Measuring Household Food Consumption: A Technical Guide

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This series

This series of Title II Generic Indicator Guides was developed by the Food and Nutrition Technical Assistance Project, and its predecessors (IMPACT, LINKAGES), as part of USAID’s support for its Cooperating Sponsors in the development of monitoring and evaluation systems for use in Title II programs. The guides are intended to provide the technical basis for the indicators and recommended methods for collecting, analyzing, and reporting on the generic indicators developed in consultation with PVOs during 1995/1996. The guides are available on the project website: http://www.fantaproject.org

Below is the list of available guides:

- Agricultural Productivity Indicators Measurement Guide
- Food Security Indicators and Framework for Use in the Monitoring and Household Food Consumption Indicators Measurement Guide
- Infant and Child Feeding Indicators Measurement Guide
- Water and Sanitation Indicators Measurement Guide
Many private voluntary organizations (PVOs) are engaged in projects aimed at improving food security and household nutrition worldwide. The U.S. Agency for International Development (USAID) supports many of these projects through the provision of Title II food aid to PVOs designated as "Cooperating Sponsors." Increasingly Cooperating Sponsors (CS) are being asked to monitor and evaluate the impact of their interventions, and USAID is generating materials to help them in this process. USAID Missions, in collaboration with PVOs and technical staff from Regional and Central USAID Bureaus have identified a set of generic impact indicators for household food consumption, to facilitate the monitoring and reporting process.

This technical guide was developed to systematize this information. It is based around the three impact indicators defined by the PL480 Title II program’s increased number of eating occasions, increased dietary diversity and increased percentage of households consuming minimum daily caloric requirements. This guide demonstrates how to measure and quantify this information.

The guide describes the process and procedures for collecting the information to assess the food-intake requirements of a household and a step-by-step analysis of the nutritional impact of the food consumed. The process begins with the design of a questionnaire; a model is provided here, but is subject to modification depending on the particular information that a given CS seeks to reveal. Filling in the questionnaire involves detailed interviews with a "respondent" (the household member responsible for food preparation) to obtain data on household composition and food consumption. The latter is gathered using a "24-hour recall" methodology, according to which the respondent is asked to recall the ingredients of each dish prepared during the previous day and the amount of that dish consumed by the household. The guide provides ideas for approximating the size of different dishes and their weight or volume and defining who is a "household member."

Once the basic information has been gathered, the methodology requires fairly complex data processing and analysis to convert information on household composition and consumption into standard formats that can be compared across households. Detailed information about analyzing household food consumption data is available in a separate Appendix. Topics covered in the Appendix include: sample ingredient codes, caloric requirement tables and sample activities grouped by activity level for males and females. The Appendix is referred to throughout the guide and is available by request from Food and Nutrition Technical Assistance (FANTA) Project, Academy for Educational Development, 1825 Connecticut Ave. NW, Washington DC 20009 - 5721.
2. **Impact Indicators for Improved Household Nutrition**

The three PL 480 Title II impact indicators developed to measure improvements in household food consumption are:

- Increased number of eating occasions per day
- Increased number of different foods or food groups consumed (dietary diversity)
- Increased percentage of households consuming minimum daily caloric requirements.

### 1. Increased number of eating occasions

The number of daily eating occasions is a proxy indicator for gauging the adequacy of household macronutrient (calories and protein) intake. An advantage in selecting this as an indicator of household food security is that data are relatively easy and inexpensive to collect. Data on the size and composition of meals are not required to calculate indicator values.

However, while the number of eating occasions may be a good indicator of household strategies to cope with transitory food insecurity, it is less sensitive as an indicator of changes in situations of chronic food insecurity or of micronutrient imbalances in the diet.

Moreover, interpreting data derived from this indicator is often complicated by cultural factors. In cultures where consumption of three meals per day is customary, household rationing in the face of food shortages can take the form of a reduction in the number of meals consumed. However, in cultures where households consume one primary meal per day, the volume, rather than the frequency, of meals tends to decline as food shortages develop. Thus measuring only the number of eating occasions will not yield significant information on household food consumption.

Another complication inherent in this indicator is the definition of a ‘meal,’ which often varies across cultures. For some, a meal is defined according to the volume and type of food consumed. For others, the time of day it is consumed is important in defining a meal. While using the term ‘eating occasions’ helps to eliminate difficulties caused by different definitions of ‘meal,’ the term still requires careful attention to cultural factors when interpreting results. The same is true of attempts to make cross-cultural comparisons of results. Because of these complicating factors, it is recommended that the ‘eating occasions’ indicator be used in conjunction with the dietary diversity indicator described below.

### 2. Increased number of different foods or food groups consumed

The number of different foods or food groups consumed in a household provides a measure of the quality of the diet by reflecting dietary diversity, thus serving as an important complement to the eating occasions indicators. To accurately capture dietary diversity, this indicator should be evaluated in terms of the variety of food groups (meats, milk, fruits, and vegetables) consumed, rather than by simply totaling all types of foods consumed. The division of food into different groups should focus on those nutrients stressed in a PVO’s program strategy.

Despite these advantages, measuring the “caloric requirements indicator” is more costly than using other indicators, as it requires a much higher level of technical expertise and more time to collect and analyze data. While it is ideal for measuring food security, a host of factors such as the difficulties in calculating food quantities and potential changes in consumption behavior due to the presence of an interviewer make the caloric requirements indicator difficult to use in practice.

For most PVOs, a preferred alternative might be to estimate the household’s consumption of minimum daily requirements, based on the ingredients of each eating occasion during the previous 24 hours, and then calculate the number of eating occasions and food diversity indicators using this detailed information. Section three offers a suggested methodology for carrying out such a survey.

### 3. Increased percentage of households consuming minimum caloric requirements

The wording of the indicator included in the list of Title II Core Indicators is “increased percent of households consuming minimum daily caloric requirements.” This indicator needs to be defined more sharply to accurately measure the nutrient of focus in a particular PVO program. The primary interest is generally caloric. Thus this guide describes the processes required to gather information to measure average caloric intake at the household level, as well as rough estimates of protein adequacy. PVO programs aiming to improve household intake of other nutrients, such as Vitamin A or iron, should consult either the Micronutrient Operational Strategies and Technologies (MOST) Project or the International Vitamin A Consultative Group for specialized methodologies.

The percentage of minimum daily caloric requirements consumed provides a good indication of overall household food security. This indicator can also be used in conjunction with a measure of dietary diversity, which can be easily calculated using data collected on caloric consumption.
COLLECTING AND ANALYZING THE DATA

PART 3.

3. Collecting and Analyzing the Data

The first phase of information collection calls for familiarity with local consumption patterns, to ensure that the survey tool developed is appropriate. Informal, exploratory approaches are the most useful at this stage. Information should be gathered on traditional forms and frequencies of eating occasions, standard ingredients, and household and market measuring units. Customary behavior should be identified, as should typical variations in behavior, particularly among targeted or food-insecure groups. With this information, the survey team can develop a set of appropriate interviewer aids, including code lists for common dishes, tools for direct measurement, and food models. Once the survey tool is complete, interviewers must be trained in the techniques described below.

Information on household food consumption should be collected using the previous 24-hour period as a reference (24-hour recall). Lengthening the recall period beyond this time often results in significant error due to faulty recall. Subsequent data collection (mid-term and final evaluations, for example) should be undertaken at the same time of year, in order to avoid conflicting results due to seasonal differences. To most accurately capture improvements in household food security, a Cooperating Sponsor (CS) should collect food consumption information during the season of greatest food shortages (such as immediately prior to the harvest).

A single 24-hour recall is usually adequate to quantify performance indicators of a program’s impact over time, when the indicators are calculated as group averages; that is, the average number of eating occasions of the recipient population. However, information from several days is necessary to obtain robust estimates of household-level consumption patterns. If the CS seeks to correlate household consumption with other household variables, as well as to analyze consumption patterns and their determinants, at least four days of recall per household are recommended.

When using the 24-hour recall method, the interviewer should first ascertain whether the previous day was “usual” or “normal” for the household. If it was a special occasion, such as a funeral or feast, or if most household members were absent, another day should be selected for the interview. If this is not possible, it is better to select another household rather than conduct the interview using an earlier day in the week.

The first few steps for collecting information on the nutrient adequacy indicator provide the data necessary for other indicators, namely the number of food groups and frequency of eating occasions. Information for these indicators can also be collected using a simplified methodology, which appears below.

In order to simplify data collection for this indicator, survey implementers can pre-define up to seven eating occasions and ask the respondent whether or not food was consumed during these periods. An example of this method appears below.

<table>
<thead>
<tr>
<th>Eating occasion</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any food before a morning meal</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>A midday meal</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A dinner meal</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A evening meal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>An evening meal and evening meal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>All evening meal</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

The sum of “yes” responses quantifies the indicator for each household, which can then be averaged over the population of interest. Because the sum is actually the total of all household members’ eating occasions, the sum will probably be larger than the number of eating occasions for any individual household member. For example, a household may report five eating occasions, whereas each individual household member may have eaten no more than three times that day.

An alternative, perhaps simpler, way of analyzing this indicator, is to calculate the percentage of households that eat “x” or more times a day. The numerator would represent the sum of households with “x” or more “yes” responses, and the denominator would represent the total number of households. This indicator can easily be modified to reflect the different number of meals consumed within a given cultural context; for example, the percentage of households eating two or more times a day. The indicator should always correspond to the specific cultural context of the project.

2. Increased number of different foods or food groups consumed

For ease of analysis, the number of different food groups consumed should be calculated, rather than the number of different foods. Knowing that households consume, for example, an average of four different food groups implies that their diets offer some diversity in both macro- and micronutrients. This is a more meaningful indicator than knowing that households consume four different foods, which might all be cereals. The U.N. Food and Agriculture Organization (FAO) uses the following set of food groups in its food balance sheets:

1. Cereals
2. Root and tubers
3. Pulses/legumes
4. Milk and milk products
5. Eggs
6. Meat and offal
7. Fish and seafood
8. Oil/fats
9. Sugar/honey
10. Fruits
11. Vegetables
12. Miscellaneous

These groups can be adapted to the local context to reflect both cultural and economic patterns in food selection (e.g., “high” and “low” status foods). The list can also be expanded to specify foods of particular nutritional value, such as those high in Vitamin A or iron. The groups used for a particular survey should be meaningful with respect to the CS’s program objectives and project-level interventions. For example, while including the addition of sugar or soft drinks to the list may not indicate improved nutritional status, it may be associated with increased income. This would be important to measure if the project goal is “improved food security through increased income.” Nonetheless, the total number of groups included in this indicator should not be too large, as interpretation of results becomes difficult.
Once the set of food groups has been defined, data for the “number of food groups” indicator can be collected by asking each respondent a series of yes-or-no questions. This allows the interviewer to list the predominant products from each food group consumed by the respondent’s household, and thus provide relevant examples for each of the food groups.

The respondent should include the food groups consumed by household members in the home, or prepared in the home for consumption by household members outside the home (e.g., at lunchtime in the fields.) As a general rule, foods consumed outside the home of foods not prepared in the household is very common, and thus it is likely that the indicator will underestimates the intake of individual household members or guests.)

Quantities prepared of foods that are a significant source of calories increases the risk of overestimating the consumption by household members, and activity levels of household members consuming the calories.

### 3.1 24-Hour Recall of Food Intake

The 24-hour recall gathers information on:

- **Eating occasions** (definition of meals/snacks or time food was consumed)
- **Household members present at each meal**
- **Visitors consuming each dish**
- **Type of dish**
- **Ingredients of dish**

#### Nutrient requirements

The sum of the “yes” responses quantifies the indicator for each household, which can then be averaged over the target population.

For a sample among three households (A, B, and C), the responses might look something like those in the box below. An estimate of caloric intake is obtained through a simple calculation: the calories consumed by each household member divided by the number of households.

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 3.2 Increased percentage of households consuming minimum daily caloric requirements

Two data components are necessary to quantify household caloric adequacy, intake and minimum requirements. The caloric intake estimate is obtained through a simple calculation: the calories consumed by each household member divided by the number of households.

An estimate of caloric requirements is calculated based on the age, sex, physiological status, and activity levels of household members consuming the calories.

#### Sample interview (H: Interviewer; R: Respondent)

- **Who was the first person in the household to wake up yesterday?**
  - R: Yes.
- **After you woke up, what was the first thing prepared or consumed in the household?**
  - R: I made breakfast: plantains and eggs.
- **Was any beverage served with breakfast?**
  - R: No.
- **What was the next thing prepared or consumed after the coffee?**
  - R: I sweetened the whole thing.
- **Did you consume the coffee with something else or only had the coffee?**
  - R: Only.
- **What were the ingredients of each dish consumed at breakfast?**
  - R: I made breakfast: plantains and eggs.
- **What was the next thing prepared or consumed after breakfast?**
  - R: No.
- **What was the next thing prepared or consumed after breakfast?**
  - R: Lunch.
- **Did anyone in the household eat anything between breakfast and lunch?**
  - R: Yes, the kids ate mangoes.
- **What was the next thing prepared or consumed after lunch?**
  - R: I made lunch: beans and rice.
- **Who was the first person in the household to wake up this morning?**
  - H: One of the kids was still sleeping.
- **What was the next thing prepared or consumed after dinner?**
  - R: We had rice and beans for dinner.
- **Was any beverage served with dinner?**
  - R: Yes.
- **What was the next thing prepared or consumed after dinner?**
  - R: No.
- **Did anyone in the household eat anything between dinner and bed?**
  - R: Yes, the kids ate mangoes again.
- **What was the next thing prepared or consumed after bed?**
  - R: I went to bed early.

#### Part 3: Collecting and Analyzing the Data

In this example, household C has the greatest dietary diversity, with a score of 10; household B has the least diversity, with a score of 4. The average diversity of the sample is (7+4+10) divided by 3, or 7.

See the Appendix for more information.
The interviewer will first lead the respondent through the entire day, recording the dishes and ingredients consumed. This permits the respondent to follow a logical memory sequence all the way through the day, without constantly changing focus from what was consumed to how much was consumed. Then the interviewer will return to the beginning of the 24-hour period to obtain information on the quantity of the ingredients that are important contributors of calories.

### 3.1.1. Filling in the Questionnaire

Figure 1 presents a sample questionnaire for recording 24-hour food consumption recall information. Detail is provided in this section on how to fill in the various columns of the questionnaire.

![Figure 1: Sample questionnaire layout](image)

#### Column 1: Eating occasions are recorded in Column 1. The information is used to identify household members present during the time the food was consumed. An eating occasion is identified when food is prepared for, or distributed to, one or more household members for their consumption. Eating occasions are numbered consecutively, starting with 1, regardless of whether they were a "meal" or "snack" and of how many people were present. If a pot of porridge was prepared at 6 a.m., and the first household members were served at 6 am, another at 6:30, and the final member at 7:30, this should be recorded as one eating occasion.

#### Column 2: Columns 2 through 8 list information on the people who did, or did not, consume the food served at each eating occasion. Column 2 lists the codes of those household members not present during the eating occasion. The cell of column 2 corresponding to a specific eating occasion can contain multiple household ID codes. These codes should not be entered vertically (one per row), accounting for multiple codes takes place at data entry. If a household member was present during the meal but did not eat, or did not eat all dishes served, that member's code is not recorded in Column 2. If a household member was not present, but took food to consume outside the home, that person's code is not recorded in Column 2.

- **Household member 01** takes a home-prepared lunch to the fields, and member 02 takes a lunch to school. Remaining members consume the same (or different) dishes at lunchtime at home. Neither member 01 nor 02 should be noted in Column 2 when the dishes served at lunch to the remaining members at home are recorded. The food prepared for 01 and 02 in the morning is recorded, the food prepared at lunch is recorded, and the total amount of food is divided among all household members.
- **Household member 02** is sick at home and does not eat any lunch.
- **Household member 02** doesn't like eggs and only eats tortillas and beans at breakfast.
- **Each household member eats a separately prepared breakfast at different times during the morning. For example, member 02 eats breakfast at 7:00 a.m. and leaves for school, member 05 eats at 8:00 a.m. and leaves for work, and member 01 breakfasts at 8:30 a.m. Therefore all members breakfasted, all were present and ate, even though at different times. The breakfasts are all considered as the same eating occasion.**

#### Columns 5 - 8 list the number of visitors in each age/sex category who ate each dish. While household members are recorded by eating occasion or meal, visitors are recorded by dish. Visitors are broken down into age/sex categories that cover a range of adult equivalents. During data analysis, a weighted "average adult equivalent" will be assigned to each of these categories.

Columns 9 - 11: The name of each dish is recorded in Column 10 and coded in Column 11. A "dish" can either be a cooked combination of ingredients or an uncooked food (in the latter case the dish is essentially equivalent to the ingredient). Dishes for which a liquid is mixed with a solid before serving (such as milk and bread, broth and rice, milk and tortilla) should be noted as a single dish, the liquid and the solid are listed as ingredients. This will facilitate the measurement of leftovers. For ease of subsequent data analysis, dishes are numbered consecutively in Column 9.

### Columns 12 and 13

Repeat the dish and its code. A measure of the total quantity of the dish is recorded in the same row. The ingredients of the dish are then recorded under the dish name in consecutive rows down Column 12, leaving two spaces between the last ingredient of one dish and the first ingredient of the next dish listed. When the dish and the ingredient are the same, it is not necessary to repeat the ingredient, unless precise information on the weight of the food would be lost if it were not repeated as an ingredient.

A four-digit coding scheme is used for dishes and ingredients, allowing for greater flexibility in determining the easiest and most accurate method of measurement. A given ingredient may pass through several stages before being cooked. For example, it may start out raw, then be soaked, then ground, then boiled. An estimate of the quantity prepared may be obtained at any stage, although it may be easiest to estimate quantity when the ingredient is raw or after it has been ground. The first digit of the four-digit code corresponds to the state in which the ingredient is raw or after it has been ground. The next three digits are used to identify the ingredient.

Survey implementers must determine the appropriate items to include under "forms of preparation." If more than nine forms are listed, a five-digit code can be used, of which the first two digits should be for coding the form of preparation.
3. Code Food Code Food

Corn provides a good example of the issues involved in coding forms of preparation and measuring quantity. The corn used to make tortillas passes through several stages: generally, dried corn kernels are cooked and then ground into a coarse meal, it may be easiest to estimate the quantity of dried kernels the respondent took from a sack or the quantity of cooked kernels taken to the mill; or the quantity of ground corn made into tortillas. For example, 450 ml of dried corn expands to 1300 ml after cooking, then reduces to 700 ml after grinding. The survey respondent can demonstrate the amount of the cooked dish served from the pot, not on each member’s plate. Given that the objective of the study is to calculate average household consumption, obtaining details on individual leftovers is too demanding and time-consuming to be worth the additional precision gained. Clearly, however, individual leftovers should be estimated when individual intake is of interest to the survey implementer.

Another example of the intricacies of coding is soup. Broth from soup is a common weaning food. Nutrition education programs often encourage mothers to dilute the consistency of the soups they serve their infants if a child is served soup or broth at a separate eating occasion. The interview must verify whether the soup served to a child included solid ingredients or just broth. The soup form of preparation code (8) should be reserved for soup with solid ingredients. A separate dish/ingredient code should be identified for broth (See Appendix, Sample Ingredient Form Codes, code 406).

Columns 14-16 are for listing the quantity of the dish prepared and selected ingredients. If the pot or container in which the dish was prepared is available, estimating the amount of the dish is straightforward. If the pot is unavailable, or the total amount of the dish is too large, the interviewer may ask the respondent to measure the portion served to each individual and estimate the amount remaining in the pot. The interviewer can then add up the individual servings plus leftovers, and enter the sum as the total amount of the dish prepared. The interviewer would also be entered separately in Column 17.

If large amounts of a dish are prepared for several days at a time, it is impractical to try to measure the total amount of the dish prepared, and then measure the amount remaining in the pot after each meal. In this case, the interviewer would not record and measure individual ingredients. Instead, the respondent should be asked to demonstrate the amount of the cooked dish served from the pot to each individual. In this case leftovers are not estimated, since leftovers at the household level refer to leftovers in the pot, not on each member’s plate. Given that the objective of the study is to calculate average household consumption, obtaining details on individual leftovers is too demanding and time-consuming to be worthwhile, and additional precision gained. Clearly, however, individual leftovers should be estimated when individual intake is of interest to the survey implementer.

The quantity of the dish and its ingredients are recorded separately. If the respondent states, “I cooked one pound of rice,” the quantity is “1,” and the unit of measure is “pounds.” The quantity (number of units) is recorded in Column 14, and the unit of measure in Column 15. The unit of measure recorded should correspond to one on the precoded unit-of-measure list. (See Appendix, for a sample listing of measurement codes.) Common household units of measure (cup, glass, spoon, recycled can, bottle, bowl, or gourd) should not be recorded. For example, if the respondent used a coffee-cup full of sugar to make juice, the interviewer must not record “1 cup of sugar” because the size and shape of coffee cups vary, as do the levels to which a respondent may have filled the cup. The interviewer can determine the volumetric equivalent of the amount of sugar by asking the respondent to fill the same coffee cup with rice to demonstrate the amount of sugar used, and then recording the quantity of milliliters.

It is not necessary to estimate the amount of water in coffee, tea, reconstituted milk/formula, juice, etc. The interviewer need only obtain quantity estimates for ingredients that are significant sources of calories (such as powdered milk, formula, or sugar) and the total amount of the dish.

Column 17 notes the quantity of the dish not consumed during the eating occasion. This “leftover” amount may include portions sent to neighbors, fed to animals, or discarded, as well as portions set aside for subsequent consumption by household members. The measure of leftovers must always use the same unit of measurement as the dish. If a different unit of measure is used, the data analyst will not be able to estimate what proportion of each ingredient in the dish was not consumed.

One or more days worth of foods, such as flat breads and rolls, may have been made during the recall period. For example, in Honduras some housewives grind enough corn and make enough tortillas for the entire day at one sitting, while others grind corn and prepare tortillas before each meal. When the whole day’s tortillas are prepared at once, it is often difficult for the survey respondent to recall the total number of tortillas prepared. In such cases the interviewer can prepare a matrix (as in the example below); the respondent is more likely to recall how many tortillas were served to each person at each meal. The columns of the matrix can then be added together to provide the total number of tortillas prepared, the amount left over and consumed at subsequent meals, and the amount not consumed that day.
The respondent prepared tortillas for the entire day at breakfast time. All household members ate all meals, and no other food was consumed in the household. The level of consumption from the same day or previous days. The code "leftover from same day" helps the interviewer create a matrix of meals consumed by household members, and asks the respondent to recall how many tortillas each member ate at each meal. The interviewer then asks if any tortillas were consumed as snacks, given to animals, given away, sold, or uneaten (leftover). The difference between the total number prepared and the number leftover is the number eaten as snacks, given to animals, given away, sold, or uneaten (leftover). The total amount prepared can also be calculated, instead of the weight of the product, the interviewer should ask to see the package. Cans and bags are often kept for reuse. If the package or container is no longer available but was purchased at a local retail outlet, the interviewer can visit the store after the interview, and actually use the quantity measured. For example, if the respondent bought one-half pound of sugar and used it all to make lemonade, or bought a 550-gm. bag of rice and cooked it all at once. The interviewer notes the total number of tortillas prepared (not the number consumed) at breakfast, which is the sum of the total number of tortillas consumed in the household that day (after subtracting leftovers and animal feed).

<table>
<thead>
<tr>
<th>Code</th>
<th>Source</th>
<th>Code</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>purchased</td>
<td>10</td>
<td>home</td>
</tr>
<tr>
<td>09</td>
<td>freely gathered</td>
<td>20</td>
<td>other</td>
</tr>
</tbody>
</table>

Columns 18 and 19 reflect the source of tortillas consumed in the household. The level of detail in the code list depends on the common role to play, and different foods are measured differently. Methods 1 and 2 are preferable, but not always feasible. Method 3 uses preselected, pretested models that reflect the local context in terms of the types of foods available and the form in which they are generally acquired and consumed. Success in implementing these techniques in the field is highly dependent on the quality and depth of interviewer training.

### 3.2.1. Recorded Weight

Ideally, the interviewer will be able to record the weight of the food prepared or consumed. This will be easiest when the respondent purchased a pre-measured amount of a food and prepared it in its entirety during the recall period. For example, the respondent bought one-half pound of sugar and used it all to make lemonade, or bought a 550-gm. bag of rice and cooked it all at once. The respondent may know the exact weight or volume of a product if it was pre-packaged, or if it was bought by the pound and weighed on a scale at the time of purchase. If a product was purchased pre-packaged, but the respondent does not know the weight, the interviewer should ask to see the package. Cans and bags are often kept for reuse. If the package or container is no longer available but was purchased at a local retail outlet, the interviewer can visit the store after the interview, identify the same brand and price, and directly ascertain the weight of the product. If the net weight on the can or container includes water (such as canned peas), the weight from the can is not used. Instead, the interviewer should estimate the volume of the drained product (see next section).

In many countries respondents may think of rice as "1 pound," even though the package clearly states the weight as 550 grams. Thus when respondents provide an oral account of the weight of a product, they may report that it was purchased without being weighed; (c) was a gift of raw or cooked food; (d) was purchased by weight, but not prepared or consumed in its entirety; or (e) is a cooked dish or an ingredient. Then the interviewer must estimate the amount prepared or consumed. Several techniques are available to do so. They require that interviewers carry with them aids such as rice, clay beakers with graduated measurements, and in some cases, cardboard models.

### 3.2.2. Volume

To convert household measures to volume, the respondent is first asked to demonstrate the amount of the product prepared or consumed using the household measure (cup, spoon) she actually used. Then water or rice is used to substitute for the product. The interviewer will carry four or five pounds of rice to be used to demonstrate the amount of dry ingredients, especially those that tend to mound when measured (such as flour, powdered milk, and sugar). The total amount prepared can also usually be estimated by volume.

### 3.1.2. Food intake can be estimated in four different ways:

1. **Recorded weight**
2. **Volume**
3. **Two-dimensional food models**
4. **Linear dimensions**

Each of these methods has an important and specific role to play, and different foods are measured differently.
Another way to measure volume is by water displacement. This is particularly useful when the ingredient or dish prepared or consumed is measured in individual units, such as a roll, piece of meat, or block of cheese. Interviewers request that respondents use clay to model the shape and size of the food. Then the interviewer fills a beaker with water to a level high enough to cover the modeled product, and notes the level of water in milliliters. Finally, the interviewer places the clay model in the water, and notes the new water level. The difference between the two levels is recorded in milliliters on the questionnaire.

### Measuring the volume of coffee and sugar

The respondent has a cook of sugar and a small cup that she uses to remove sugar from the sack before adding it to coffee. The interviewer asks the respondent to demonstrate using the same cup and the study rice the amount of sugar she used yesterday in the morning coffee. The respondent fills the cup with rice to where it was filled with sugar; the interviewer repeats the rice into a beaker and records the quantity in milliliters. Then the interviewer asks the respondents to fill the beaker used yesterday with water to the level it was filled with coffee. This amount is measured in the beakers and recorded as the total amount of the dish prepared. The interviewer asks if any coffee was left in the pot after everyone had been served. If so, the respondent is asked to demonstrate by placing water to the level of leftover coffee in the beaker. The interviewer records this amount in the total dish leftover column.

Another example comes from a study in Honduras, where vegetable shortening (manteca) is commonly used for cooking. The product is usually squeezed from a plastic tube into the frying pan, then heated. In this case, respondents were asked to estimate the amount of manteca used, and the interviewer poured water into the pan by adding water to the empty pan until the quantity replicated the amount of manteca. The amount of sugar was measured in milliliters.

### Measuring the volume of cheese by water displacement

If a respondent purchased a portion of cheese but did not serve all of it yesterday, the interviewer can estimate the amount of cheese consumed by asking the respondent to make a clay model similar to the size and shape of the cheese when originally purchased. Having filled a 1,000-ml beaker up to the 600 ml mark, the interviewer places the clay model in the beaker and notes that the water level has risen to 850 ml. Thus the volume of the original portion of cheese was 250. Of the interviewer then asks for a model demonstrating the amount of cheese not served. Making sure that the beaker still has 600 ml of water (the water level remains as in the previous day), the interviewer records the amount of cheese consumed the previous day.

### Two Dimensional Food Models

When the interviewer determines that models are necessary, he or she will demonstrate the range of models available for the particular food item, and ask the respondent to indicate which size best corresponds to the amount of the food prepared or consumed. Most food models are two-dimensional, that is, they show the length and width of the product, but not its thickness. It is possible, however, to develop cardboard food models to measure thickness.Flatbreads, such as tortillas, may vary widely in both diameter and thickness in different regions of a country. Using cardboard that is approximately as thick as the thinnest commonly observed bread, survey implementers can create a set of models covering several different thicknesses. Interviewers can then ask respondents to indicate both the size of bread or tortilla and the thickness, using the different cardboard models. Model sizes can be coded using letters, and the number of models coded by number. For example, if five model sizes are to be used, model size B, the interviewer would record "B2" with the corresponding code for the list of units of measure.

### Food Models

Food models for roots and tubers should be developed to cover three-to-five sizes and one-to-three shapes. To estimate

Conversion factors for all foods measured by volume will need to be obtained. Some such factors are available from nutrient composition tables that list, for example, the volume of a standard 8-ounce measuring cup: the standard 8-oz cup contains 236.6 ml. The weight of one cup of the product divided by 236.6 will give the conversion factor to grams for one milliliter of volume of the product. Some volumetric conversion factors for common foods in Honduras, used in a 1994 survey, are included in the Appendix. For conversion factors of foods not included in the Appendix, survey implementers will need to calculate survey-specific conversion factors. To do so, the implementers should purchase a sample of different weights of the product of interest. The volume of each sample should be measured, using the most appropriate technique (directly for dry or liquid ingredients, water displacement for solid ingredients, if possible). The volume-to-gram conversion factor for each sample is then averaged to obtain a milliliter-to-grain conversion factor for the product.

### Appendix

#### Table 1: Measuring the Volume of Coffee and Sugar

<table>
<thead>
<tr>
<th>Dish</th>
<th>Dish code</th>
<th>Ingredient code</th>
<th>Ingredient</th>
<th>Quantity</th>
<th>Unit of measure</th>
<th>Unit code</th>
<th>Leaffower quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee</td>
<td>1230</td>
<td>Coffee</td>
<td>1230</td>
<td>1050</td>
<td>ml</td>
<td>01</td>
<td>230</td>
</tr>
<tr>
<td>Coffee</td>
<td>0060</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 2: Measuring the Volume of Cheese

<table>
<thead>
<tr>
<th>Dish</th>
<th>Dish code</th>
<th>Ingredients code</th>
<th>Quantity</th>
<th>Unit of measure</th>
<th>Unit code</th>
<th>Leaffower quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh cheese</td>
<td>2104</td>
<td>Fresh cheese</td>
<td>2104</td>
<td>250</td>
<td>ml</td>
<td>01</td>
</tr>
<tr>
<td>Fresh cheese</td>
<td>0104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
the quantity of the ingredient, the respondent is asked to select the size and shape closest to that prepared. The respondent may select several models to demonstrate the range of shapes and sizes prepared. The respondent is then asked how many pieces each root was cut into, the sum of which is recorded as the total amount of the dish. Individual portions will then be defined as the number of pieces. When the data is analyzed, the total weight of the sum of the food models (ingredients) is divided by the total number of pieces to calculate an average weight per piece. (Fig.3)

3.1.2.4 Linear Dimensions
The amount of some foods—most commonly already cooked square or rectangular foods received as gifts or purchased—can be estimated using their dimensions. One Latin American example is the tamale. The respondent can be asked to draw a rectangle to estimate the length and width of the food, and to indicate the height with the distance between two fingertips. The interviewer records the information as "cubic centimeters."

However, if the respondent prepared tamales in the home during the reference period, it is not necessary to estimate the dimensions of the finished tamales in this manner. Rather, the interviewer should record all the ingredients and their respective quantities. To obtain the total amount of the dish, the interviewer records the total number of tamales made, using the slice/piece unit of measure code.

![Figure 3 Estimating the quantity of cassava consumed](image)

3.2. Recording Household Composition
Caloric requirements of household members are based on their gender, height, weight, physiological status, and level of activity. For the purposes of quantifying the Title II caloric adequacy indicator, average heights and weights for the country should be used. Figure 4 presents the layout of a sample questionnaire for collecting the additional information required to calculate caloric requirements for each household member.

3.2.1. Age
For the purposes of the caloric adequacy indicator, age in years completed is collected for all household members over one year of age. Age in months is needed for children younger than one year.

3.2.2. Gender
The gender of each household member is recorded. Females do not need to be identified here as pregnant or lactating, as this is recorded in the column on physiological status.

3.2.3. Physiological Status of Women of Reproductive Age (14 - 49 years)
Women of reproductive age should be asked whether they are: pregnant but not breastfeeding, breastfeeding but not pregnant, pregnant and breastfeeding, or not pregnant or breastfeeding. A woman may be unaware that she is pregnant, especially during the first trimester. It is not necessary for interviewers to probe further (such as asking the date of the woman's last menstrual period). The level of error that would be introduced by miscoding a pregnant woman as not pregnant, especially in the first trimester, is not significant in relation to the relatively high level of error in this indicator of household average caloric adequacy.

### Table: Sample questionnaire for household composition

<table>
<thead>
<tr>
<th>Member</th>
<th>Name</th>
<th>Sex</th>
<th>Number</th>
<th>Age</th>
<th>Physiological status</th>
<th>Activity level</th>
<th>Current household residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
<td>5.</td>
<td>6.</td>
<td>7.</td>
<td></td>
</tr>
</tbody>
</table>

1. Male
2. Female
3. Years
4. Months
5. Infant
6. Toddler
7. Preschooler
8. Young child
9. School age
10. Teen
11. Adult
12. Elderly

### Figure 4: Sample questionnaire for household composition

The information recorded in this column is necessary because household members included in the calculation of average household caloric adequacy should be limited to those who are currently consuming from the household food supply. While ideally only such household members will be mentioned by the respondent, it is not uncommon for respondents to list individuals as household members even when they are not currently residing at home. For example, a respondent may list a daughter who is attending school in the capital city and living with a relative. For the respondent, the daughter is still considered to be a member of the household.
household. Rather than insult a respondent by not recording the daughter's name, the interviewer can record her information, but code her as "2"—not currently residing in the household. If the daughter returns for a visit during the period of interviews, she should be recorded as a "visitor" in the appropriate columns of the questionnaire. Additional motives for collecting household composition data include the need to calculate income per capita or household labor supply. The criteria for listing an individual as "present" or "absent" will differ according to the motive of the survey. For the purposes of calculating caloric adequacy, household members should be included only when currently residing in the household.

4. Analyzing the data

Calculating the percentage of households meeting the minimum standards of daily nutrient requirements entails significant manipulation of data. This section summarizes the steps to be taken to perform the calculations. A more detailed guide to the SPSS/PC programming procedures to be followed is provided in the Appendix. The procedures have been designed for ease and convenience; nonetheless, the CS will probably have to employ or train staff in SPSS/PC so that programs can be debugged and modified as needed.

Once data on the amount of food consumed and the people consuming the food has been collected, the information must be converted to the two data components necessary to quantify household caloric adequacy: intake and requirements. Caloric intake is estimated based on the data on consumption of all significant sources of calories during the previous day (see the Appendix). Caloric requirements for household members are calculated based on their age, sex, physiological status, and activity levels (see the Appendix), and the resulting calculation of individual caloric requirements.

Computing caloric adequacy requires a detailed analysis of the composition of each dish consumed by the household, which involves converting ingredients to standard weights, establishing putative recipes for dishes with no recipes; and accounting for leftovers. Using the survey data, the data analyst then proceeds to compute the number of people that consumed each dish and the calories consumed by the household. The average intake of calories is then compared with caloric requirements, to calculate the adequacy of average caloric intake for each household.

Appendix document

A separate Appendix with numerous examples of steps and procedures and information about analyzing the data is available from the FANTA Project. Information is provided on:
- sample ingredient codes
- sample ingredient form codes
- sample unit of measure codes
- sample activities for males and females, grouped by activity level
- row numbers for FAO member countries
- daily calorie requirement for an adult equivalent
- calorie requirement for children under 10 years of age by sex
- average weight by age and sex for FAO member countries
- dietary files
- inputting average recipes for dishes without recipes
- household recipe proportions
- adult equivalent file
- population distribution (proportions) by age and sex for selected countries, 1997
- sample calculation of weighted average adult equivalent ratios for guest categories
- command file containing nutritional value of foods
- Title II generic indicators
- setting food diversity targets