members**
ix.	Head of Nutrition DFID	- **Member**
x.	Head of Nutrition AusAID	- **Member**
xi.	Nutrition Head World Bank	- **Member**
xii.	Nutrition Chief UNICEF	- **Member**
xiii.	Nutrition MO WHO	- **Member**
xiv.	Head of Nutrition WFP	- **Member**
xv.	Representative from Micronutrient Initiative	- **Member**
xvi.	Representative from GAIN	- **Member**
xvii.	Any member co-opted by the DG M/o NHSR&C	

Objective:-

To ensure high quality output of the survey by providing technical inputs to the selected research institutes/firms in different stages of implementation.

Responsibilities:-

i. To supervise bidding process and provide feedback on the survey proposal submitted by the selected research institutes/firms and submit for approval from Steering Committee.

ii. To provide feedback on the survey tools. including questionnaire submitted by the selected research institutes/firms

iii. To provide technical assistance in terms of anthropometric. socio economic as well as clinical data in the context of NNS

iv. To provide feedback on the report submitted by the research institutes/firms.

v. To review the final report submitted by the research institutes/firms and endorse the report.

Proposed frequency/number of meetings to be held and mode of meetings:-

1. First meeting to review the proposal submitted by the research institutes/firms: A two day meeting with the selected research institutes and finalizes the proposal in Islamabad

2. Monitor data collection to ensure the quality of data.

3. Second meeting to review the data/tables received after cleaning the data from the field, to ensure the quality of data two to three day meeting in Islamabad.

4. Third meeting to review the document submitted by the research institutes/firms (2 — 3 days meeting) in Islamabad.

Director (Programs)
Ministry of NHSR&C
28·4·16

Copy to:-

i. SPS to the Secretary Mo NHSR&C
ii. PS to the Director General, Mo NHSR&C
iii. The Distribution List attached

ANNEX N

Regional technical committee notification

National Nutrition Survey 2018

NO. 1-2 (NNS-2017)/2016-Dir (Nut)-NHSRC
GOVERNMENT OF PAKISTAN
Ministry of National Health Services, Regulations and Coordination
Telephone: +92 51 9255096; Fax: +92 51 9255214
****

Islamabad the 7th April, 2017.

OFFICE ORDER

Subject: **Constitution of Regional Technical Committee for National Nutrition Survey (NNS) 2017.**

The Nutrition Wing of Ministry of National Health Services Regulation and Coordination is pleased to constitute the Regional Technical Committee including ICT, FATA, AJK and GB to support and facilitate the National Nutrition Survey 2017. Following are the members of the committee and their terms of references:

Chairperson:
Director Nutrition Focal Person Mo NHSR&C

Secretary:
National Survey Coordinator, NNS-2017/NFA

Members: (representatives from Regions)

- ✓ DG/Director Health Services, GB, FATA, AJK
- ✓ District Health Officer, ICT
- ✓ Nutrition Program Managers/Focal person, FATA, AJK, GB
- ✓ Regional Bureau of Statistic, GB, FATA, AJK
- ✓ WHO
- ✓ UNICEF

Any member co-opted by the Director Nutrition (Chairperson)

Objective: to ensure high quality output of the survey by providing technical inputs to the selected research institutes/firms in different stage of implementation

Responsibilities:

1. To provide administrative support and guidance to survey conducting firm
2. To provide technical assistance in terms of anthropometric: socio economic as well as clinical data in the context of NNS-2017

3. To supervise and monitor the field activities of the survey teams
4. To support and facilitate the survey teams in their field activities
5. To develop detail work plan including meeting schedule

(Dr. Baseer Khan Achakzai)
Director Nutrition/NPM

Distribution to:

1. PS to DG, Health
2. DG, Health, AJK
3. Director Health Services, FATA
4. Director Health Services, GB
5. District Health Officer, ICT
6. Nutrition Program Manager/Focal Person, AJK, FATA, GB

ANNEX 01

Punjab provincial technical committee notification

National Nutrition Survey 2018

GOVERNMENT OF THE PUNJAB
PRIMARY & SECONDARY HEALTHCARE DEPARTMENT
Dated Lahore the 14th June, 2017

NOTIFICATION

S.O (V&PP) 1-1/2017(Misc.): The Primary & Secondary Healthcare Department, Government of Punjab is pleased to constitute the 'Provincial Technical Committee' to support and facilitate the National Nutrition Survey – 2017 for which following are members of the committee and their terms of reference:

1.	**Director General Health Services, Punjab**	**Chairman**
2.	**Additional Director, Food & Nutrition Program, Punjab**	**Secretary**
3.	**Representative, IRMNCH**	**Member**
4.	**Representative, Bureau of Statistics**	**Member**
5.	**Representative, Planning and Development Department**	**Member**
6.	**Representative, Public Health Engineering Department**	**Member**
7.	**Representative, UNICEF**	**Member**
8.	**Representative, WHO**	**Member**
9.	**Representative, WFP**	**Member**
10.	**Representative, Micronutrient Initiative (MI)**	**Member**
11.	**Representative, GAIN**	**Member**
12.	**Any Co-opted Member**	**Member**

TORs of the Committee are as follows:
Objective:

- To ensure high quality output of the survey by providing technical inputs to the selected research institutes/firms in different stage of implementation.

Responsibilities:

- To provide the administrative support and guidance to survey conducting firm.
- To provide technical assistance in terms of anthropometric: socio-economic as well as clinical data in the context of NNS-2017.
- To supervise and monitor the field activities of the survey teams.
- To support and facilitate the survey teams in their field activities.
- To develop detail work plan including meeting schedule.

SECRETARY
Primary & Secondary Healthcare Department

No. & Date Even:
1. PS to DGHS, Punjab.
2. Director Nutrition, Ministry of National Health Services Regulations & Coordination (MNHSR&C).
3. Additional Director, Food & Nutrition, O/o DGHS, Punjab 4-Cooper Road Lhr,
4. Officers concerned.
5. PSO to Secretary to Government of Punjab, P&SHC Department.

14/06/17

(DR. AQEEL M KHALEEL)
SECTION OFFICER (V&PP)
P&SHC

LHE
142000737336
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PC

3213

Food & Nutrition Program
Directorate General Health Services Punjab
24-Cooper Road, Lahore. Ph: (042)99203749

No. 51 – 53 /F&N Date 19.06 2017

Dr. Baseer Ahmed Achakzai
Director Nutrition/NPM,
Ministry of National Health Services, Regulation and Coordination,
NIH, Chak Shehzad, Islamabad.
(Ph: 051-9255096)

SUBJECT: FORMATION OF PROVINCIAL TECHNICAL COMMITTEE FOR NATIONAL NUTRITION SURVEY (NNS) 2017

Reference letter No. 1-2(NNS-2017)/2016-Dir(Nut)-NHSRC dated April, 2017 on the subject mentioned above.

The Primary & Secondary Health Care Department, Government of Punjab has notified the **Provincial Technical Committee,** as per proposed constitution, to support and facilitate the National Nutrition Survey-2017 (copy attached).

It is requested that expected dates of initiation of survey in Punjab may be provided to this office so that it can be shared with all members of the committee.

With kind regards,

1033
20-6-17

20/6

Dr. Ahmed Nadeem
(Additional Director-F&N)

Copy for information:

- PA to Secretary, P&SHC Department, Govt. of Punjab, Lahore
- PA to Director General Health Services Punjab, Lahore
- Office copy

ANNEX O2

Sindh provincial technical committee notification

National Nutrition Survey 2018

GOVERNMENT OF SINDH
HEALTH DEPARTMENT
Karachi, dated: the 06th July, 2017

NOTIFICATION

NO:SO(VP)(H)M-2017: Health Department Government of Sindh has been pleased to constitute a Provincial Technical Committee to support and facilitate the National Nutrition Survey (NNS) 2017, with following composition and Terms of References (ToRs).

COMPOSITION:

I.	Director General, Health Services Sindh, Hyderabad.	**Chairperson**
II.	Program Manger Nutrition Support Program Sindh.	**Secretary**
III.	Representatives of Provincial Programs of NPFP & PHC, MNCH, Bureau of Statistics.	**Members**
IV.	Representative of Planning and Development Board, Govt. of Sindh.	**Member**
V.	Representative of Public Health Engineering Department, Govt of Sindh.	**Member**
VI.	Representative of Nutrition Wing, MoNHSR&C, Islamabad.	**Member**
VII.	Representative of UNICEF.	**Member**
VIII.	Representative of WHO.	**Member**
IX.	Representative of WFP.	**Member**
X.	Representative of Micronutrient Initiative (MI).	**Member**
XI.	Representative of GAIN.	**Member**
XII.	Any co-opted Member.	**Member**

TORs:

- i. To provide administrative support and guidance to survey conducting firm.
- ii. To provide technical assistance in terms of anthropometric: socio economic as well as clinical date in the context of NNS-2017.
- iii. To supervise and monitor the field activities of the survey teams.
- iv. To support and facilitate the Survey team in their field activities.
- v. To develop detail work plan including meeting schedule.

SECRETARY HEALTH

NO:SO(VP)(H)M-2017 **Karachi, dated: the 06th July, 2017**

A copy is forwarded for information and necessary action to:-

1. Chairman/ Members concerned.
2. The Director General Health Services Sindh, Hyderabad.
3. The Director Nutrition, Ministry of National Health Services, Regulations and Coordination, Islamabad.
4. The Program Manager, Nutrition Support Program Sindh Karachi.
5. The Nutrition Coordinator P&D Board Sindh.
6. The Officers concerned.
7. The P.S to Secretary Health.

SECTION OFFICER (VERTICAL PROGRAM)

ANNEX O3

KP provincial technical committee notification

National Nutrition Survey 2018

GOVERNMENT OF KHYBER PAKHTUNKHWA
HEALTH DEPARTMENT

Dated, Peshawar the 31, August, 2017.

NOTIFICATION

NO.E&A(Health)/2-264/Notification/2013. With the approval of the competent authority, Health Department is pleased to constitute the Provincial Technical Committee to support and facilitate the National Nutrition Survey, 2017. Following are the members of the committee and their terms of references;

E. **CONSTITUTION OF NATIONAL TECHNICAL COMMITTEE FOR NATIONAL NUTRITION SURVEY (NNS) 2017**

1.	Director General Provincial Health Department	Chairperson.
2.	Provincial Nutrition Program Manager/Focal Person.	Secretary
3.	Provincial Program Managers of , NPFP&PHC, MNCH	Member.
4.	Bureau of Statistics.	Member.
5.	Planning and Development Department	Member
6.	Public Health Engineering (PHE)	Member
7.	Representative of Nutrition Wing, MoNHSR&C	Member
8.	UNICEF	Member
9.	WHO	Member
10.	NFP	Member
11.	Micronutrient Initiative (MI)	Member
12.	GAIN	Member

Any member Co-opted by the DG (Chairperson)

Objective: to ensure high quality output of the survey by providing technical inputs to the selected research institutes/firms in different stage of implementation.

Responsibilities:

1. **To provide administrative support and guidance to survey conducting firm.**
2. **To provide technical assistance in terms of anthropometric, socio economic as well as clinical data in the context of NNS-2017**
3. **To supervise and monitor the field activities of the survey teams**
4. **To support and facilitate the Survey team in their field activities**
5. **To develop detail work plan including meeting schedule.**

Secretary
Govt: of Khyber Pakhtunkhwa
Health Department.

CC.

1. **Director Nutrition, Ministry of National Health Services Regulations and Coordination (MNHSR&C)**
2. **PS to Director General, Khyber Pakhtunkhwa Health Department.**

5/9/17.

(Jibreel Raza)
Section Officer,(General)

ANNEX 04

Balochistan provincial technical committee notification

National Nutrition Survey 2018

To be published in the next issue of Balochistan Gazette.

GOVERNMENT OF BALOCHISTAN
HEALTH DEPARTMENT
(Planning Cell)

Dated Quetta, the 20th July, 2017

NOTIFICATION

No.PC(H)/ Nut /2017/ 5029-50 The Government of Balochistan, Health Department is pleased to constitute a Provincial Technical Committee (PTC) to ensure high quality output of the survey by providing technical/inputs to the selected research institute/firm in different of implementation. The composition of the committee and ToR is as under:-

1.	Director General Health Services	Chairperson
2.	Provincial Nutrition Program Manager/Focal Person	Secretary
3.	Representative of Balochistan Program Manager NPFP&PHC, MNCH	Member
4.	Representative from Bureau of Statistics	Member
5.	Representative from Planning & Development Department	Member
6.	Representative from Public Health Engineering Department	Member
7.	Representative from Nutrition Wing M/o NHSR&C Islamabad	Member
8.	Representative from World Food Program	Member
9.	Representative from World Health Organization	Member
10.	Representative from UNICEF	Member
11.	Representative from Nutrition International	Member
12.	Representative from GAIN	Member
13.	Any Member co-opted by Chairperson	

TORs

i) To provide administrative support and guidance to survey conduction firm/ institution.
ii) To provide technical assistance in terms of anthropometric, socio economic as well as clinical data I the context of NNS-2017.
iii) To supervise and monitor the field activities of the survey teams.
iv) To support and facilitate the survey team in their field activities.
v) To develop detail work plan including meeting schedule.

ASMATULLAH KAKAR
SECRETARY HEALTH

The **Controller**
Govt. Printing Press
Balochistan, Quetta.

NO. EVEN. DATED. EVEN.

Copy forwarded to:-

1) The Director General, Ministry of NHSR&C Government of Pakistan, Islamabad.
2) The ACS (Dev.) P&D Department, Govt. of Balochistan, Quetta.
3) The Director General, Health Services Balochistan, Quetta.
4) The Additional Secretary (Dev.) Health Department, Govt. of Balochistan, Quetta.
5) The Program Manager Nutrition Program Balochistan, Quetta.
6) The PS to Secretary Health Department, Government of Balochistan, Quetta.
7) All members of the Committee.
8) Office File.

Naseer

(Muhammad Naseer)
Dy. Chief Planning Officer

D:\SAMSUNG 2017\NUT\PTC Comttee NSS 20 JULY -17.doc

ANNEX P

The Nutritional status of WRA fl, pregnant women and non pregnant women from MUAC

Table: Nutritional status of WRA (15-49 years)

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		7.2	92.8	270.1	113139
Urban		6.2	93.8	275.2	34203
Rural		7.7	92.3	267.0	78936
Province/ region					
Punjab	Urban	4.4	95.6	281.8	12976
	Rural	5.8	94.2	272.7	26938
	Total	5.3	94.7	276.2	39914
Sindh	Urban	8.7	91.3	265.7	10628
	Rural	13.0	87.0	247.5	9428
	Total	10.7	89.3	257.2	20056
KP	Urban	5.8	94.2	282.0	2999
	Rural	6.0	94.0	277.9	11584
	Total	5.9	94.1	278.8	14583
Balochistan	Urban	8.7	91.3	265.8	4268
	Rural	10.9	89.1	255.8	14264
	Total	10.2	89.8	258.7	18532
ICT	Urban	4.6	95.4	273.6	582
	Rural	7.2	92.8	275.1	735
	Total	5.9	94.1	274.3	1317
KP-NMD	Urban	13.1	86.9	271.7	221
	Rural	6.9	93.1	272.2	3508
	Total	7.1	92.9	272.2	3729
AJK	Urban	7.4	92.6	278.8	1687
	Rural	10.3	89.7	261.7	6998
	Total	10.0	90.0	264.0	8685
GB	Urban	2.5	97.5	268.9	842
	Rural	4.6	95.4	256.2	5481
	Total	4.1	95.9	258.9	6323
Age					
15-19		17.5	82.5	240.8	20087
20-24		8.3	91.7	259.1	18614
25-29		5.1	94.9	271.8	21782
30-34		3.6	96.4	279.4	17724
35-39		3.6	96.4	285.9	16724
40-44		3.2	96.8	291.3	10678
45-49		2.9	97.1	290.4	7530

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19				
	Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
	GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Education				
None	7.4	92.6	267.7	61181
Primary	6.4	93.6	274.0	11807
Middle	8.2	91.8	270.7	10980
Secondary	7.0	93.0	271.8	14666
Higher	6.3	93.7	273.4	14505
Wealth index quintile				
Poorest	11.7	88.3	251.5	28453
Second	8.1	91.9	264.0	26157
Middle	6.4	93.6	271.7	22964
Fourth	5.3	94.7	277.7	19818
Richest	4.7	95.3	283.7	15747

Table: Nutritional status of WRA (15-49 years)

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		7.2	92.8	270.1	113139
Punjab	ATTOCK	4.5	95.5	303.2	1376
	RAWALPINDI	5.1	94.9	276.5	1571
	JHELUM	3.7	96.3	286.7	1203
	CHAKWAL	4.4	95.6	275.1	1549
	SARGODHA	5.2	94.8	270.7	777
	BHAKKAR	5.4	94.6	264.0	878
	KHUSHAB	4.0	96.0	269.2	768
	MIANWALI	4.6	95.4	278.5	727
	FAISALABAD	6.2	93.8	276.5	1616
	CHINIOT	4.2	95.8	272.5	789
	JHANG	4.5	95.5	264.0	738
	TOBA TEK SINGH	6.2	93.8	273.8	847
	GUJRANWALA	3.5	96.5	291.4	1712
	HAFIZABAD	4.3	95.7	276.5	657
	GUJRAT	3.5	96.5	282.1	1312
	MANDI BAHAUDDIN	4.3	95.7	284.4	846
	SIALKOT	1.6	98.4	296.4	1430
	NAROWAL	3.5	96.5	281.5	1164
	LAHORE	3.4	96.6	288.4	1942

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KASUR	3.6	96.4	281.7	1199
	SHEIKHUPURA	5.8	94.2	279.1	1144
	NANKANA SAHIB	2.0	98.0	288.3	799
	OKARA	4.2	95.8	282.1	1115
	SAHIWAL	4.2	95.8	278.5	551
	PAKPATTAN	8.0	92.0	266.3	1117
	VEHARI	5.6	94.4	264.7	923
	MULTAN	4.2	95.8	266.7	1340
	LODHRAN	3.5	96.5	272.7	850
	KHANEWAL	5.7	94.3	274.5	1337
	DERA GHAZI KHAN	8.1	91.9	258.8	977
	RAJANPUR	13.5	86.5	253.2	922
	LAYYAH	6.0	94.0	250.0	889
	MUZAFFARGARH	2.6	97.4	281.3	1205
	BAHAWALPUR	7.5	92.5	264.4	1124
	BAHAWALNAGAR	10.7	89.3	261.2	1163
	RAHIM YAR KHAN	11.7	88.3	254.8	1357
	Total	5.3	94.7	276.2	39914
Sindh	JACOBABAD	6.4	93.6	270.0	511
	KASHMOR	10.3	89.7	243.5	462
	SHIKARPUR	14.2	85.8	245.0	587
	LARKANA	5.3	94.7	268.0	779
	KAMBAR SHAHDAD KOT	6.8	93.2	255.6	578
	SUKKUR	15.2	84.8	247.4	643
	GHOTKI	7.6	92.4	256.1	640
	KHAIRPUR	10.2	89.8	252.7	712
	NAUSHAHRO FEROZE	16.7	83.3	244.2	851
	SHAHEED BENA-ZIRABAD	19.2	80.8	240.8	745
	DADU	7.8	92.2	259.7	671
	JAMSHORO	11.9	88.1	256.3	599
	HYDERABAD	11.8	88.2	263.3	943
	TANDO ALLAHYAR	18.2	81.8	247.9	524
	TANDO MUHAMMAD KHAN	8.9	91.1	262.6	492
	MATIARI	16.5	83.5	249.1	487
	BADIN	15.8	84.2	244.3	424
	THATTA	6.0	94.0	249.6	654

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	SUJAWAL	13.7	86.3	242.1	601
	SANGHAR	6.9	93.1	265.8	618
	MIRPUR KHAS	15.0	85.0	246.3	488
	UMER KOT	19.6	80.4	238.2	549
	THARPARKAR	18.5	81.5	234.0	548
	KARACHI WEST	7.4	92.6	267.2	879
	MALIR	10.4	89.6	261.9	1107
	KARACHI SOUTH	6.2	93.8	268.4	748
	KARACHI EAST	6.6	93.4	270.1	788
	KARACHI CENTRAL	8.0	92.0	268.5	1354
	KORANGI	9.4	90.6	266.0	1074
	Total	10.7	89.3	257.2	20056
KP	CHITRAL	7.2	92.8	255.1	984
	UPPER DIR	3.5	96.5	264.9	491
	LOWER DIR	0.7	99.3	292.4	728
	SWAT	10.0	90.0	266.7	835
	SHANGLA	7.0	93.0	273.1	609
	BUNER	0.8	99.2	305.5	551
	MALAKAND PRO-TECTED AREA	3.8	96.2	287.2	564
	KOHISTAN	14.9	85.1	253.0	699
	BATAGRAM	8.0	92.0	254.8	430
	TORGHAR	5.1	94.9	260.7	538
	MARDAN	3.1	96.9	296.8	354
	SWABI	9.6	90.4	276.8	840
	CHARSADDA	5.1	94.9	285.5	606
	PESHAWAR	3.9	96.1	281.6	1344
	NOWSHERA	4.9	95.1	322.2	627
	KOHAT	14.5	85.5	259.7	593
	HANGU	7.1	92.9	275.8	639
	KARAK	9.6	90.4	270.7	656
	BANNU	4.8	95.2	269.5	599
	LAKKI MARWAT	2.7	97.3	276.9	639
	DERA ISMAIL KHAN	4.9	95.1	269.3	748
	TANK	1.3	98.7	283.1	509
	Total	5.9	94.1	278.8	14583
Balochistan	QUETTA	8.3	91.7	272.1	998
	PISHIN	13.2	86.8	246.6	640

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KILLA ABDULLAH	6.0	94.0	285.8	731
	CHAGAI	7.4	92.6	256.3	812
	NUSHKI	8.7	91.3	251.2	654
	LORALAI	8.9	91.1	255.1	647
	BARKHAN	23.0	77.0	231.2	657
	MUSAKHEL	6.3	93.7	242.1	470
	KILLA SAIFULLAH	11.3	88.7	241.9	691
	ZHOB	30.1	69.9	213.8	468
	SHERANI	14.4	85.6	227.1	397
	SIBI	5.2	94.8	264.7	830
	HARNAI	4.8	95.2	268.5	592
	ZIARAT	6.4	93.6	254.8	474
	KOHLU	10.4	89.6	255.4	448
	DERA BUGTI	14.3	85.7	233.7	516
	LEHRI	9.3	90.7	258.6	581
	KACHHI	13.9	86.1	244.6	549
	JAFFARABAD	17.4	82.6	244.4	488
	NASIRABAD	3.5	96.5	297.6	515
	JHAL MAGSI	13.8	86.2	231.8	572
	SOHBATPUR	14.0	86.0	237.8	612
	KALAT	7.5	92.5	251.9	590
	MASTUNG	2.8	97.2	270.4	575
	KHUZDAR	3.3	96.7	276.2	600
	AWARAN	8.7	91.3	244.7	321
	KHARAN	10.8	89.2	245.0	396
	WASHUK	52.1	47.9	221.7	279
	LASBELA	20.7	79.3	234.3	802
	KECH	9.1	90.9	254.0	597
	GWADAR	12.1	87.9	243.8	461
	PANJGUR	1.1	98.9	274.1	569
	Total	10.2	89.8	258.7	18532
ICT	ISLAMABAD	5.9	94.1	274.3	1317
	Total	5.9	94.1	274.3	1317
KP-NMD	BAJAUR AGENCY	2.9	97.1	278.3	534
	MOHMAND AGENCY	13.0	87.0	254.2	730
	KHYBER AGENCY	7.0	93.0	277.9	670
	KURRAM AGENCY	5.7	94.3	273.4	598
	ORAKZAI AGENCY	16.9	83.1	245.0	598

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	FR BANNU	0.0	100.0	276.5	63
	FR D.I.KHAN	0.0	100.0	323.3	77
	FR KOHAT	6.8	93.2	270.7	244
	FR LAKKI MARWAT	2.1	97.9	280.2	43
	FR PESHAWAR	5.3	94.7	302.9	109
	FR TANK	1.6	98.4	262.6	63
	Total	7.1	92.9	272.2	3729
AJK	MUZAFFARABAD	22.9	77.1	247.4	1262
	NEELUM	12.6	87.4	240.7	537
	HATTIAN BALA	7.4	92.6	258.2	670
	BAGH	13.3	86.7	247.2	613
	SUDHNOTI	4.0	96.0	276.8	669
	POONCH	8.4	91.6	263.2	687
	HAVELI	8.5	91.5	258.3	618
	BHIMBER	5.8	94.2	275.5	1086
	MIRPUR	4.8	95.2	291.7	1546
	KOTLI	5.5	94.5	267.5	997
	Total	10.0	90.0	264.0	8685
GB	GILGIT	2.1	97.9	271.2	1014
	GHIZER	4.2	95.8	253.3	815
	HUNZA	1.0	99.0	271.4	612
	NAGAR	3.2	96.8	259.4	658
	SHIGAR	7.2	92.8	245.9	678
	GHANCHE	3.6	96.4	258.1	519
	BALTISTAN	5.7	94.3	254.1	772
	KHARMANG	8.9	91.1	240.1	607
	ASTORE	4.1	95.9	257.0	648
	Total	4.1	95.9	258.9	6323

Table: Nutritional status of Pregnant Mothers

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		5.3	94.7	267.3	4610
Urban		3.2	96.8	274.4	1262
Rural		6.4	93.6	263.4	3348
Province/ region					
Punjab	Urban	1.4	98.6	281.4	427
	Rural	4.4	95.6	270.8	974
	Total	3.3	96.7	274.6	1401
Sindh	Urban	4.8	95.2	267.3	453
	Rural	9.6	90.4	245.6	506
	Total	7.3	92.7	256.0	959
KP	Urban	4.5	95.5	271.4	102
	Rural	4.4	95.6	272.2	525
	Total	4.4	95.6	272.0	627
Balochistan	Urban	5.2	94.8	265.0	170
	Rural	10.0	90.0	261.3	796
	Total	9.0	91.0	262.1	966
ICT	Urban	3.6	96.4	274.8	32
	Rural	5.6	94.4	263.6	38
	Total	4.6	95.4	269.5	70
KP-NMD	Urban	.0	100.0	285.9	8
	Rural	11.8	88.2	258.1	104
	Total	11.4	88.6	259.0	112
AJK	Urban	13.0	87.0	275.8	36
	Rural	12.6	87.4	252.9	165
	Total	12.6	87.4	255.0	201
GB	Urban	1.8	98.2	267.1	34
	Rural	1.8	98.2	258.3	240
	Total	1.8	98.2	260.0	274
Age					
15-19		7.7	92.3	251.8	264
20-24		7.6	92.4	258.6	1142
25-29		4.2	95.8	269.0	1469
30-34		3.6	96.4	273.4	890
35-39		4.9	95.1	277.0	575
40-44		3.8	96.2	279.6	202
45-49		3.5	96.5	283.3	68

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19				
	Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
	GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Education				
None	6.8	93.2	261.8	2770
Primary	5.1	94.9	269.8	454
Middle	3.2	96.8	273.6	367
Secondary	2.8	97.2	273.2	544
Higher	2.5	97.5	280.2	475
Wealth index quintile				
Poorest	9.8	90.2	252.1	1412
Second	5.4	94.6	262.7	1087
Middle	5.3	94.7	268.4	849
Fourth	2.0	98.0	276.5	706
Richest	3.1	96.9	280.3	556

Table: Nutritional status of Pregnant Mothers

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		5.3	94.7	267.3	4610
Punjab	ATTOCK	0.0	100.0	304.4	17
	RAWALPINDI	0.0	100.0	277.2	56
	JHELUM	0.0	100.0	278.6	33
	CHAKWAL	4.0	96.0	277.5	43
	SARGODHA	0.0	100.0	276.9	20
	BHAKKAR	0.0	100.0	256.3	12
	KHUSHAB	0.0	100.0	269.1	13
	MIANWALI	0.0	100.0	285.8	14
	FAISALABAD	4.8	95.2	268.7	64
	CHINIOT	0.0	100.0	265.7	24
	JHANG	0.0	100.0	265.7	18
	TOBA TEK SINGH	0.0	100.0	289.7	17
	GUJRANWALA	0.0	100.0	293.1	84
	HAFIZABAD	0.0	100.0	294.9	28
	GUJRAT	2.2	97.8	262.8	35
	MANDI BAHAUDDIN	0.0	100.0	275.8	33
	SIALKOT	0.0	100.0	283.7	63
	NAROWAL	4.3	95.7	286.9	47
	LAHORE	2.8	97.2	284.7	82

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KASUR	0.0	100.0	276.6	28
	SHEIKHUPURA	2.8	97.2	269.1	35
	NANKANA SAHIB	7.2	92.8	264.2	16
	OKARA	8.9	91.1	306.1	25
	SAHIWAL	0.0	100.0	297.4	13
	PAKPATTAN	0.0	100.0	272.6	44
	VEHARI	5.6	94.4	260.9	38
	MULTAN	5.5	94.5	274.9	39
	LODHRAN	0.0	100.0	280.9	38
	KHANEWAL	4.0	96.0	260.5	77
	DERA GHAZI KHAN	0.0	100.0	287.1	20
	RAJANPUR	4.9	95.1	275.7	41
	LAYYAH	13.1	86.9	254.1	24
	MUZAFFARGARH	3.6	96.4	278.8	75
	BAHAWALPUR	12.5	87.5	255.9	58
	BAHAWALNAGAR	4.9	95.1	256.5	81
	RAHIM YAR KHAN	6.6	93.4	256.4	46
	Total	3.3	96.7	274.6	1401
Sindh	JACOBABAD	0.0	100.0	252.0	17
	KASHMOR	0.0	100.0	268.5	17
	SHIKARPUR	7.0	93.0	251.4	29
	LARKANA	3.2	96.8	258.7	24
	KAMBAR SHAHDAD KOT	17.7	82.3	230.8	9
	SUKKUR	10.0	90.0	254.1	22
	GHOTKI	9.4	90.6	250.7	45
	KHAIRPUR	8.9	91.1	253.9	20
	NAUSHAHRO FEROZE	2.5	97.5	251.4	37
	SHAHEED BENA-ZIRABAD	45.1	54.9	229.4	5
	DADU	4.7	95.3	262.4	39
	JAMSHORO	11.6	88.4	257.5	46
	HYDERABAD	10.3	89.7	253.8	47
	TANDO ALLAHYAR	11.8	88.2	243.1	39
	TANDO MUHAMMAD KHAN	4.1	95.9	264.0	26
	MATIARI	3.0	97.0	258.3	28
	BADIN	18.6	81.4	243.1	27
	THATTA	5.0	95.0	241.9	70

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	SUJAWAL	11.5	88.5	242.0	53
	SANGHAR	5.8	94.2	244.6	32
	MIRPUR KHAS	13.6	86.4	246.6	30
	UMER KOT	14.6	85.4	247.8	15
	THARPARKAR	4.4	95.6	236.8	29
	KARACHI WEST	1.3	98.7	276.1	55
	MALIR	13.7	86.3	260.2	44
	KARACHI SOUTH	0.0	100.0	266.4	24
	KARACHI EAST	2.5	97.5	265.4	33
	KARACHI CENTRAL	4.1	95.9	272.4	47
	KORANGI	8.3	91.7	265.6	50
	Total	7.3	92.7	256.0	959
KP	CHITRAL	4.2	95.8	251.8	31
	UPPER DIR	0.0	100.0	257.4	23
	LOWER DIR	0.0	100.0	290.6	12
	SWAT	3.5	96.5	268.2	28
	SHANGLA	6.0	94.0	267.2	18
	BUNER	0.0	100.0	315.9	14
	MALAKAND PRO-TECTED AREA	32.2	67.8	253.8	2
	KOHISTAN	10.5	89.5	251.8	63
	BATAGRAM	0.0	100.0	251.5	39
	TORGHAR	6.5	93.5	252.5	78
	MARDAN	4.9	95.1	288.5	30
	SWABI	18.4	81.6	253.3	29
	CHARSADDA	0.0	100.0	277.3	28
	PESHAWAR	2.5	97.5	272.7	76
	NOWSHERA	0.0	100.0	310.3	24
	KOHAT	12.6	87.4	260.2	24
	HANGU	15.2	84.8	269.1	12
	KARAK	2.7	97.3	271.5	29
	BANNU	11.6	88.4	285.1	19
	LAKKI MARWAT	0.0	100.0	275.3	18
	DERA ISMAIL KHAN	0.0	100.0	266.5	19
	TANK	0.0	100.0	276.1	11
	Total	4.4	95.6	272.0	627
Balochistan	QUETTA	7.7	92.3	262.8	44
	PISHIN	26.0	74.0	228.4	12

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KILLA ABDULLAH	2.6	97.4	302.4	113
	CHAGAI	0.0	100.0	275.9	14
	NUSHKI	15.1	84.9	246.2	144
	LORALAI	7.2	92.8	247.4	19
	BARKHAN	12.6	87.4	228.5	75
	MUSAKHEL	8.5	91.5	227.7	42
	KILLA SAIFULLAH	3.5	96.5	240.7	38
	ZHOB	41.1	58.9	204.6	23
	SHERANI	13.3	86.7	221.5	64
	SIBI	2.4	97.6	259.6	29
	HARNAI	6.9	93.1	285.5	12
	ZIARAT	0.0	100.0	262.2	10
	KOHLU	10.4	89.6	264.0	24
	DERA BUGTI	43.2	56.8	224.1	7
	LEHRI	11.5	88.5	256.6	28
	KACHHI	4.3	95.7	250.5	24
	JAFFARABAD	19.7	80.3	243.3	20
	NASIRABAD	0.0	100.0	266.4	19
	JHAL MAGSI	0.0	100.0	244.4	6
	SOHBATPUR	21.9	78.1	225.8	21
	KALAT	4.2	95.8	262.4	59
	MASTUNG	5.8	94.2	272.9	19
	KHUZDAR	0.0	100.0	273.5	3
	AWARAN	0.0	100.0	270.6	5
	KHARAN	26.1	73.9	240.7	24
	WASHUK	36.9	63.1	232.2	21
	LASBELA	12.6	87.4	239.7	15
	KECH	0.0	100.0	262.5	4
	GWADAR	4.0	96.0	240.1	18
	PANJGUR	4.3	95.7	254.7	10
	Total	9.0	91.0	262.1	966
ICT	ISLAMABAD	4.6	95.4	269.5	70
	Total	4.6	95.4	269.5	70
KP-NMD	BAJAUR AGENCY	9.9	90.1	242.7	15
	MOHMAND AGENCY	0.0	100.0	300.6	9
	KHYBER AGENCY	12.1	87.9	255.7	46
	KURRAM AGENCY	11.3	88.7	273.4	18
	ORAKZAI AGENCY	30.6	69.4	236.0	16

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	FR KOHAT	0.0	100.0	268.7	5
	FR PESHAWAR	0.0	100.0	377.3	3
	Total	11.4	88.6	259.0	112
AJK	MUZAFFARABAD	27.0	73.0	242.4	53
	NEELUM	10.8	89.2	232.2	15
	HATTIAN BALA	6.5	93.5	258.8	28
	BAGH	21.1	78.9	240.4	35
	SUDHNOTI	19.8	80.2	276.1	3
	POONCH	0.0	100.0	244.6	6
	HAVELI	0.0	100.0	271.9	6
	BHIMBER	0.0	100.0	286.1	20
	MIRPUR	0.0	100.0	323.5	8
	KOTLI	0.0	100.0	268.1	27
	Total	12.6	87.4	255.0	201
GB	GILGIT	3.9	96.1	267.4	56
	GHIZER	0.0	100.0	263.4	40
	HUNZA	0.0	100.0	278.2	20
	NAGAR	0.0	100.0	255.6	35
	SHIGAR	0.0	100.0	245.0	25
	GHANCHE	0.0	100.0	257.9	19
	BALTISTAN	0.0	100.0	256.1	20
	KHARMANG	15.7	84.3	235.8	24
	ASTORE	0.0	100.0	253.4	35
	Total	1.8	98.2	260.0	274

Table: Nutritional status of Non Pregnant Mothers

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		7.2	92.8	270.2	108529
Urban		6.4	93.6	275.2	32941
Rural		7.8	92.2	267.1	75588
Province/ region					
Punjab	Urban	4.5	95.5	281.8	12549
	Rural	5.9	94.1	272.8	25964
	Total	5.3	94.7	276.2	38513
Sindh	Urban	8.9	91.1	265.6	10175
	Rural	13.2	86.8	247.6	8922
	Total	10.9	89.1	257.3	19097
KP	Urban	5.9	94.1	282.5	2897
	Rural	6.1	93.9	278.1	11059
	Total	6.0	94.0	279.1	13956
Balochistan	Urban	8.8	91.2	265.8	4098
	Rural	10.9	89.1	255.5	13468
	Total	10.3	89.7	258.6	17566
ICT	Urban	4.7	95.3	273.5	550
	Rural	7.3	92.7	275.7	697
	Total	6.0	94.0	274.6	1247
KP-NMD	Urban	13.6	86.4	271.2	213
	Rural	6.7	93.3	272.7	3404
	Total	7.0	93.0	272.7	3617
AJK	Urban	7.3	92.7	278.8	1651
	Rural	10.3	89.7	262.0	6833
	Total	9.9	90.1	264.2	8484
GB	Urban	2.5	97.5	269.0	808
	Rural	4.7	95.3	256.1	5241
	Total	4.2	95.8	258.8	6049
Age					
15-19		17.7	82.3	240.6	19823
20-24		8.4	91.6	259.1	17472
25-29		5.2	94.8	272.0	20313
30-34		3.6	96.4	279.7	16834
35-39		3.5	96.5	286.2	16149
40-44		3.2	96.8	291.5	10476
45-49		2.9	97.1	290.5	7462

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19				
	Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
	GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Education				
None	7.4	92.6	268.0	58411
Primary	6.5	93.5	274.2	11353
Middle	8.4	91.6	270.6	10613
Secondary	7.1	92.9	271.8	14122
Higher	6.5	93.5	273.1	14030
Wealth index quintile				
Poorest	11.8	88.2	251.4	27041
Second	8.2	91.8	264.0	25070
Middle	6.4	93.6	271.8	22115
Fourth	5.5	94.5	277.8	19112
Richest	4.8	95.2	283.8	15191

Table: Nutritional status of Non Pregnant Mothers

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
Total		7.2	92.8	270.2	108529
Punjab	ATTOCK	4.6	95.4	303.2	1359
	RAWALPINDI	5.3	94.7	276.5	1515
	JHELUM	3.8	96.2	287.0	1170
	CHAKWAL	4.4	95.6	275.0	1506
	SARGODHA	5.4	94.6	270.5	757
	BHAKKAR	5.5	94.5	264.1	866
	KHUSHAB	4.0	96.0	269.2	755
	MIANWALI	4.7	95.3	278.4	713
	FAISALABAD	6.2	93.8	276.8	1552
	CHINIOT	4.3	95.7	272.8	765
	JHANG	4.7	95.3	263.9	720
	TOBA TEK SINGH	6.4	93.6	273.5	830
	GUJRANWALA	3.7	96.3	291.3	1628
	HAFIZABAD	4.5	95.5	275.7	629
	GUJRAT	3.6	96.4	282.6	1277
	MANDI BAHAUDDIN	4.5	95.5	284.8	813
	SIALKOT	1.7	98.3	297.0	1367
	NAROWAL	3.4	96.6	281.3	1117
	LAHORE	3.5	96.5	288.5	1860

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KASUR	3.7	96.3	281.9	1171
	SHEIKHUPURA	5.9	94.1	279.4	1109
	NANKANA SAHIB	1.9	98.1	288.8	783
	OKARA	4.1	95.9	281.5	1090
	SAHIWAL	4.3	95.7	278.1	538
	PAKPATTAN	8.4	91.6	266.0	1073
	VEHARI	5.5	94.5	264.8	885
	MULTAN	4.2	95.8	266.5	1301
	LODHRAN	3.6	96.4	272.3	812
	KHANEWAL	5.8	94.2	275.4	1260
	DERA GHAZI KHAN	8.3	91.7	258.2	957
	RAJANPUR	13.9	86.1	252.2	881
	LAYYAH	5.9	94.1	249.8	865
	MUZAFFARGARH	2.5	97.5	281.4	1130
	BAHAWALPUR	7.3	92.7	264.9	1066
	BAHAWALNAGAR	11.1	88.9	261.6	1082
	RAHIM YAR KHAN	11.9	88.1	254.8	1311
	Total	5.3	94.7	276.2	38513
Sindh	JACOBABAD	6.7	93.3	270.7	494
	KASHMOR	10.7	89.3	242.6	445
	SHIKARPUR	14.5	85.5	244.7	558
	LARKANA	5.3	94.7	268.3	755
	KAMBAR SHAHDAD KOT	6.6	93.4	256.0	569
	SUKKUR	15.4	84.6	247.2	621
	GHOTKI	7.4	92.6	256.5	595
	KHAIRPUR	10.3	89.7	252.6	692
	NAUSHAHRO FEROZE	17.3	82.7	243.9	814
	SHAHEED BENA-ZIRABAD	19.1	80.9	240.9	740
	DADU	8.0	92.0	259.5	632
	JAMSHORO	12.0	88.0	256.2	553
	HYDERABAD	11.8	88.2	263.8	896
	TANDO ALLAHYAR	18.7	81.3	248.3	485
	TANDO MUHAMMAD KHAN	9.1	90.9	262.5	466
	MATIARI	17.3	82.7	248.5	459
	BADIN	15.6	84.4	244.4	397
	THATTA	6.2	93.8	250.5	584

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	SUJAWAL	13.9	86.1	242.2	548
	SANGHAR	6.9	93.1	267.0	586
	MIRPUR KHAS	15.1	84.9	246.3	458
	UMER KOT	19.7	80.3	237.9	534
	THARPARKAR	19.4	80.6	233.8	519
	KARACHI WEST	7.8	92.2	266.7	824
	MALIR	10.2	89.8	261.9	1063
	KARACHI SOUTH	6.4	93.6	268.5	724
	KARACHI EAST	6.8	93.2	270.3	755
	KARACHI CENTRAL	8.2	91.8	268.4	1307
	KORANGI	9.4	90.6	266.0	1024
	Total	10.9	89.1	257.3	19097
KP	CHITRAL	7.3	92.7	255.2	953
	UPPER DIR	3.6	96.4	265.3	468
	LOWER DIR	0.7	99.3	292.5	716
	SWAT	10.2	89.8	266.7	807
	SHANGLA	7.0	93.0	273.3	591
	BUNER	0.8	99.2	305.2	537
	MALAKAND PRO-TECTED AREA	3.7	96.3	287.2	562
	KOHISTAN	15.3	84.7	253.1	636
	BATAGRAM	8.7	91.3	255.1	391
	TORGHAR	4.8	95.2	262.1	460
	MARDAN	2.9	97.1	297.5	324
	SWABI	9.3	90.7	277.7	811
	CHARSADDA	5.3	94.7	285.9	578
	PESHAWAR	4.0	96.0	282.2	1268
	NOWSHERA	5.1	94.9	322.7	603
	KOHAT	14.6	85.4	259.6	569
	HANGU	7.0	93.0	275.9	627
	KARAK	9.9	90.1	270.7	627
	BANNU	4.6	95.4	269.0	580
	LAKKI MARWAT	2.7	97.3	277.0	621
	DERA ISMAIL KHAN	5.0	95.0	269.3	729
	TANK	1.4	98.6	283.2	498
	Total	6.0	94.0	279.1	13956
Balochistan	QUETTA	8.3	91.7	272.6	954
	PISHIN	12.9	87.1	246.9	628

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	KILLA ABDULLAH	6.6	93.4	282.5	618
	CHAGAI	7.5	92.5	255.9	798
	NUSHKI	7.0	93.0	252.6	510
	LORALAI	9.0	91.0	255.3	628
	BARKHAN	24.2	75.8	231.5	582
	MUSAKHEL	6.1	93.9	243.5	428
	KILLA SAIFULLAH	11.8	88.2	242.0	653
	ZHOB	29.6	70.4	214.2	445
	SHERANI	14.6	85.4	228.1	333
	SIBI	5.3	94.7	264.9	801
	HARNAI	4.8	95.2	268.1	580
	ZIARAT	6.5	93.5	254.7	464
	KOHLU	10.4	89.6	254.9	424
	DERA BUGTI	14.0	86.0	233.8	509
	LEHRI	9.2	90.8	258.7	553
	KACHHI	14.3	85.7	244.3	525
	JAFFARABAD	17.3	82.7	244.5	468
	NASIRABAD	3.7	96.3	298.9	496
	JHAL MAGSI	14.0	86.0	231.6	566
	SOHBATPUR	13.7	86.3	238.3	591
	KALAT	7.8	92.2	250.9	531
	MASTUNG	2.7	97.3	270.3	556
	KHUZDAR	3.3	96.7	276.2	597
	AWARAN	8.8	91.2	244.3	316
	KHARAN	10.0	90.0	245.2	372
	WASHUK	53.4	46.6	220.8	258
	LASBELA	20.9	79.1	234.1	787
	KECH	9.2	90.8	254.0	593
	GWADAR	12.5	87.5	244.0	443
	PANJGUR	1.1	98.9	274.6	559
	Total	10.3	89.7	258.6	17566
ICT	ISLAMABAD	6.0	94.0	274.6	1247
	Total	6.0	94.0	274.6	1247
KP-NMD	BAJAUR AGENCY	2.7	97.3	279.5	519
	MOHMAND AGENCY	13.2	86.8	253.5	721
	KHYBER AGENCY	6.6	93.4	279.4	624
	KURRAM AGENCY	5.5	94.5	273.4	580
	ORAKZAI AGENCY	16.6	83.4	245.2	582

Percent distribution of woman reproductive age 15-49 years by their nutritional status , NNS, 2018-19					
		Nutritional status from MUAC		Mean MUAC(mm)	Number of women reproductive age (15-49 years)
		GAM (MUAC<210mm)	Normal (MUAC>=210mm)		
	FR BANNU	0.0	100.0	276.5	63
	FR D.I.KHAN	0.0	100.0	323.3	77
	FR KOHAT	7.0	93.0	270.8	239
	FR LAKKI MARWAT	2.1	97.9	280.2	43
	FR PESHAWAR	5.4	94.6	301.5	106
	FR TANK	1.6	98.4	262.6	63
	Total	7.0	93.0	272.7	3617
AJK	MUZAFFARABAD	22.8	77.2	247.6	1209
	NEELUM	12.7	87.3	241.0	522
	HATTIAN BALA	7.5	92.5	258.2	642
	BAGH	12.9	87.1	247.6	578
	SUDHNOTI	3.9	96.1	276.8	666
	POONCH	8.5	91.5	263.4	681
	HAVELI	8.6	91.4	258.2	612
	BHIMBER	5.9	94.1	275.3	1066
	MIRPUR	4.8	95.2	291.6	1538
	KOTLI	5.7	94.3	267.5	970
	Total	9.9	90.1	264.2	8484
GB	GILGIT	2.0	98.0	271.4	958
	GHIZER	4.5	95.5	252.8	775
	HUNZA	1.0	99.0	271.1	592
	NAGAR	3.4	96.6	259.6	623
	SHIGAR	7.5	92.5	245.9	653
	GHANCHE	3.8	96.2	258.1	500
	BALTISTAN	5.9	94.1	254.0	752
	KHARMANG	8.6	91.4	240.3	583
	ASTORE	4.4	95.6	257.2	613
	Total	4.2	95.8	258.8	6049

GOVERNMENT OF PAKISTAN
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