ANALYSIS, PLANNING AND PERFORMANCE

WFP

World Food Programme

SAVING LIVES CHANGING LIVES

Sampling Guidance on Household Food Security Assessment

WFP Handbook

August 2025

Acknowledgement

We extend our sincere thanks to Kusum Hachhethu and Silvia Passeri for their invaluable contributions to the development of this sampling guidance, to Lorenzo Moncada for his invaluable inputs and to Alirah Weyori, Eve Chalifour, Lena Hohfeld, and Marianne Jensby for their review. Their expertise, dedication, and collaborative efforts have ensured that this resource is both technically sound and operationally relevant for humanitarian contexts. This guidance reflects a shared commitment to improving the quality and accountability of our data collection efforts, ultimately strengthening our ability to respond effectively to the needs of affected populations.

Contents

Checklist

1 DEFINE SURVEY OBJECTIVES

- ☐ Clearly define survey objectives
- ☐ Identify key research questions
- ☐ Consider the level of generalizability of the findings
- ☐ Identify available resources and budget

2 DEFINE TARGET POPULATION

- ☐ Identify the sampling unit create (where possible) a sampling frame for the target population

3 SELECT SAMPLING METHOD

- ☐ Determine the appropriate sampling method:
    - ☐ Simple random sampling
    - ☐ Systematic Sampling
    - ☐ Stratified sampling
    - ☐ Cluster sampling

The chosen method will influence the formula for sample size calculation

4 CALCULATE SAMPLE SIZE

- ☐ Specify confidence interval: choose the desired level of confidence (e.g., 95%)
- ☐ Determine Margin of Error: Decide on an acceptable margin of error (e.g. 10%).
- ☐ Estimate prevalence/mean of key indicators. If no prior estimates are available, use a prevalence of 50%
- ☐ Account for Design Effects if using complex sampling methods (e.g., cluster sampling)
- ☐ Use appropriate formula: Utilize statistical software, excel sheets or online calculators to calculate sample size based on the chosen sampling method, confidence level, margin of error, and estimated population parameters
- ☐ Adjust for Non-Response \ Account for attrition: Estimate the expected non-response \ attrition rate and adjust the sample size accordingly

5 REVIEW CALCULATED SAMPLE SIZE

- ☐ Adjust the calculated sample size as needed based on available resources, time constraints, and practical limitations

6 CONSTRUCT SURVEY WEIGHTS

- ☐ Construct survey weights as needed

1. Introduction

Household surveys conducted by WFP remain a cornerstone of food security assessments, providing critical information on the extent and drivers of food insecurity in different contexts. The results of these surveys inform key decisions, including program design, targeting and assistance, and policy formulation. However, the quality of these surveys and their results depend largely on the sampling strategy employed and by extension how representative the study sample is in terms of the overall population. When conducting household assessments, selecting the right sampling approach is one of the most critical steps. This forms the basis of all conclusions drawn from the survey, as its responses are used to represent and generalize findings for the entire population. A poorly designed sample can lead to biased or non-representative results, undermining the effectiveness of the assessment and the decisions based on it. Conversely, a well-designed sample ensures that data are representative, unbiased, and reliable, providing accurate insights to guide program planning and decision-making. Given the critical role of sampling, it is essential that Vulnerability, Analysis and Mapping (VAM) officers have a clear understanding of recommended sampling methods and how to apply them effectively in their work. This is particularly important given the role these officers play in the generation of evidence both for policy interventions and reporting.

Thus, while the intention of this guidance is not to re-invent the wheel on sampling practices already adopted and used by VAM officers, the broader aim is to streamline various sampling methods for operational ease during assessments. In operational contexts, where time and resources may be constrained, having access to a clear, concise, and practical manual is essential. This guide is designed to simplify complex concepts, enabling VAM officers to quickly and accurately plan surveys that align with WFP's standards and yield high-quality and reliable data for both our and the operations of our partners.

In this regard, the object of this sampling guidance is to serve as a first point of call for VAM officers in their day-to-day activities of assessments from covering aspects of why we sample, where to sample, who to sample, how many to sample and what type of weighting methodology to use. It is especially aimed to be the go-to WFP document when in doubt on anything related to sampling. It must however be clarified that this is not a technical document that covers all aspects of sampling for any type of survey[1].

1.1 OBJECTIVE OF THE GUIDELINE

The overarching objective of this Sampling Guidance is to provide a practical organisational guidance for VAM officers in Country Offices on WFP corporate sampling methods and to offer step-by-step instructions on how to calculate appropriate sample sizes for different survey objectives.

Whether you are planning a food security assessment, designing a monitoring survey, or evaluating the outcomes of a program, this manual is designed to help you:

- Understand basics of household sampling: Learn about the principles of sampling, including probability and non-probability sampling, and their implications for survey design in the context of WFP operations.
- Choose the right sampling method for your assessment/monitoring exercise: Gain insight into recommended sampling techniques such

1. For a full review of statistical sampling methods, the reader may refer to the following resources which are freely available: https://unstats.un.org/unsd/demographic/sources/surveys/Series_F98en.pdf

as simple random sampling, stratified sampling, and cluster sampling, with a focus on their applicability for food security assessments and program monitoring.

- Calculate sample sizes that allow for external validity of your survey: Use practical, step-by-step instructions and examples to determine the sample size needed to meet survey objectives while considering factors critical variables like population size, confidence levels, and design effects.
- Account for complex sampling designs to accommodate different population groups in your sample: Learn how to adjust sampling strategies for complex survey designs, such as stratified or two-stage cluster sampling, to ensure accurate and reliable data is collected that reflects the actual population the sample is drawn from.
- Apply appropriate weights to the data to account for the unequal probability of selection in complex sampling designs.

By using this Sampling Guidance, the VAM officer would have achieved following goals at the end of the survey:

1. Achieved a survey sample that is representative of the population of interest.
2. Minimized sampling errors increasing the reliability of outcome indicators.
3. Collect data that meets WFPs global data quality thresholds as well as methodological requirements.

The guidance is organized as follows. First, a brief explanation of sampling and why sampling is needed in large household surveys is provided. This is followed immediately by a section on sampling design. The third section presents the relevant sampling methods widely used for assessments/monitoring exercises. The final section then looks at sample weights and their applications to household surveys.

1.2 SAMPLING: WHAT IT IS AND WHY IT MATTERS

Sampling is the process of selecting a smaller number of households in a population with representative characteristics to stand in for the whole population.

Sampling is a fundamental part of household surveys that allow us gather information about a referenced population without the need to interview every individual survey unit in the reference population. While interviewing every survey unit would be provide the best outcome results, this in practice is not possible because of time-constraint and the associated cost and logistics to conduct such as exercise.

Figure 1: Sample Illustration

Sampling is therefore seen as a statistical way of using a few data units within the reference population to represent the entirety of the reference population. This helps to reduce the cost and time of studying an entire population while still providing statistically reliable and comparable outcomes with external validity that can be generalised to the larger referenced population. Thus, sampling when properly implemented enables you to achieve the following:

- Survey efficiency - you can achieve statistically comparable results using less time, cost and resources (manpower) for data collection.
- Collect data and insight on both hard-to-reach and easily accessible areas
- Pin-point analysis – sampling can allow for a more detailed and laser focused analysis of a specific group

2. Sampling Design

A sampling design is a structured plan outlining how survey units are selected from a larger population. It defines the process for choosing a representative sample of households and plays a critical role in ensuring the data collected is representative, unbiased, reliable, and valid. A well-designed sampling approach is essential for producing accurate results and making meaningful generalizations about the broader population.

Several important factors must be carefully considered before deciding on the appropriate sampling design:

Define the target population

Explicitly define the population of interest to study. *Example: All households in a specific region, all IDPs or refugee households.*

Identify/create a sampling frame

A sampling frame is a complete list of all eligible survey units within the target population, ensuring each has a known and equal chance of selection. It may be derived from recent census data or household lists maintained by official bodies such as the national bureau of statistics. When no suitable frame exists, one must be created—preferably through a household census, if resources allow. In cases where this is not feasible, alternative methods like random walk sampling can be used to select households; however, this does not constitute a true sampling frame but serves as a practical substitute. In case of remote surveys, when a comprehensive list of phone numbers is not available. Random Digit Dialing (RDD) is commonly used as a sampling frame by generating phone numbers at random to reach a representative sample of the population with access to telecommunication services.

The key characteristics of a good sampling frame include the following:

- The sampling frame must be comprehensive
- It must be accurate and up to date
- It must have clearly defined (specificity) boundaries
- Readily available and accessible (whether manually or electronically)

Example: A typical example of a good sampling frame is a census list with all house addresses in a city.

Select the sampling method

Select the most appropriate sampling technique that will allow you to achieve the objective of the survey with the available resources. *Example: Cluster sampling, stratified sampling etc.*

Define the sampling unit

Determine the basic unit of analysis within the target population — *for example, households.*

Since households are the most used sampling unit in food security surveys, this guidance will refer to “households” as the sampling unit throughout.

Determine the sample size

Calculate the required sample size to achieve the desired levels of precision and accuracy. *Example: 380 households per unit of analysis.*

3. Sampling Methods

All sampling methods can be broadly classified into two main categories based on how the sample is drawn or selected. These are **probability** and **non-probability sampling methods**.

Probability sampling

Probability sampling ensures that every sampling unit (household) has a known, non-zero, and equal chance of selection, producing representative samples that allow reliable generalization to the entire population. The random selection process follows predefined steps to minimize selection bias, making it the preferred method for quantitative surveys and household-level food security assessments. Besides enabling accurate population inferences, probability sampling also allows analysts to quantify the margin of error around estimates, enhancing the validity and reliability of the findings even when using relatively small, well-designed samples.

Key characteristics of this method include:

1. Random selection of survey units
2. Known probability of selection for each unit (typically based on the sampling frame)
3. Ensures representativeness
4. Provides external validity, allowing confident extrapolation to the larger population

At WFP, the most commonly used probability sampling techniques are:

- Simple Random Sampling
- Systematic Random Sampling
- Stratified Random Sampling
- Cluster Sampling

In practice, most face-to-face assessments in WFP are based on a stratified cluster sampling methodology, which has relatively low information requirements and is logistically easy to implement. Simple random sampling and systematic random sampling are often applied to select households within clusters. For remote assessments \ mVAM, simple random sampling and stratified random sampling are mostly used.

Non-probability sampling

Non-probability sampling is a method where households are selected based on the analyst's judgment rather than random, statistical processes. This approach introduces selection bias and limits the ability to generalize results to the broader population. Without a statistical basis, it is impossible to measure the precision or reliability of the estimates. Although easier to implement, non-probability sampling is generally not recommended for WFP food security assessments and monitoring surveys except in cases where remote populations need to be reached through phone survey or disaggregated analysis needs to be done. It is only preferred when probability sampling is not feasible due to logistical or resource constraints, such as the absence of a complete sampling frame or poor phone network access.

The most common non-probability sampling techniques include:

- Convenience sampling
- Voluntary response sampling
- Purposive sampling
- Snowball sampling

This guidance note focuses exclusively on probability sampling methods recommended for household food security assessments.

For remote surveys, particularly in areas with limited network access or when detailed, disaggregated data is needed without a pre-existing representative database, snowball sampling has emerged as a successfully tested and effective alternative to random digit dialing in various countries. More information can be found here.

3.1 SIMPLE RANDOM SAMPLING

Simple random sampling involves selecting households entirely at random from the target population, following predefined selection rules. Each household has an equal probability of being chosen. Implementing this method requires a complete sampling frame—a comprehensive list of all households—and the ability to contact and engage them in the study. In case of remote surveys, in the absence of a complete sampling frame, random digit dialing could be used.

Steps for conducting rigorous simple random sampling:

- **Define the target population:** Clearly specify the group of households to be surveyed, ensuring all units are well-defined and mutually exclusive (e.g., all households within a specific administrative area).
- **Identify or create a sampling frame:** Compile a complete and up-to-date list of all eligible households or sampling units. An incomplete frame can introduce selection bias and compromise results.
- **Determine the sample size:** Calculate the number of households needed to achieve the desired precision and confidence level, based on the survey's objectives.
- **Assign numbers:** If not already numbered, assign a unique ID to each household in the sampling frame.
- **Use a random number generator:** Use a random number generator (e.g., randomizer.org or Excel's RAND function) to select households until the target sample size is reached.
- **Map the selected households:** Mapping the selected households helps plan fieldwork and facilitates the data collection process.

3.1.1 ADVANTAGES OF SIMPLE RANDOM SAMPLING

Simple random sampling is often the statistically preferred method for field surveys due to several key advantages:

1. **Ease of implementation** when a complete and up-to-date sampling frame is available—particularly in camp settings or urban areas with reliable household registries.
2. **Cost-effectiveness and operational efficiency** compared to more complex sampling methods.
3. **Minimization of selection bias** and the ability to generalize findings to the entire population when properly applied.
4. **Simplicity in data analysis**, as results can be interpreted using basic statistical tools without the need for complex weighting adjustments.

3.1.2 LIMITATIONS OF SIMPLE RANDOM SAMPLING

While simple random sampling has clear advantages, it also has several important limitations:

1. **Poor representation of small subgroups** – Because selection is purely random, minority or underrepresented groups may be inadequately sampled, limiting the ability to draw meaningful conclusions about them.
2. **Dependence on a complete sampling frame** – This method requires an up-to-date and exhaustive list of the target population,

which is often unavailable in many WFP operational contexts such as rural or displaced populations. Without such a frame, the method cannot be applied.

3. **Operational challenges in dispersed areas** – In large or geographically spread-out areas, implementing face-to-face surveys using simple random sampling can be resource-intensive, time-consuming, and costly.

Simple random sampling has limited applicability in many WFP face-to-face assessments, particularly in rural areas, informal settlements, and remote locations where obtaining a complete and accurate sampling frame is difficult or impossible. This significantly limits the practical use of simple random sampling in such contexts.

Example

Application of Simple Random Sampling

A food security assessment is planned in an IDP camp in Juba, South Sudan (Step 1), requiring a sample of 355 households. A complete list of all 4,500 households, along with maps showing their locations by zone and block, is available from IOM (Steps 2 & 3).

Each household is assigned a unique number from 1 to 4,500 (Step 4). Using Randomizer.org, 355 households are randomly selected for the sample (Step 5). The selected households are then mapped to support data collection.

The workload is divided among three data collection teams, each assigned a mapped area with roughly 100 households. Due to the camp's dense layout, teams can easily travel on foot between selected households.

Random Digit Dialing (RDD) is a widely used sampling technique in telephone surveys, where a computer program randomly generates telephone numbers, typically within designated area codes and exchanges, to create a sample of potential respondents. This method helps overcome the limitations of relying solely on published phone directories, as it includes unlisted numbers and thus broadens the reach to a more representative segment of the population with telephone access. While RDD aims to provide every telephone number with an equal chance of selection, approximating a simple random sample, practical challenges such as disconnected numbers, the increasing prevalence of cell-phone-only households, and varying household phone configurations can introduce complexities that needs to be addressed through various weighting and screening procedures to ensure the sample's generalizability.

3.2 SYSTEMATIC RANDOM SAMPLING

Systematic random sampling selects households from a population at regular, fixed intervals known as the sampling interval, which is calculated by dividing the population size by the desired sample size. The first household is chosen randomly, and subsequent households are selected by adding the fixed interval to the previous selection.

Unlike simple random sampling, systematic sampling can be conducted without a complete, up-to-date list of all units. For example, after selecting the first household randomly, the survey team may select every 10th household by counting through the population according to the sampling interval.

3.2.1 ADVANTAGES OF SYSTEMATIC RANDOM SAMPLING

1. Easy to implement, similar to simple random sampling.
2. Produces a well-representative sample by evenly distributing selections across the entire population.
3. Ensures good geographic coverage of the survey area.

Systematic random sampling is most effective when the population is homogeneous, a complete sampling frame or accurate population size is available, and no underlying periodic patterns exist. However, it is unsuitable for heterogeneous or widely dispersed populations, groups with high non-response rates, or situations where the sampling interval aligns with periodic trends—risking the selection of only certain segments of the population.

3.2.2 LIMITATIONS OF SYSTEMATIC RANDOM SAMPLING

1. The fixed interval may introduce non-randomness, potentially affecting sample representativeness.
2. Can be time-consuming and challenging to manage in large or geographically dispersed populations.
3. May become costly when populations are widely spread out.
4. Requires knowledge of the total population size to calculate the sampling interval; without this, results may be biased.

Example

Application of Systematic Random Sampling

WFP Iraq Office plans to assess household food security in a refugee camp with 200 households. The target sample size is 50 households.

The first step is to calculate the sampling interval (200/50 = 4)

Then, a random starting point is selected: A number between 1 and 4 is randomly chosen. Suppose the starting point is 3.

Finally, households are selected: The first household surveyed is number 3, followed by households numbered 7, 11, 15, and so on, adding the sampling interval of 4 each time until the sample of 50 households is reached (e.g., 3, 7, 11, ..., 195, 199).

Figure 2: Illustrative Systematic Random Sampling

3.3 STRATIFIED RANDOM SAMPLING

Stratified random sampling involves dividing the population into clearly defined sub-groups, or strata, that share similar characteristics relevant to the study objectives. A representative sample is then randomly selected from each stratum to ensure all key groups are included.

In WFP assessments, strata might be based on livelihoods (urban/rural), demographics, prior food security status, or residential status (refugee, IDP, permanent resident). This method is especially valuable in food security surveys, as it enables targeted analysis within and across groups, providing actionable insights that improve intervention targeting and resource allocation.

Steps to Implement Stratified Random Sampling

1. **Define the target population:** Clearly specify who and what should be included or excluded from the survey.
2. **Divide the population into homogeneous strata:** Group the population based on relevant characteristics, such as geography (urban/rural), demographics (male/female-headed households), or livelihood types (farmers, traders).
3. **Determine the sample size:** For each strata, calculate the appropriate sample size to achieve the desired precision and confidence level.
4. **Select random samples within each stratum:** Use suitable sampling methods (e.g., simple random or systematic sampling) to select samples from each group.
5. **Combine samples from all strata:** Merge the selected samples to form a representative overall sample. Apply weighting if the stratification is disproportionate.

Stratified random sampling is used to capture differences between sub-groups and obtain precise estimates for each. Unlike simple or systematic sampling, it ensures smaller groups—such as IDPs, refugees, returnees, or urban/rural populations—are included in the sample.

There are two main approaches to stratified sampling:

- **Proportionate stratified sampling:**

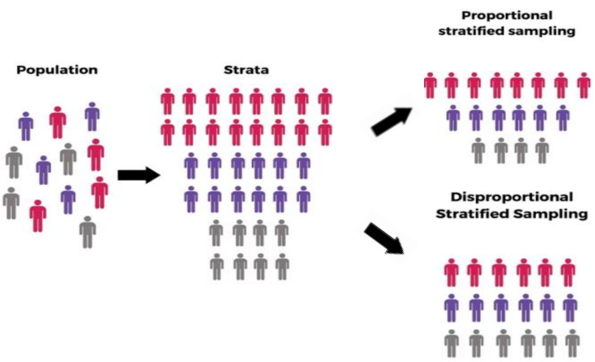
  The sample size for each stratum matches its share of the population. Smaller groups receive smaller samples, which may reduce the precision of their estimates. This method provides accurate overall population estimates without needing weighting during analysis. It is best suited for large-scale surveys in which representing the entire population proportionally is the priority.

- **Disproportionate stratified sampling:**

  Smaller groups are oversampled to ensure sufficient representation for detailed analysis. While this improves precision for underrepresented groups, it requires applying weights during analysis to adjust for sampling disproportions. This method is ideal when the goal is to obtain precise estimates for each subgroup, even if it slightly compromises the accuracy of the overall population estimate.

In summary, use **proportionate sampling** to prioritize overall population representativeness, and **disproportionate sampling** to focus on detailed insights within smaller subgroups.

Figure 3: Proportional and Disproportional Stratified Sampling



3.3.1 ADVANTAGES OF STRATIFIED RANDOM SAMPLING

1. Ensures accurate and precise representation of all groups of interest, resulting in more reliable estimates.
2. Reduces sampling errors by dividing the population into homogeneous strata, which lowers variability within each group and improves the precision of the results.

3.3.2 LIMITATIONS OF STRATIFIED RANDOM SAMPLING

1. Can be complex to implement, especially with large, diverse subgroups; obtaining accurate information for proper stratification can be challenging or sometimes impractical, potentially leading to biased strata.
2. May be more expensive than simple or systematic random sampling due to the additional effort required in designing and managing the stratification process.

When computing the sample size for remote surveys, it's generally recommended to use stratified random sampling with Population Proportion to Size (PPS). This approach ensures that the sample size for each stratum is proportional to its population. After calculating the sample size per stratum, quotas should be generated for the next administrative level, using PPS, to ensure a representative sample. However, there's a specific exception to this rule. If the goal is to collect data that is representative at a lower administrative level (e.g., the second administrative level), and the sample size per stratum is very low, it's better to use simple stratified random sampling without PPS, particularly when there are more than 15 sub-units within that lower administrative level.

Example

Application of Stratified Random Sampling

WFP Rwanda office is planning a food security assessment covering 9,850 households distributed across three distinct regions. Households within each region are relatively homogeneous in terms of livelihoods, income, and food security outcomes, but these characteristics vary significantly between regions. To accurately capture these differences, stratified random sampling is selected.

The distribution of households across the regions is shown in the table below. Assuming a total sample size of 300 households, the allocation of samples to each stratum will vary depending on whether a proportionate or disproportionate sampling approach is used.

	Population	Share of Population
Region A	4500	46%
Region B	3250	33%
Region C	2100	21%

Proportionate Stratified Sampling

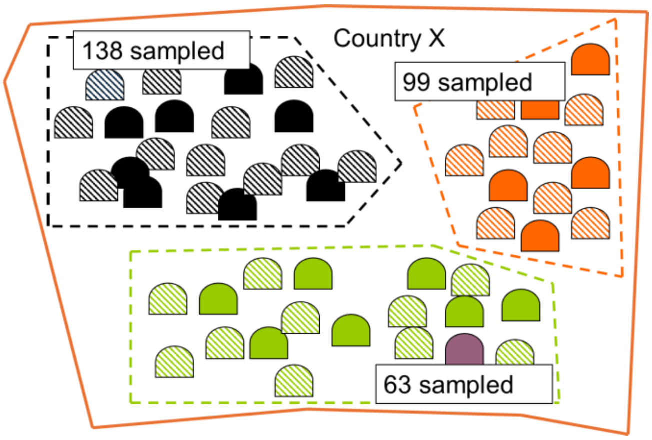
The sample size for proportionate stratified sampling, can be calculated using probability proportion to size as follows:

Region A: 300 * 46% = 138 households

Region B: 300 * 33% = 99 households

Region C: 300 * 21% = 63 households

Figure 4: Illustrative Proportionate Stratified Sampling Example



Disproportionate Stratified Sampling

The sample size for disproportionate stratified sampling, can be calculated as follows:

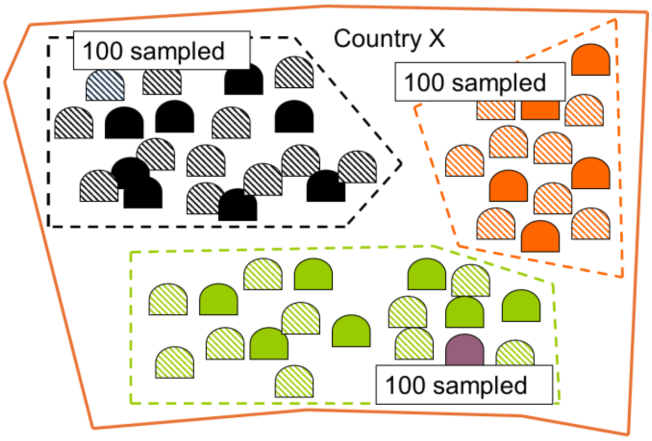
Region A: 300 / 3 = 100 households

Region B: 300 / 3 = 100 households

Region C: 300 / 3 = 100 households

Note: Since the sample units are not self-weighted in this case, post-sampling weights are required during data analysis to correct for selection bias caused by the under-sampling of Regions B and C.

Figure 5: Illustrative Disproportionate Stratified Sampling Example



Stratified random sampling should be the preferred methodology if :

1. Sub-group food security estimates are essential.
2. Achieving a minimum level of precision for these sub-groups is a key objective.
3. The expected sub-group sample sizes are otherwise too small to produce precise estimates.
4. Reliable secondary or pre-existing data is available to create separate sampling frames for each sub-group.

3.4 CLUSTER SAMPLING

Cluster Sampling divides the population into smaller heterogeneous groups called clusters. A random selection of clusters is then made, and all or some households within these selected clusters are surveyed to represent the population.

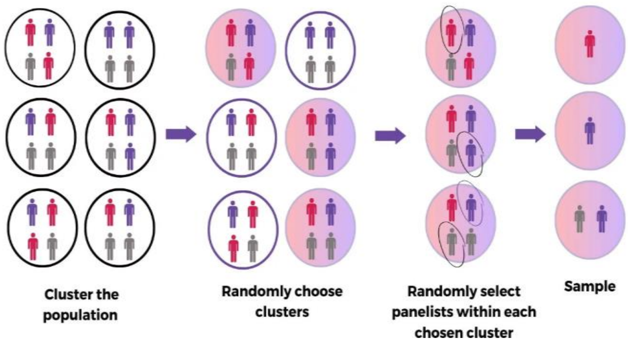
While there are various cluster sampling methods, this guidance focuses on **two-stage cluster sampling**, the most commonly used approach in WFP household food security assessments. This method offers several advantages, including reduced implementation costs, easier data collection, and improved efficiency. However, it generally requires a larger overall sample size compared to simple or systematic random sampling.

Steps to Implement Cluster Sampling

- **Cluster Definition:** Clearly define the clusters (e.g., villages) within the study population—this is a critical first step before selecting clusters.[2]
- **Cluster Selection:** Randomly select clusters from the defined list of clusters in the population.
- **Household Selection:** Within each selected cluster, randomly select a subset of households to include in the sample.

In two-stage cluster sampling, the clusters are referred to as primary sampling units (PSUs) and the households selected in the second stage as the secondary sampling units (SSUs).

Figure 6: Illustrative Cluster Sampling



How many clusters should be selected?

The number of clusters chosen depends on several key factors:

- **Within-cluster variance:** This measures how much households within a cluster differ from each other. High within-cluster variance means more households per cluster are needed to capture diversity accurately, which may lead to selecting fewer clusters overall to manage sample size and budget constraints.
- **Inter-cluster correlation (ICC):** This reflects how similar different clusters are to each other. A high ICC indicates clusters are alike, allowing fewer clusters to be sampled while still achieving good representation.
- **Desired precision:** Higher precision demands more clusters to ensure the sample accurately and reliably represents the population, as a larger number of clusters covers greater population diversity.

Typically, WFP face-to-face assessments select 25 clusters per stratum, with 10 households in each cluster. However, in contexts with limited access, resource constraints, or data management challenges, the sample size can be adjusted. For example, reducing clusters to 5 per stratum while increasing households per cluster to 18 offers a more practical and feasible design in such settings.

2. A cluster is a mutually exclusive, naturally occurring subgroup of the population—such as a village, city block, or postal code—that collectively covers the entire population. Because clusters are assumed to be relatively homogeneous and interchangeable, sampling from a subset of clusters can represent the whole population, simplifying the sampling process.

Stage 1: How to select clusters

Probability Proportional to Size (PPS) sampling selects clusters with a probability proportional to their size (e.g., number of households). This approach is especially useful when cluster sizes vary significantly or accurate population data is available. By giving larger clusters a higher chance of selection, PPS ensures that each household in the overall population—whether from a large or small cluster—has an approximately equal probability of being included in the sample. This balancing helps maintain fairness and representativeness across diverse cluster sizes in two-stage cluster sampling.

Steps for Selecting Clusters Using Probability Proportional to Size (PPS):

- List all clusters in the sampling frame.
- Record the population size or number of households for each cluster.
- Calculate the cumulative population size for each cluster by summing the sizes of all preceding clusters plus the current one.
- Determine the sampling interval by dividing the total population size (from the last cluster's cumulative value) by the number of clusters to select.
- Randomly select a starting number between 1 and the sampling interval. The cluster whose cumulative population contains this number is the first selected cluster.
- Select subsequent clusters by repeatedly adding the sampling interval to the starting number until the required number of clusters is reached.

Stage 2: How to select households within the cluster?

Households within selected clusters can be chosen using one of the following methods:

1. **Simple Random or Systematic Random Sampling** (Recommended when detailed, updated population data is available):

- Construct a detailed sampling frame listing all households in the cluster.
- Select households either randomly or systematically from this list.
- This approach works best when clusters are small, as it can become costly and time-consuming with larger clusters.

Example 1: Systematic Random Sampling

If the population size is 4,000 and the desired sample size is 350, the sampling interval is 4000 ÷ 350 ≈ 11.5.

Select a random start between 1 and 11, e.g., 2. Then select households at positions 2, 13, 24, and so on by adding the interval each time.

Example 2: Simple Random Sampling

Number all households from 1 to 4,000. Place these numbers on slips of paper, mix thoroughly, and randomly draw 350 slips to select households.

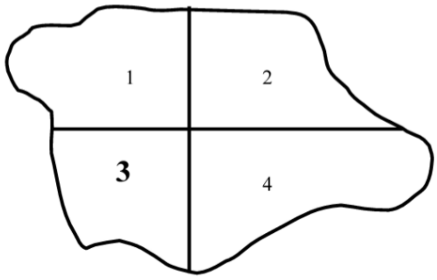
2. **Segmentation** (Alternative method when detailed household lists are unavailable)

- Divide each cluster into smaller segments, each containing approximately the number of households needed.
- Randomly select one segment, then include all households within that segment in the sample.
- This method requires a map of the cluster and some knowledge of population distribution within clusters. It can be more resource-intensive but useful in large or complex clusters without detailed household lists.

Example: Segmentation

In rural Iraq, districts are divided into enumeration areas used as clusters. For a survey with 30 clusters and 15 households per cluster, each cluster is divided into smaller segments of about 15 households. Four segments per cluster are numbered (1 to 4), one segment (e.g., segment 3) is randomly chosen, and all households in that segment are surveyed.

Figure 7: Illustrative Segmentation



3. Bottle spin technique/ Random walk

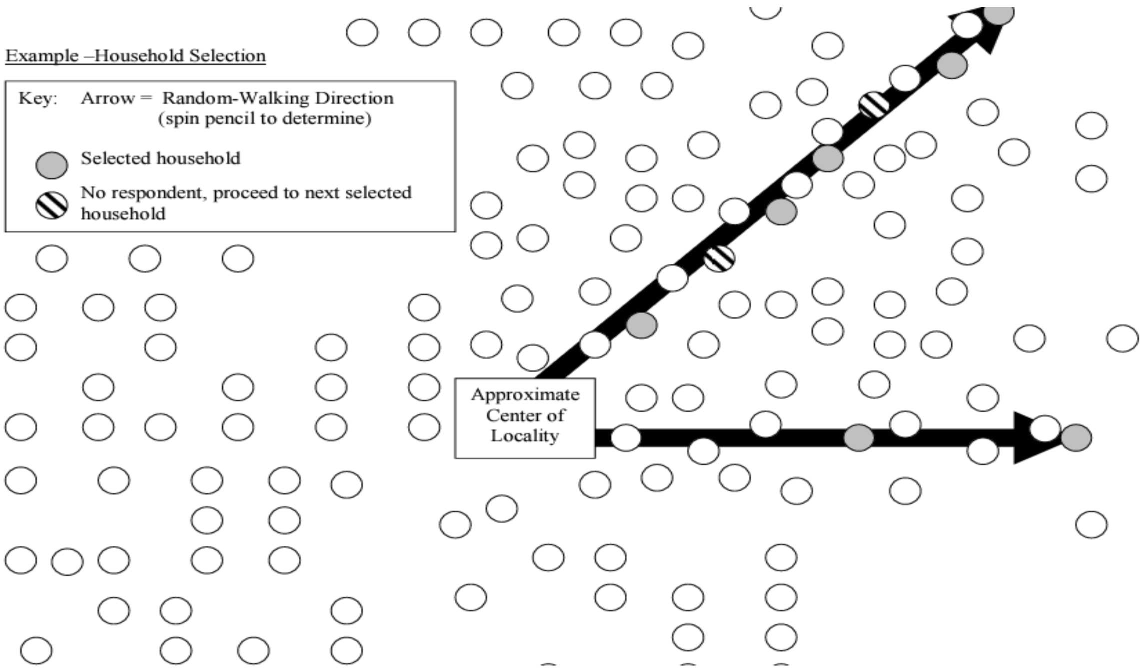
Recommended: In areas without updated population data or sampling frames.

This method is quick and practical but less preferred due to potential biases. It offers a reasonable alternative when detailed household lists are unavailable.

Key Steps:

1. Enumerators identify the center of the study area.
2. They spin a bottle or throw a pencil to randomly select a walking direction.
3. Walking along this line, they count all households encountered.
4. The total number of households along the line is divided by the desired sample size to calculate the sampling interval (how often to select a household).
5. A random starting point within this interval is chosen. From that point, households are systematically selected at regular intervals along the transect, moving from the outer end back toward the center.
6. If the end of the area is reached before the required sample size is met, enumerators return to the center, spin again, and repeat the process in a new direction.
7. If a household is unavailable or refuses participation, it is skipped, and enumerators continue to the next household in the sequence.

Figure 8: Illustrative Bottle Spin/Random Walk



Example: Bottle Spin technique

A food security assessment is conducted in a region of Ghana, divided into livelihood zones. From each zone, 30 villages (clusters) are selected, and within each village, 7 households need to be surveyed.

To select households in each village, the enumeration team goes to the village center and spins a pencil to randomly pick a direction. Walking in that direction, they count all houses; in this case, there are 14 houses along the line.

The sampling interval is calculated as the total houses divided by the number of households to be surveyed: 14 ÷ 7 = 2

Next, a random number between 1 and 2 is selected. If the number 2 is chosen, the team interviews the 2nd house, then moves on counting 2 houses at a time, selecting the 4th house, then the 6th, and so on.

If a household refuses to participate or is unavailable, it is skipped. If the team does not find enough households in that direction, they return to the center, spin the pencil again, and repeat the process in a new direction.

Example
Application of Two-Stage Cluster Sampling

The WFP Haiti Country Office conducted a Household Food Security using two-stage cluster sampling design, with households as the unit of analysis and localities serving as clusters.

Stage 1: Cluster Selection

The sampling was stratified by department, and sample sizes were calculated based on the prevalence of inadequate food consumption in each department:

- Centre: 35%
- North: 25%
- Northeast: 30%
- West: 20%

Although the ideal design included 30 clusters per department, resource and logistical constraints required a reduction to 20 clusters per stratum.

Clusters (localities) within each department were selected using Probability Proportional to Size (PPS). A complete list of localities with household population data was compiled, and a cumulative population column was created. Then, 20 random numbers were generated, and each was matched to a locality using the cumulative population values to determine which clusters would be selected.

Stage 2: Household Selection

Within each selected cluster, households were selected using the random walk method, particularly because detailed population lists were not available. The procedure was as follows:

- The enumerators identified the center of the locality.
- A bottle or pencil was spun to choose a random direction.
- They walked in that direction, counting the households along the way.
- The sampling interval was calculated by dividing the total number of households by the number of households to be interviewed.
- A starting point was randomly selected within the interval.
- Subsequent households were selected by adding the sampling interval, moving from the end of the transect back toward the center if necessary.

This approach allowed the team to collect data from a representative sample of households while managing the constraints of limited access to household-level data.

3.3.1 ADVANTAGES OF CLUSTER SAMPLING

1. **Cost-effectiveness:** By concentrating data collection within selected clusters, travel and logistical expenses are significantly reduced compared to sampling scattered households across a wide area.
2. **Efficiency:** Focusing on a limited number of clusters speeds up data collection, enabling better use of resources and time.

3.3.2 LIMITATIONS OF CLUSTER SAMPLING

Cluster sampling, while efficient and cost-effective, has several limitations:

1. **Complex implementation:** The design and execution of cluster sampling can be more complex than simpler methods like simple or systematic random sampling. It requires careful planning for cluster identification, selection, and within-cluster sampling procedures.
2. **Increased sampling bias risk**: Since households within the same cluster often share similar characteristics, there is a higher risk of sampling bias. This homogeneity can reduce variability and potentially lead to under- or over-representation of specific subgroups, such as displaced populations.
3. **Difficulty in defining clusters:** In contexts where natural or administrative groupings (e.g., villages or enumeration areas) are unclear or unavailable, defining appropriate clusters becomes challenging. Poorly defined clusters can compromise the reliability and representativeness of the survey.

3.5 HOW TO CHOOSE THE APPROPRIATE SAMPLING METHODS

The choice of sampling method depends on:

Survey Objectives

Define what the survey aims to achieve and whether results need to represent the entire population or specific sub-groups.

Population Characteristics

Consider if the population is homogeneous or contains diverse groups. Stratified sampling is ideal for analyzing specific sub-groups, while simpler methods work well for uniform populations.

Resources Available

Factor in time, budget, and data availability. More complex methods like stratified or cluster sampling require more resources, while simpler methods are more feasible in constrained settings.

Table 1: Differences among the most common probability-sampling techniques

	Simple random sampling	Systematic sampling	Stratified random sampling	Two-stage cluster sampling
Population	The entire population is considered	Population is ordered in some way	Population is divided into strata or subgroups	Population is grouped into clusters
Sampling unit	Households are randomly selected from the population	Every unit in the population is selected for surveying (i.e. every 5th household)	Households within each subpopulation are randomly selected	Clusters and subset of households within the selected clusters are randomly selected
Homogeneity within the sample unit	Assumes homogeneity across the entire population	Assumes homogeneity within selected intervals	Lower homogeneity within each stratum/subgroup	High homogeneity within each selected cluster
Complexity	Simple to implement	Simple to implement	More Complex	More complex
Advantages	Ease of Implementation, Ease of Analysis	Ease of implementation, geographic coverage, and straightforward selection process	Improve Precision, Reduce sampling errors	Cost-effectiveness and efficiency
Limitations	Potential for underrepresentati on, limited applicability in certain contexts, and logistical challenges associated with its implementation	Potential for non-randomness, logistical challenges, and dependence on accurate population size information	Complexity of implementation and Higher costs	Complexity, sampling bias and difficulty in cluster identification

4. Sample Size Calculation

Determining the appropriate sample size depends on several key factors:

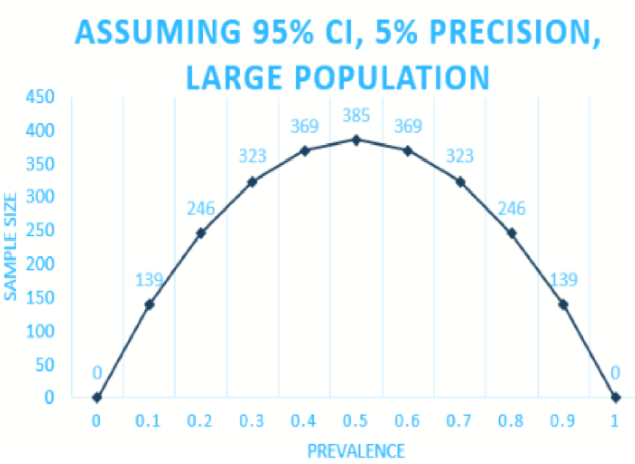
Prevalence or Mean of the Indicator of Interest

For food security assessments, the Food Consumption Score (FCS) from the most recent, comparable study is typically used.

No Recent Data? Use 50%

If no recent FCS data is available, use a prevalence estimate of 50%. This conservative assumption yields the largest required sample size, ensuring sufficient statistical power even if actual prevalence is lower.

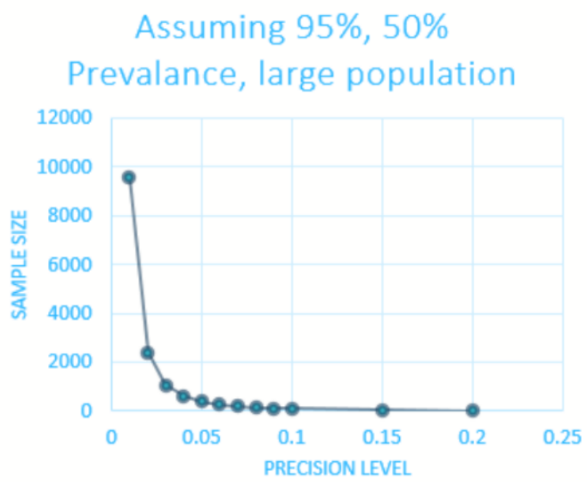
Figure 9: Required sample size vs. prevalence



Margin of Error (Precision)

This reflects how close the sample estimate should be to the true population value. A smaller margin of error requires a larger sample size. While 5% is the commonly recommended standard, 10% may be acceptable for one-time surveys with limited resources. Longitudinal assessments that track trends over time should aim for 5% or lower. Ultimately, the margin of error should balance statistical rigor with available resources and operational capacity.

Figure 10: Required sample size vs. precision



Confidence Level

This indicates how certain we are that the sample results reflect the true population values. A 95% confidence level is standard for WFP assessments. However, in cases of limited budget or when there are many strata, a 90% confidence level may be acceptable.

Design Effect (DEFF)

More complex sampling methods—such as two-stage cluster sampling or stratification—typically require larger sample sizes than Simple Random Sampling to maintain the same precision. This is due to added variability introduced by these designs. The Design Effect adjusts for this variability, ensuring the sample size remains sufficient to achieve the desired accuracy.

As a general guideline, design effects typically range from 1.5 to 2 for cluster sizes of 10 to 15 households. For WFP assessments where food security varies notably within clusters, a design effect of 1.5 is recommended when sampling 10 households per cluster.

If the design effect (DEFF) is 1.5, the required sample size for cluster sampling must be 50% larger than that for simple random sampling to achieve the same level of precision. In other words, cluster sampling is 50% less efficient, so you need to collect 50% more data to maintain the same accuracy.

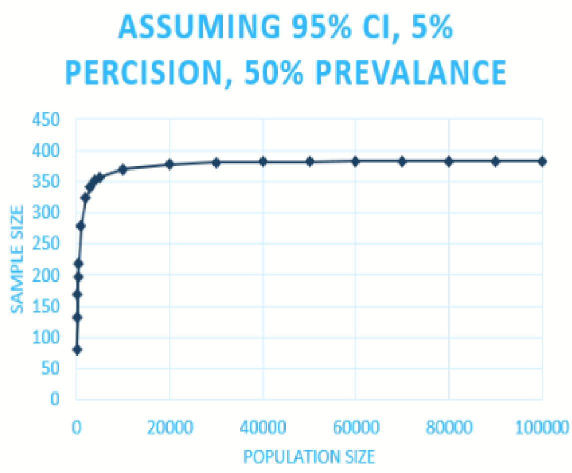
Expected Non-Response Rate

This is the proportion of households likely to decline participation or be unreachable. High non-response reduces sample precision and can bias results if certain groups are underrepresented. To compensate, increase the initial sample size based on estimated non-response rates from similar surveys. Even without a full household list, consider factors like accessibility, refusals, and absences to adjust sample size accordingly.

Population size

This is the total number of households in the population of interest. Generally, once the population exceeds 10,000 households, its size has minimal impact on the final sample size needed. Larger populations do not necessarily require larger samples.

Figure 11: Required sample size vs. population



5. Sampling design and sample size calculation in practice

5.1 SIMPLE RANDOM SAMPLING

The formula for computing the total sample size when using Simple Random Sampling is:

$$N = \frac{Z^2\left(p * (1 - p)\right)}{E^2}$$

Where:

N = Sample size

Z = Confidence level

p = Expected prevalence

E = Margin of Error

<u>Example</u>

Calculate the required sample size for a food security assessment in Iraq, based on the following information:

- Total population: 47,500,000 households
- Confidence level: 95% (corresponding to a Z-score of 1.96)
- Key indicator of interest: Food Consumption Score (FCS), Prevalence (poor + borderline) = 50%
- Required precision: margin of error of 10% (or 0.1)

$$N = \frac{1.96^2\left(0.5 * (1 - 0.5)\right)}{0.1^2} = 96$$

96 households per area surveyed

5.2 STRATIFIED RANDOM SAMPLING

The formula for computing the total sample size when using Stratified Random Sampling is:

$$n_h = \left(\frac{N_h}{N}\right) * n_{total}$$

Where:

n_h = sample size for stratum h

N_h = population size of stratum h

N = total population size

n_{total} = total sample size

<u>Example</u>

Calculate the required sample size for IDPs and Residents for a food security assessment in Iraq, given the following information:

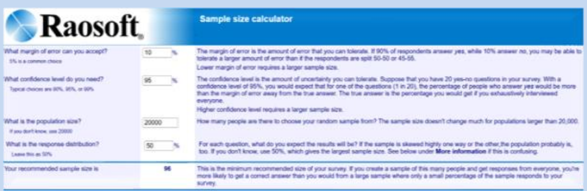
- Total population: 47,500,000 households
- Total IDP population: 1,200,000
- Total Resident population: 46,300,000
- Desired overall sample size: 900

n_h (IDPs) = $\left(\frac{1{,}200{,}000}{47{,}500{,}000}\right) * 900$ = 23

n_h (Res) = $\left(\frac{46{,}300{,}000}{47{,}500{,}000}\right) * 900$ = 877

23 IDP households and 877 resident households

For practical sample size calculations, it is highly recommended to use online tools such as the <u>Raosoft Sample Size Calculator</u>.



3. As the population size is greater than 10,000, its influence on the sample size calculation is minimal. Therefore, it was not included in the formula.

5.3 TWO-STAGE CLUSTER SAMPLING

The formula for computing the sample size for a two-stage cluster sampling is the same as the formula for simple random sampling with the addition of the design effect:

$$N = DEFF * \frac{Z^2\left(p * (1-p)\right)}{E^2}$$

Where:

$DEFF$ = Design Effect

N = Sample size

Z = Confidence level

p = Expected prevalence

E = Margin of Error

<u>Example</u>

Calculate the required sample size for a food security assessment to be conducted in Iraq, given the following information:

- Total population: 47,500,000 households
- Confidence level: 95% (corresponding to a Z-score of 1.96)
- Key indicator of interest: Food Consumption Score (FCS), Prevalence (poor + borderline) = 50%
- Required precision: margin of error of 10% (or 0.1)
- Design Effect: 1.5 (assuming 10 households per cluster)

$$N = 1.5 * \frac{1.96^2\left(0.5 * (1-0.5)\right)}{0.1^2} = 144$$

144 households per area surveyed[4]

4. As the population size is greater than 10,000, its influence on the sample size calculation is minimal. Therefore, it was not included in the formula.

6. Construction and use of survey weights

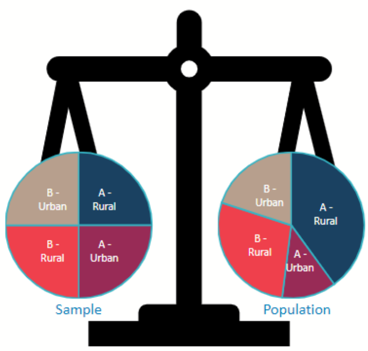
6.1 SURVEY WEIGHTS: WHAT THEY ARE AND WHY WE NEED THEM

Survey weights are a statistical technique used during sampling and/or data analysis to ensure that the sampled population—or the collected data—accurately represents the entire population, including its various groups and composition, rather than just the individual respondents or households interviewed. In simple terms, weights show how much importance each sampled observation should have when calculating estimates.

While weighting is not always necessary, especially in well-designed simple random samples where every unit has an equal chance of selection and response rates are uniform across all groups, it becomes essential when certain groups are over- or under-represented. Weights address three key issues in surveys:

- **Sampling bias —** correcting for over- or under-representation of certain groups.
- **Differences in response rates —** adjusting for non-response to ensure all groups are properly represented.
- **Achieving external validity —** enabling generalization of results from a smaller, weighted sample to the broader population.

Figure 12: Illustrative Sampling Weights



6.2 HOW ARE WEIGHTS DETERMINED

Weights can be either simple or complex depending on the study design and the purpose for which they are calculated.

Basic weighting:

$$Weight = \frac{Total\ Population}{Sample\ Size}$$

- Total Population: This refers to the entire population from which the survey or assessment will be conducted. For example, if you are conducting a survey in Country A, you would use the country's total population. This number is usually obtained from the most recent census or population estimates published by a national statistical bureau or agency.
- Sample Size: This is the number of interviews or observations that the assessment plans to conduct, based on available resources, accessibility, and time constraints.

6.3 STEPS IN IMPLEMENTING WEIGHTS

Step 1: Data Collection for Weight Calculation

The first step in creating weights is to gather the necessary data. The following practical field steps can be used to calculate and apply weights in food security and other assessment surveys:

1. Obtain population size from secondary data sources, such as government statistical agencies. This is preferable to primary data collection like a full household census whenever possible.
2. If reliable secondary data are unavailable, consult key authoritative informants to estimate population sizes, starting from the smallest administrative units (e.g., ADMIN5)

up to the largest (e.g., ADMIN1) within the survey area. This can be done by:

- Asking for the estimated number of people residing in each geographic location, or
- Asking for the number of households and the average household size in the area to calculate population estimates.

Step 2: Identify and Calculate Design (Sampling) Weights

The second step is to determine the type of weights to use, often referred to as **design weights** or **sampling weights**. This depends on the sampling method employed—whether the survey uses a **simple random sample** or a **stratified sample**.

It is crucial to apply the correct design weights to adjust for any over- or under-representation of certain groups or households in the sample, ensuring that the final results accurately reflect the population structure.

The general method for calculating the design/sampling weights is:

$$DW = \frac{1}{P_s}$$

DW = Design weights

P_s = Probability of selection

The **probability of selection** is calculated as the product of the selection probabilities at each stage of the sampling process.

How to Calculate Design Weights for Household Surveys:

- Understand the sampling design: Identify the type of sampling used, which is typically stratified random sampling.
- List all Primary Sampling Units (PSUs): Compile a complete list of all PSUs within each stratum.
- Determine the number of PSUs to select in each stratum: Note the planned number of PSUs to be sampled from each stratum, especially if these numbers differ across strata.
- Calculate the probability of selecting a PSU within each stratum: This is usually the number of PSUs selected divided by the total number of PSUs available in that stratum.

$$P_{PSU} = \frac{Number\ of\ PSUs\ Selected\ in\ a\ Stratum}{Total\ Number\ of\ PSUs\ in\ the\ Stratum}$$

- Calculate the probability of selecting Secondary Sampling Units (households): For each selected PSU, determine the number of households sampled and divide it by the total number of households within that PSU. This gives the probability of selecting a household within the PSU.

$$P_{HH} = \frac{Number\ of\ HHs\ Selected\ in\ the\ PSU}{Total\ Number\ of\ HHs\ in\ each\ PSU}$$

- Combine the two probabilities from Step 4 and 5 above to get the total selection probability:

$$P_{Total} = P_{PSU} \times P_{HH}$$

- Calculate the final design weight given as the inverse product of the overall selection probability (P_{Total})

$$DW = \frac{1}{P_{Total}}$$

Example

Calculating Design Weights for Two-Stage Stratified Sampling

Stratum	Population	PSUs	PSUs Selected	HH per PSU	HHs sampled per PSU
Rural	15,000	50	15	300	25
Urban	25,000	75	20	334	20

Calculating the Design Weights for the Rural Stratum:

$$P_{PSU} = \frac{15}{50} = 0.3$$

$$P_{HH} = \frac{25}{300} = 0.083$$

$$P_{Total} = 0.3 \times 0.083 = 0.025$$

$$DW = \frac{1}{0.025} = 40.16 \cong 40$$

Calculating the Design Weights for the Urban Stratum:

$$P_{PSU} = \frac{20}{75} = 0.27$$

$$P_{HH} = \frac{20}{334} = 0.06$$

$$P_{Total} = 0.27 \times 0.06 = 0.016$$

$$DW = \frac{1}{0.016} = 61.72 \cong 62$$

6.4 WEIGHTING IN REMOTE PHONE SURVEYS

Weighting is particularly important in remote phone surveys, where sampling and coverage biases are more likely to occur due to the nature of the data collection method.

In phone-based surveys, some segments of the population—such as those without regular access to mobile networks or phone ownership—are often underrepresented, while groups with stable access and better connectivity tend to be overrepresented. This leads to sampling bias, which can distort the findings if not corrected. Therefore, in remote surveys, **weighting is almost always necessary** to ensure the survey results accurately reflect the broader population.

Common Types of Weights Used in Remote Phone Surveys:

1. **Post-Stratification Weights (Non-Response Weights)**

These are used to adjust for differences between the sample and the known population characteristics (such as gender, age group, education level, or urban/rural location). Post-stratification weights correct for the fact that certain groups may be less likely to respond to phone surveys.

These weights are **computed after data collection**, using external reference data such as census statistics, large-scale representative surveys such as the Demographic and Health Survey (DHS) or baseline surveys.

Example

If 60% of your sample are from urban areas, but it represents only 35% of the actual population. Since the survey is over-representing urban households and under-representing rural households, post-stratification weights is used to compensate for this bias.

$$w_{poststrat} = \frac{35\%}{60\%} = 0.58$$

2. Design Weights (Sampling Weights)

These weights are used to correct for the unequal probabilities of selection due to the survey design, such as oversampling certain strata or areas. Design weights are essential for ensuring that every observation contributes appropriately to the analysis, regardless of how it was selected. For more on calculating design weights, see Section 6.

3. Dynamic Weights

For remote surveys that are continuous with a moving analysis window and results visualized \ updated daily, dynamic weight should be applied. This means that weights need to be generated at every analysis point (or every day to produce daily estimates) because the sample's characteristic are different day by day depending on the households included in the analysis.

6.5 KEY CONSIDERATIONS FOR APPLYING WEIGHTS

Assess the need for weighting

Weighting is not always required. If the sample's demographic distribution closely reflects that of the target population, only minimal or no weighting may be necessary.

Select weights carefully

When selecting socio-demographic variables for weighting (especially for post-stratification), the priority should be given to variables where the distribution in the sample deviates significantly from that of the actual population. These are the dimensions most likely to introduce bias and therefore most important to correct.

Evaluate the impact of weighting

After applying weights, assess how they affect your results. Weights should improve representativeness and accuracy—not introduce new distortions.

Use with caution

Be cautious when working with small sample sizes or when there are large variations in weights (i.e., extreme values). These can inflate variance and lead to unstable estimates.

Annex I
Adapting Sample Design and Sample Size for Resource Constraints

This annex provides guidance on how to adjust sampling methods and sample size calculations when faced with limitations in resources, time, or budget, while still aiming to maintain the integrity of household food security assessments. The calculated sample size should be reviewed and adjusted as needed based on available resources, time constraints, and other practical limitations.

1. Selecting the Appropriate Sampling Method

The choice of sampling method should be guided by available resources. More complex methods, like stratified or cluster sampling, typically require more resources, while simpler methods are more feasible in constrained settings.

- **Non-Probability Sampling:** This method, which relies on the analyst's judgment rather than random processes, is generally not recommended but may be used when probability sampling is not feasible due to logistical or resource constraints, such as a lack of a complete sampling frame or poor phone network access.
- **Simple Random Sampling:** While statistically preferred, this method can be resource-intensive, time-consuming, and costly in large or geographically dispersed areas. It also requires a complete and up-to-date sampling frame, which is often unavailable in WFP's operational contexts.
- **Stratified Random Sampling:** The implementation of this method can be complex and more expensive than simple or systematic sampling due to the additional effort required for its design and management.
- **Cluster Sampling:** This method is often preferred for its cost-effectiveness and efficiency, as it reduces travel and logistical expenses by concentrating data collection within selected clusters. However, its implementation can be complex, and it generally requires a larger overall sample size to maintain the same precision as simple random sampling.

2. Modifying Sample Size Calculations

Some parameters that can be adjusted to reduce the required sample size under resource constraints, though this may impact the precision of the results.

- **Margin of Error:** The standard margin of error is typically 5%, but a 10% margin of error may be acceptable for one-time surveys with limited resources.
- **Confidence Level:** While a 95% confidence level is standard, a 90% confidence level may be acceptable in cases of a limited budget or when there are many strata.
- **Prevalence of the Indicator:** When there is no recent data available for the key indicator, a conservative prevalence of 50% is typically used to calculate the largest possible sample size.

3. Adjusting Sample Design and Implementation

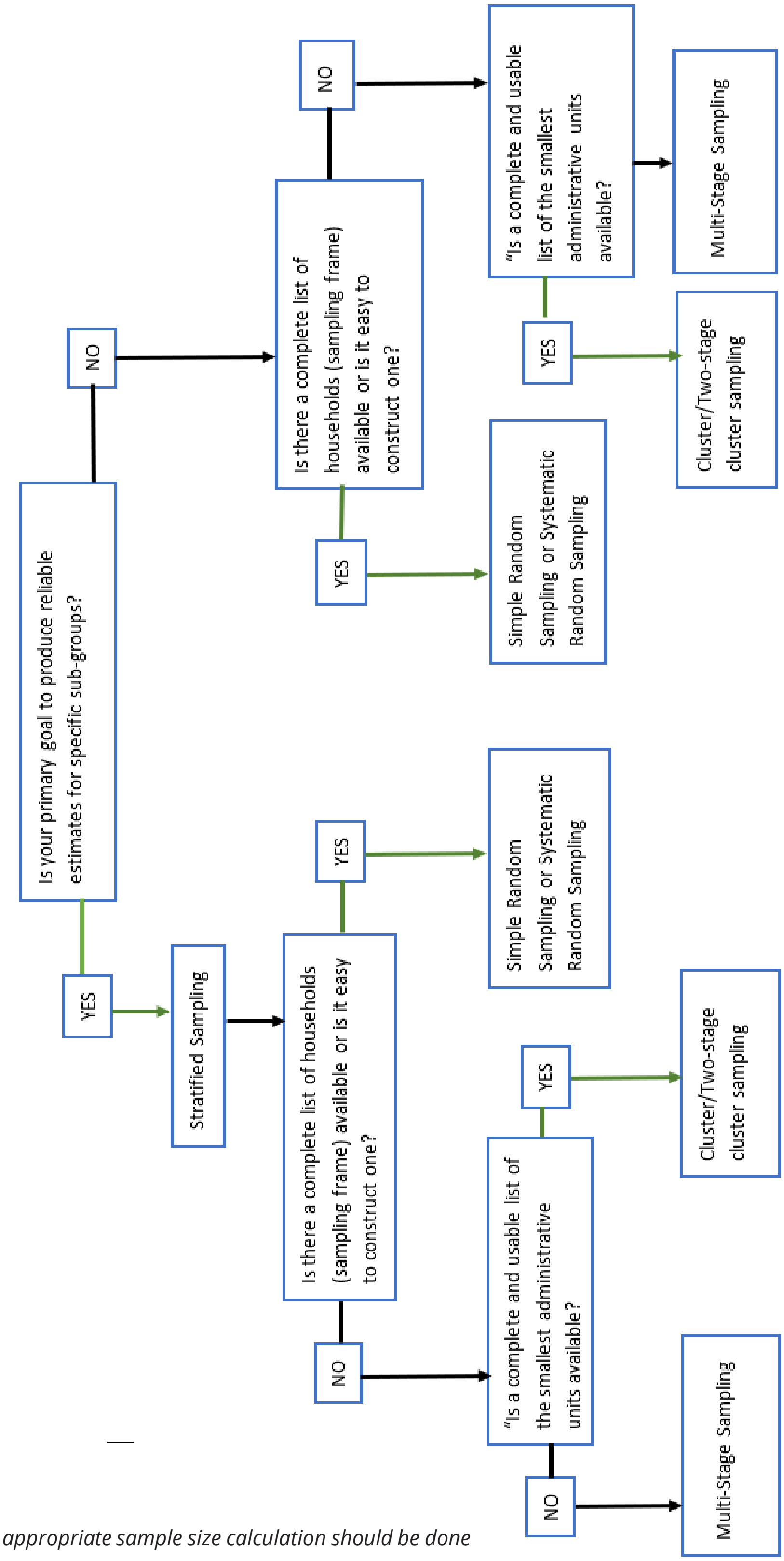
Beyond the initial calculation, the sampling design itself can be adjusted to be more practical and feasible in constrained settings.

- **Cluster Sampling Adjustments:** For face-to-face assessments, the standard design is 25 clusters per stratum with 10 households per cluster. In situations with limited access or resource constraints, this can be adjusted. For example, the number of clusters can be reduced to 5 per stratum while increasing the number of households per cluster to 18 to offer a more practical and feasible design.
- **Within-Cluster Selection:** If a complete household list is unavailable within a cluster, the random walk method can be used as a practical alternative to simple or systematic random sampling, although it is less preferred due to potential biases.

Annex II

Decision tree to guide analysts in choosing the sampling method

Figure 13:



For all sampling techniques, appropriate sample size calculation should be done

Glossary

General Sampling Concepts	
Sample	A subset of data selected from a larger population using a defined method to draw conclusions about the whole.
Sample Size	The total number of households or units included in the study.
Sampling Unit	A single member of the population eligible for selection (e.g., a household or individual).
Target Population	The full population the study aims to describe or analyze.
Sampling Frame	A complete and updated list of all elements in the target population from which the sample is drawn.
Sampling Method	The specific statistical approach used to select a representative sample from a population.
Probability Sampling Techniques	
Probability Sampling:	A sampling approach where each household has a known and usually equal chance of being selected through randomization.
Simple Random Sampling (SRS)	Every unit in the population has an equal probability of being chosen, ensuring unbiased selection.
Stratified Sampling	The population is divided into distinct subgroups (strata) based on shared characteristics (e.g., age, gender, location), and samples are drawn from each stratum.
Systematic Sampling	Units are selected at regular intervals from a list, starting from a randomly chosen point.
Two-Stage Cluster Sampling	A method where the population is first divided into clusters (e.g., geographic areas). In the first stage, a random sample of clusters is selected. In the second stage, households are randomly selected within each chosen cluster.
Primary Sampling Unit (PSU)	A geographic or administrative unit (e.g., village, enumeration area) selected in the first stage of multi-stage sampling.
Strata	Subgroups of the population created based on specific characteristics (e.g., gender, region, age) used in stratified sampling to ensure representation.
Cluster Size	The number of households or units included in each selected cluster.
Non-Probability Sampling Techniques	
Non-Probability Sampling	A sampling method where not all households have an equal chance of being selected; selection is based on criteria or judgment rather than randomization.
Snowball sampling	A technique where existing study participants recruit future participants from among their acquaintances. This method is often used for hard-to-reach or hidden populations, like refugees or people with rare characteristics.
Oversampling	A strategy where specific subgroups are deliberately sampled at a higher rate to ensure sufficient data for analysis.
Under-Sampling	A strategy where some groups are sampled less frequently to balance representation across categories.
Bias and Error	
Sampling Error (Standard Error)	The random variation that occurs because only a sample—not the entire population—is surveyed. Measured as the standard deviation of the estimate.
Standard Error (as % of Estimate)	The standard error expressed as a percentage of the estimate, to indicate relative precision.
Design Effect (DEFF)	The ratio of the variance of a complex sample design to the variance of a simple random sample of the same size. Higher values mean less precise estimates.
Intracluster Correlation (ICC)	A measure of similarity between units within the same cluster; high ICC means individuals in a cluster tend to have similar responses.
Non-Response Bias	A bias that occurs when households that do not respond differ in important ways from those that do, potentially skewing results.
Sampling Bias	A type of error that occurs when certain members of the population are more or less likely to be included in the sample due to the sampling method. This results in a sample that is not representative of the population and can lead to inaccurate or misleading conclusions.
Weighting and Adjustments	
Weight	A numerical factor applied to each sampled unit to correct for unequal selection probabilities, non-response, or to adjust to population totals.

Acronyms

ADMIN	Administrative
DEFF	Design Effect
DHS	Demographic and Health Survey
DW	Design Weight
FCS	Food Consumption Score
ICC	Inter-cluster correlation
IDP	Internally Displaced Population
IOM	International Organization for Migration
mVAM	mobile Vulnerability Analysis and Mapping
PPS	Probability Proportion to Size
PSU	Primary Sampling Unit
RDD	Random Digit Dialing
SRS	Simple Random Sampling
SSU	Secondary Sampling Unit
VAM	Vulnerability Analysis and Mapping
WFP	World Food Programme

Photo Credits

Cover Photo : WFP/Giulio d'Adamo
Photo page 7: © WFP/Alice Rahmoun
Photo page 10: WFP/Mehedi Rahman
Photo page 14: WFP/Oluwaseun Oluwamuyiwa
Photo page 16: WFP/Alejandro Arriola
Photo page 22: WFP/ Arete/Riyal Riffai
Photo page 26: WFP/ Emily Fredenberg
Photo page 28: WFP/ Arete/Fredrik Lerneryd

World Food Programme
Via Cesare Giulio Viola 68/70, 00148 Rome,
Italy - T +39 06 65131
wfp.org