CHAPTER 6

# Food security analysis in a CFSVA

## 6.1 ANALYTICAL STEPS

### 6.1.1 Introduction

This chapter presents a chronological flow of analytical steps to be followed in the CFSVA. Adhering to this order is not compulsory; some steps naturally precede others; some can be implemented simultaneously.

The results of the analysis should be integrated in the report in such a way that the report reflects the various dimensions of the Food and Nutrition Security Conceptual Framework. Accordingly, the report will reflect not the chronology of the analysis but rather the logic of the framework. Important links between the various components in the framework should be highlighted in the report.

Secondary data analysis, literature review, qualitative information (especially from focus group discussions), and primary quantitative data are all used in a CFSVA to:

- Describe all the components of the Food and Nutrition Security Conceptual Framework, highlighting the particular characteristics of the country studied and the important differences among regions and population groups;
- Explore how local food security outcomes are influenced by various underlying and basic causes;
- Combine information to identify regions and population groups most at risk of food insecurity;
- Create a benchmark for food security assessments in the event of a crisis or shock;
- Design and implement food security monitoring systems that track key trends and regions within a country;
- Create a "global food security baseline" against which the impact of specific WFP projects/programmes can be compared; and
- Derive key findings, conclusions, and recommendations for improving food security in the short and long term (WFP 2007).

The analysis of food security in a CFSVA is grounded in the Food and Nutrition Security Conceptual Framework. By looking at livelihood assets and strategies and linking them to food access and utilization, the Household Food Security Conceptual Framework combines a livelihood approach with the UNICEF Nutrition Framework.[73] The framework describes the basic underlying causes of food and nutrition security, by exploring how households use natural, physical, human, financial, and social assets to develop livelihood strategies within the context of the socio-economic and political environment.
These analytical steps are outlined here:

**Pre-survey steps: Desk study**

1. Hazard analysis
2. Food security zoning
3. Description of the food security context of the country

73. See Chapter 1, Introduction and Concepts.

4. Analysis of trends and seasonality
5. Market analysis

**Post-survey steps**

1. Analysis of focus group discussions
2. Computation of a wealth index and wealth n-tiles
3. Creation of livelihood groups
4. Analysis of household food consumption
   a. Computation of Food Consumption Score (FCS) and food consumption groups
   b. Analysis of food consumption patterns
5. Utilization of the FCS as a proxy for food for food security
6. Contextualization: incorporation of seasonality and trends
7. Nutrition analysis
8. Market analysis (primary data)
9. Food security profiling and determinants of food insecurity
   a. Determinants of household food security
   b. Profiling of household food security
10. Analysis of household vulnerability and risk, and scenario building
11. Conclusions and recommendations

Results of the desk study and of FGDs must be integrated throughout the quantitative household data analysis, and not in separate chapters of the CFSVA report. Brief reports (of a few pages) should be prepared on each of the subtopics, synthesizing the results of the literature review, before proceeding to the other analytical steps. These will be integrated in the final report, triangulated with other data.

### 6.1.2 Pre-survey steps

These steps should generally take place before primary data collection. They will both inform and complement primary data collected as part of the CFSVA. These steps rely on the collection and analysis of secondary data. See Chapter 3 for detailed information.

Although data quality and usefulness vary from source to source, CFSVA studies should attempt to locate and utilize existing secondary sources, when they:

- are up to date;
- contain applicable coverage and/or aggregations of data; and
- adhere to accepted data collection methods and techniques.

Any meaningful information that can be related to the Food and Nutrition Security Conceptual Framework should be reviewed and synthesized, and the relevant parts reported. Literature review is often the main source of information on the political and socio-economic environment.[74]

74. See Chapter 3 for more information on secondary data analysis.

Some of the most common sources of secondary data include:
- Government documents
- Municipal development plans
- Official statistics
- Technical reports
- Project reports
- Baseline studies
- Project evaluations
- Professional and academic journals
- Reference books
- Research organizations
- Public and private universities
- Public and private libraries
- Computerized databases
- Internet websites

#### 6.1.2.1 Hazard analysis

Information regarding the type of hazards that threaten food security in the country, their level of intensity, and the temporal and spatial dimensions of the hazards should be collected.

#### 6.1.2.2 Food security zoning

Food security zoning is the construction of geographical areas based on the physical distribution of basic causes of food insecurity (e.g. ecological, agricultural, socio-economic factors). Food security zones can be determined from analysis of secondary data. Through multivariate techniques (PCA and clustering), areas with similar ecological, agricultural, and socio-economic characteristics are grouped into a zone. Geographical areas with similar underlying causes show similar food security characteristics. Within zones, the resulting food security situation is expected to be rather homogenous, though there can be large differences between zones.[75] The resulting zoning is used for sampling and analysis.

Food security zoning may or may not be undertaken. Typically, the country is already stratified into geographic areas that differentiate unique ecologies associated with food security. These may or may not coincide with administrative boundaries, but more frequently they do coincide with agro-ecological zones declared by ministries of agriculture. Hence, such agro-ecological zones or, alternatively, pre-existing food security zones such as FEWS livelihood zones, can be used.

All strata, whether food security zones created for the survey, administrative boundaries, or existing zones, should be reviewed and cleared by all stakeholders.

#### 6.1.2.3 Analysis of trends and seasonality (secondary data)

Seasonal factors influence household food consumption patterns, particularly for the food insecure. Many basic and underlying causes of food insecurity such as climate,

75. A factorial model (GLM), with the zoning system as an explanatory variable and a food security indicator as the dependent variable, systematically proves this.

availability of food and food prices, prices of agricultural produce, household purchasing power, household stocks, as well as the household food security status itself, health and hygiene conditions, and individual nutritional status, have a cyclical nature and long-term changes. Accordingly, it is essential to include trends and seasonality analysis in a CFSVA in order to contextualize the results.

Information on both long- and short-term cyclical trends, such as rainfall data, agricultural production, trade volumes, and fluctuating food prices can be obtained from secondary sources. The seasonal calendar, Normalized Difference Vegetation Index (NDVI), and rainfall estimate (RFE) patterns can be used to determine how the food security situation at the time of data collection may improve or deteriorate during various times of the year (WFP 2007).

Determining when the CFSVA data collection took place in relation to the seasonal calendar is the first step toward placing findings in a larger context.

#### 6.1.2.4 Market analysis (secondary data)

"The main purpose of the market analysis in the CFSVA is to provide baseline information, analyse market effects on food security and vulnerability, and analyse possible market shocks" (WFP 2007). The market plays a major role in guaranteeing household access to food. Volumes, seasonality, real prices of staples, prices of cash crops and livestock (as appropriate), determinants of demand and supply, and trade patterns are best analysed through the use of secondary data.

### 6.1.3 Analytical steps (post-survey, primary, and secondary data)

A major component in a CFSVA consists of collecting data at the household and community level. After primary data have been verified and cleaned, the steps for analysis outlined in section 6.1.1 should be followed. Some analysts find it useful to produce output tables at an early stage in the analysis. This step will depend on complex indicators and strata described in section 4.1.2. The mean values of all continuous indicators are displayed for various administrative units, food security zones, livelihood groups, food consumption groups, and gender. For categorical variables, the frequency of main categories can be tabulated for each of these units.



#### 6.1.3.1 Analysis of focus group discussions

If FGDs were included as part of the primary data collected, they should be analysed early on to help direct subsequent steps. FGDs may provide insight into the root causes of food insecurity and vulnerability and the reasons for resilience, exposure, and vulnerability.

This information must be combined with other data in relevant parts of the report.

#### 6.1.3.2 Computation of a wealth index and wealth n-tiles[76]

Household wealth is an important contributor to food security, resilience, and nutritional outcomes. Additionally, it can be a long-term indicator of successful

76. See section 8.2.2.6. for detailed information

livelihood strategies. An asset wealth index can be computed with the use of principal components analysis (PCA).

#### 6.1.3.3 Creation of livelihood groups[77]

Households that share similar livelihood strategies tend to be affected by the same shocks or risk factors. The livelihoods group to which a household belongs is therefore an important determinant of food security outcomes. Livelihood grouping is achieved through "a cluster analysis preceded by principal components analysis (PCA)." Primary livelihood strategies can be recognized through the PCA. Livelihood groups are then composed based on their reliance on various strategies (WFP 2007).

#### 6.1.3.4 Household food consumption analysis

Food consumption analysis is the cornerstone of the CFSVA. The analysis of diet diversity and frequency provides key information on food consumption at the household level. It is the basis for classifying households according to food security status. See Section 6.2.1 for detailed information.

**Computation of food consumption score and food consumption groups**

The construction of a food consumption score (FCS) allows for a standardized interpretation of households' diet diversity and frequency. Standard thresholds help categorize households into different food consumption groups (poor, borderline, adequate).

**Analysis of food consumption patterns**

PCA and cluster analysis are exploratory techniques and are used only to describe typical dietary patterns in the population, providing valuable information on the quality of food consumption.

#### 6.1.3.5 From food consumption to food security

The FCS has been a reliable indicator of food insecurity in all CFSVAs and EFSAs where it has been applied. The FCS is one of the only food security indicators that can be equally collected in many different regions, countries, and settings, though other indicators may be more context-specific. It is important to check during a household survey that all food security indicators point in the same logical direction. Therefore, the FCS, or the FCGs, are compared with the food consumption patterns and other typical food security indicators (wealth index, household expenditures, household food production, coping strategies index, etc.). If the FCS shows a contradiction with other indicators, further investigation may reveal the reasons,[78] and the results should be presented taking these reasons into account. This will help to properly interpret and contextualize the FCS. If all indicators confirm the FCS (that is, the FCS reflects the current household food security situation), we can confidently state that the FCGs are equivalent to "current food security groups" (poor, borderline, adequate). The more universal nature of the FCS and its cut-offs allows us to come up with a more standardized food security classification.

77. See section 1.2 detailed information on livelihoods.
78. For instance, some households received food aid; some regions have different seasonality.

#### 6.1.3.6 Contextualization: Incorporation of seasonality and trends

The timing of the household survey influences the values of some key indicators. If data are collected immediately after the harvest, results will be very different from those collected during the lean season. Equally, results will differ if the agricultural season after which the survey is conducted is an exceptionally good one, or an exceptionally difficult one.

Therefore, the result indicator levels have to be put in context by:

- A qualitative description of the current situation as it relates to seasonal calendars; and
- The incorporation of historical data on production, prices, or other indicators, in order to make statements about the current year as compared with past years.

#### 6.1.3.7 Nutrition analysis[79]

Food insecurity is one of the immediate causes of malnutrition, and undernourished populations are more vulnerable to food access and utilization problems. The prevalence of chronic and acute malnutrition in various regions and subpopulations (such as FCGs) is very relevant information. Be sure that sampling methods and confidence intervals are considered and included when reporting anthropometric variables.

#### 6.1.3.8 Market analysis (primary data)

Aside from secondary data and data from the traders and market surveys, we can collect data at the community and household level that provides information on how various types of households are involved in markets, how vulnerable households are to market price changes, and which market-related factors are linked with food security. Market analysis may also be part of seasonality/trend analysis for contextualization, as well as part of risk analysis.

#### 6.1.3.9 Food security profiling and determinants of food insecurity

The next two steps are complementary. Each feeds into the other, and so their order is irrelevant. Exploratory analysis done for household food security profiling may highlight key possible causal factors of food insecurity, and the causal analysis will provide more details for food security profiling.

**Household food security profiling**

Through simple cross-tabulations and group means, we can describe many indicators (demography, human assets, livelihoods, nutrition, access indicators, etc.) for each of the food security groups.

This step addresses the questions:

- Who are the food insecure (livelihoods, nutrition, wealth groups, access, etc.)?
- Where are the food insecure (geospatial analysis)?
- How many food insecure are there currently?

This step also begins to address the question:

- Why are they food insecure?

79. See section 6.2 for more information on the importance of nutrition in analysis.

We can find the absolute numbers in food-insecure and borderline households for various population groups, administrative zones, and agro-ecological areas by multiplying population numbers by prevalence found in the various strata.

**Determinants of household food security**
To study causality, one should set up controlled experiments to see the effect of one factor – an impossible task in the context of the CFSVA. Although causality "strictu sensu" cannot be observed in a household survey, we can measure the "net association" of many immediate and underlying causes of food security or nutrition using a general linear model. This, together with information from qualitative sources, helps explain observed differences in food security, highlighting important determinants and excluding some suspected causes of food insecurity.

This step explores with depth the question:
- Why are the food insecure food insecure?

#### 6.1.3.10 Household vulnerability and risk analysis, and scenario building[80]
The current "static" situation of relative food security or food insecurity can change based on households' sensitivity to shocks to the livelihoods on which they depend and on their resilience to the effects of those shocks. Vulnerability and risk analysis bring a more dynamic element to the CFSVA.

The vulnerability analysis identifies population groups and regions most vulnerable to various shocks. A vulnerability map is very useful at the time a shock occurs: vulnerability information combined with information on the extent and intensity of the shock provides an initial calculation of the expected impact on food security.

If households vulnerable to a particular hazard live in areas where the chance for such a hazard is high, they are at risk of becoming food insecure.

Risk analysis will allow agencies involved in food security to prioritize areas where they should concentrate, and will allow WFP, in particular, to focus on these high-risk areas and be prepared for the emergency operations.

In particular, this step attempts to address the questions:
- What are households vulnerable to?
- What is the probability of key hazards occurring?
- What are the effects of these hazards on household food security for different population groups?

### 6.1.4 Conclusions and recommendations

From all preceding analytical work, significant conclusions about food insecurity can be made. As important immediate, underlying, and basic causes of situations are identified, recommendations can be made that tackle, in the short and long term, various sources of food insecurity.

80. See sections 3.3.5 and 6.2.4 for detailed information on risk analysis.

### 6.1.5 Key references: Analytical steps

- CARE. 2002. *Household Livelihood Security Assessments: A Toolkit for Practitioners*. Atlanta: CARE USA.
- WFP. 2007. *CFSVA Methodology Workshop Report*. 17–20 April. Rome.

## 6.2 KEY FOOD SECURITY ANALYSIS IN A CFSVA

### 6.2.1 Food security classification

#### 6.2.1.1 Food consumption groups

Food consumption indicators are designed to reflect the quantity and/or quality of people's diets. In CFSVA, the most commonly used food consumption indicator is the food consumption score. This proxy indicator represents the dietary diversity and energy and macro and micro (content) value of the food people eat. It is based on dietary diversity (the number of food groups consumed by a household over a reference period), food frequency (the number of times, usually in days, a particular food group is consumed), and the relative nutritional importance of different food groups. The FCS is calculated from the types of foods and the frequency with which they are consumed over a seven-day period.

Although it provides essential information on people's current diet, the FCS is of limited value for in-depth analysis of food consumption patterns, for the following reasons:

- It is based on a seven-day recall period only. This is insufficient for a full analysis of food consumption over longer periods, which is likely to vary according to season, for example.
- It provides no indication of the quantity of each foodstuff consumed.
- It does not give information on intra-household food consumption, such as who eats first and last.
- It does not show how food consumption has changed as a result of the crisis, unless previous food consumption scores for the same types of households are available.

More information is needed if food consumption practices and trends are to be fully understood. For example, questions regarding customary food consumption should be asked to complement the seven-day household FCS.

The calculation of the FCS is explained in Box 6.1[81] and Table 6.1.

81. For further information on the application of the FCS, see *Food Consumption Analysis: Calculation and Use of the Food Consumption Score in Food Consumption and Food Security Analysis*, Draft, WFP Vulnerability Analysis and Mapping Branch, August 2007.

## Box 6.1. Calculation of the food consumption score

**In the household questionnaire**

Households are asked to recall the **foods they consumed in the previous seven days** (see the list of items in Table 6.1). Each food item is given a score of 0 to 7, depending on the number of days it was consumed. For example:

- If potatoes were eaten on three of the last seven days, they are given a frequency score of 3.
- If potatoes were eaten on three of the last seven days, even if they were eaten twice on each of those days, at two meals, they are still given a frequency score of 3.

**In the analysis**

Food items are grouped according to **food groups** (see Table 6.1) and the frequencies of all the food items surveyed in each food group are summed. Any summed food group frequency value over 7 is recoded as 7.

Each food group is assigned a **weight** (see Table 6.1), reflecting its **nutrient density**. For example:

- Beans, peas, groundnuts, and cashew nuts are given a weight of 3, reflecting the high protein content of beans and peas and the high fat content of nuts.
- Sugar is given a weight of 0.5, reflecting its absence of micronutrients and the fact that it is usually eaten in relatively small quantities.

For each household, the **household food consumption score** is calculated by multiplying each food group frequency by each food group weight, and then summing these scores into one composite score.

The household score can have a maximum value of 112, which implies that each of the food groups was consumed every day for the last seven days.

The household score is compared with pre-established **thresholds** that indicate the status of the household's food consumption. WFP finds the following thresholds to be applicable in a wide range of situations:

- Poor food consumption: 0 to 21
- Borderline food consumption: 21.5 to 35
- Acceptable food consumption: > 35

These thresholds can be adjusted if there is clear justification for doing so, for example, in populations where the consumption of sugar and/or oil is frequent among nearly all households surveyed, even when the consumption of other food groups is rare and the food score is otherwise low. In these cases if this base diet of oil and sugar is combined only with frequent consumption (7 days' worth) of a starch base, the score already arrives at 21. However, this clearly cannot be classified as even a borderline diet. For this reason the thresholds can be raised from 21 and 35 to 28 and 42 (by adding 7 to each threshold, this accounts for the daily consumption of oil and sugar, which gives 7 points to the FCS).

If the consumption of oil and sugar for the overall population is higher, the FCS thresholds should be changed as follows:

- Poor food consumption: 0 to 28
- Borderline food consumption: 28.5 to 42
- Acceptable food consumption: > 42

**Table 6.1: A completed food consumption score template**

| Food item | Food group | Weight (A) | Days eaten in past 7 days (B) | Score A x B |
|---|---|---|---|---|
| Maize, rice, sorghum, millet, bread and other cereals | Cereals tubers, and root crops | 2 | 7 | 14 |
| Cassava, potatoes, and sweet potatoes | | | | |
| Beans, peas, groundnuts, and cashew nuts | Pulses | 3 | 1 | 3 |
| Vegetables, relish, and leaves | Vegetables | 1 | 2 | 2 |
| Fruits | Fruit | 1 | 0 | 0 |
| Beef, goat, poultry, pork, eggs, and fish | Meat and fish | 4 | 0 | 0 |
| Milk, yoghurt, and other dairy | Milk | 4 | 1 | 4 |
| Sugar and sugar products | Sugar | 0.5 | 4 | 2 |
| Oils, fats, and butter | Oil | 0.5 | 2 | 1 |
| **Composite score** | | | | 26 |

Since the FCS is a continuous variable, standard statistics such as the mean and variance can be calculated, and trends of means over time and across categories can be determined. For FCGs, frequencies and cross-tabulations can be determined.

**Box 6.2: Validation of the food consumption score**

Recent research conducted by the International Food Policy Research Institute (IFPRI) has attempted to validate the use of the FCS for the classification of household food security status with the help of survey data from three countries – Burundi, Haiti, and Sri Lanka. The study found the usefulness of the dietary diversity and food frequency indicators encouraging. There are positive and statistically significant associations with calorie consumption per capita, particularly when small quantities are excluded from food frequencies. However, the cut-off points currently used by WFP to define poor, borderline, and adequate FCGs correspond with energy intake, which is considerably below the usual average 2,100 kcal per capita per day benchmark, which is often used to define undernourishment. Hence, the poor FCG corresponds with extreme undernourishment, and even some households belonging to the "acceptable food consumption group" have consumption below 2,100 kcal per capita per day.

**Table 6.2: Food consumption groups with corresponding food consumption score thresholds and corresponding energy intake levels**

| Food consumption groups | Burundi | | Haiti | |
|---|---|---|---|---|
| | Food consumption score | Corresponding energy consumption in kcal/capita/day | Food consumption score | Corresponding energy consumption in kcal/capita/day |
| **Poor** | ≤23 | ≤1550 | ≤28 | ≤1600 |
| **Borderline** | >23 and ≤37 | >1550 and ≤1800 | >28 and ≤42 | >1600 and ≤1900 |
| **Acceptable** | >37 | >1800 | >42 | >1900 |

These data reinforce the notion of context specificity in formulating FCS.
In CFSVAs it is recommended that the current cut-offs illustrated in Box 6.1 be used.

#### 6.2.1.2 Description of the current food security situation

A key part of describing household food security in an EFSA or CSFVA is conducting a short-term household food security classification based on the "current" food consumption in the household as a proxy for "current" food security. This gives a snapshot depiction of the situation of the household at the time of the data collection.

This is an essential step in both the EFSA and CFSVA processes and is the starting point for situation analysis and scenario-building exercises (see section 6.1.3.10).
In short, households are classified according to the FCS (poor, borderline, or acceptable). For some households, the FCS may not reveal their current food security situation. Information on how these households access food and their sources of food is crucial and will allow the households to be reclassified.

**The basis of the current household food security description is hence the food consumption score (FCS) and its thresholds**, as described in Table 6.2. This usually[82] means that households with an FCS of 21 or below have poor food security; households with an FCS between 21.5 and 35 have borderline food security, and households with an FCS higher than 35 have acceptable food security.

The household food consumption classification is meant to serve as a standardized, objective, and replicable tool for describing **short-term food security.** The standardization of this classification is made possible by using the household FCS as a basis for comparison. Although differences in context must be considered while interpreting the FCS, this method of standardization is acceptable given that the FCS is well-defined[83] and objectively measurable. Similarly, if FCS thresholds are appropriately defined, resulting food consumption groups relate to a certain degree with corresponding levels of food intake.[84]

If the FCS does not properly reflect the food security situation of the moment, **this short-term household food security description needs to be adjusted**. This is the case for households whose sources of food are not sustainable or whose strategies for accessing food are uncertain or damaging their future livelihoods, or whose strategies are so severe they are endangering household members' health. A typical example are food aid recipients, who may benefit from acceptable food consumption at the time of the assessment, but who, without food aid, most probably will have "poor" food security. The FCS-based classification as a description for the current food security situation should be triangulated with other food security indicators, such as the Coping Strategy Index (CSI) and income and production indicators.

Finally, a CFSVA and an EFSA should always go beyond the description of current food security as described in this section. For a complete situation analysis, the analyst will make statements about the evolution of the overall food security context and about critical livelihood factors related to resilience, coping mechanisms, and how income generation and food production will define future access to food.

82. Thresholds 21–35 can be adjusted up to 28–42, based on the consumption of oil and sugar; see Table 6.2.
83. It will often be necessary to establish country-specific questionnaires to ensure that evaluation of household food consumption using the standard FCS is appropriate to the local context.
84. See Box 6.2. – IFPRI validation study.

The description of the current household food security situation, therefore, serves only as a starting and reference point. The sections in the EFSA manual on "Conducting a situation analysis" and "Conducting a forecast analysis" go beyond this "snapshot analysis" and include projections for the future.

The situation analysis will start from the current household food security description, which is based on the FCS and has to be complemented by a livelihoods analysis to become a true, forward-looking food security classification. Adjustments are based on the judgement of the analyst, who, based on other food security indicators and a livelihoods analysis, will concentrate on how households will be able to access food in the immediate or long-term future. He will ideally draw on a combination of quantitative indicators and qualitative information. Context-specific indicators used for household food security classification are:

- Income sources, non-sustainable or harmful coping strategies, debt, distress indicators;
- Production, stocks, reserves;
- Food sources, including aggregate food supply; and
- Asset ownership and access to natural resources.

Therefore, analysis based on household food consumption alone should not serve as a simplistic approach to targeting food assistance during programme implementation. In fact, the description of "current" household food insecurity does not automatically equate to a food assistance requirement: not everyone with poor food consumption at the time of data collection needs assistance, and some households with currently good consumption may need assistance later. It is therefore indispensable to define assistance, and to have a good understanding of how households access food, their livelihoods and the effects of shocks thereon, and the macro trends for the future.

### 6.2.2 Nutrition analysis

In the Food and Nutrition Security Conceptual Framework (based on the UNICEF framework), presented in section 1.3, the nutrition status is the final outcome, at the individual level, of all factors mentioned in the framework. The two immediate causes of malnutrition are the heath status and individual food intake, which are intimately linked to food security. Hence, assessing and understanding the reasons behind the nutrition status are important parts of food security analysis. Unfortunately, many food security analyses focus solely on food **availability** (production, imports) and food **access** (market access, purchasing power), and largely ignore food **utilization** (the degree to which individuals can convert food accessed by the household, into energy for maintaining nutritional status and growth).

In this section, nutrition is discussed primarily in terms of anthropometric and micronutrient malnutrition outcomes. As described by the Food and Nutrition Security

WFP defines malnutrition as "a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance processes such as growth, pregnancy, lactation, physical work and resisting and recovering from disease."

Conceptual Framework, which is based on the UNICEF Conceptual Framework (the standard for nutrition), nutritional status is an outcome of both health status and dietary intake. Dietary intake is itself an outcome of food security status and care practices. Therefore, **nutrition status is an outcome of food security status.**

While the "utilization" aspect of food security is sometimes addressed using anthropometric outcomes, CFSVAs often do not describe these outcomes in terms of "food security." This is due to the fact that in some cases it may be difficult to determine whether poor nutritional status is caused by food insecurity, inadequate care and feeding practices, disease, or any combination of these factors. It is therefore critical for CFSVAs to analyse the possible underlying causes of poor nutrition in order to identify the interventions that have the greatest potential for improving nutritional status among WFP beneficiaries. The conceptual framework presents a basic outline of the many related factors that often contribute to malnutrition at the individual level.

#### 6.2.2.1 Underlying causes of malnutrition

Looking at the Food and Nutrition Security Conceptual Framework, Figure 1.1, we see that the most immediate determinants of malnutrition are insufficient dietary intake and disease. However, continuing down the causal chain, we find that these causes are themselves the result of multiple underlying causes (WFP 2005).

#### Household food insecurity

Consumption-related malnutrition is typically the result of an inability to access adequate food to meet dietary needs through either household production or purchases. In nutrition assessments, **wasting** (low weight for height) is often interpreted as a sign of inadequate food consumption over the short term or of acute disease, such as diarrhoea (both of which can be due to inadequate care practices). Longer periods of inadequate food consumption or repeated disease, heavy parasite load, micronutrient deficiencies, and so on may result in chronic malnutrition as measured by **stunting** (low height for age) (CDC/WFP, 2005). An understanding of both the quantity and the quality of diet in terms of macro- and micronutrients is important for analysing the relationship between food security, as measured by consumption and malnutrition. In emergency contexts, global acute malnutrition also must be assessed because of the importance of oedema in these settings. Global acute malnutrition combines the prevalence of wasting with the presence of oedema. In emergencies, the prevalence of oedema can be quite high, so it is imperative that Global Malnutrition Rate (GMR) be presented, together with the presence of wasting and oedema.

Nutritionists have also long recognized dietary diversity as a key element of high-quality diets. Dietary diversity is the sum of the number of different foods or food groups consumed by an individual or household over a specific time period. Increasing the variety of foods is thought to ensure adequate intake of essential nutrients and thus promote good health. Lack of dietary diversity is a serious problem among poor populations in the developing world. Because their diets are based predominantly on starchy staples and often include little or no animal products and few fresh fruits or vegetables, nutrient inadequacy is a common outcome. Measures of dietary diversity are relatively simple to collect, and research shows that high measures of dietary

diversity are associated with both nutrient adequacy[85] and adequate nutritional status.[86] In addition, dietary diversity at the household level tends to increase with income and wealth (WFP 2005; CDC 2005; Hoddinott and Yohannes 2002; Ruel 2002; Swindale *et al*. 1999).

Dietary diversity (number of different foods or food groups eaten by an individual or household over a specific time period) is recognized as being one determinant of diet quality. A varied diet is more likely to ensure adequate micronutrient intake. Poor dietary diversity is often a problem among poor households in the developing world. Measures of dietary diversity include the FCS and other standard indicators.

### Inadequate health services and unhealthy environment

The health environment of a household or individual has a direct impact on their ability to prevent and control disease. Necessary conditions for adequate nutrition include access to and utilization of:

**Good quality health services**

Health and nutrition are linked in a vicious circle in which the presence of disease contributes to malnutrition, and malnutrition makes individuals more susceptible to disease. Common afflictions that contribute to malnutrition include diarrhoea, acute respiratory infections, measles, and malaria. Access to health clinics, pre- and post-natal care, vaccinations, and vitamin supplements are central elements of well-functioning health services. Vitamin A supplementation and measles immunizations often serve as reasonable proxy indicators of access to health services.

**Safe water supplies**

Clean and safe water is essential for maintaining health and achieving adequate nutritional status. Diseases such as diarrhoea from unsafe water sources and vector-borne diseases are common problems in developing countries strongly associated with negative nutritional outcomes.

**Adequate sanitation**

Availability of and access to adequate sanitation services (latrines, washing facilities, etc.) are essential for maintaining a healthy environment. Personal hygiene practices and the correct disposal of faeces both have a direct influence on nutritional outcomes.

**Adequate shelter**

Adequate shelter has always been recognized as a basic human need. In the absence of adequate housing, multiple aspects of personal well-being are negatively affected, including nutritional status.

### Inadequate maternal and child care

Malnutrition can occur even when access to food and health care is sufficient and the environment is reasonably healthy. The social context and the care environment within

85. IFPRI/WFP, 2008, Validation of Food Frequency and Dietary Diversity as Proxy Indicators of Household Food Security, http://documents.wfp.org/stellent/groups/public/documents/ena/wfp186895.pdf.
86. Several CFSVAs show significant correlations between low FCS and wasting and underweight.

the household and the community also directly influence nutrition. Factors influencing nutrition status include:

- Breastfeeding practices;
- Weaning practices;
- Maternal hygiene behaviour;
- Relationships between morbidity and water and sanitation;
- Pregnancies and antenatal care;
- Pre-natal, peri-natal, ante-natal health of the mother; and
- HIV/AIDS.

#### 6.2.2.2 Integrating health and nutrition information into a CFSVA

To enable achievement of WFP goals related to the prevention of severe malnutrition and the provision of nutritional support to moderately and severely malnourished individuals, it is essential that CFSVA provide reliable information on the scale, scope, and distribution of malnutrition (CDC/WFP 2005). Where possible, CFSVA should provide information on two distinct types of malnutrition:

- **Macronutrient malnutrition:** acute or chronic deficiencies in protein and energy. The groups most vulnerable to macronutrient malnutrition are pregnant and lactating women, children under 5 years of age, and women of reproductive age.
- **Micronutrient malnutrition:** deficiencies in key vitamins and minerals. Micronutrient deficiencies are widespread in developing countries and affect all age groups. However, given the technical requirements of accurately measuring micronutrient malnutrition, most CFSVAs will be limited to assessing the prevalence of stunting, wasting, and underweight, which are as much outcomes of macro- as of micronutrient deficiencies.

Previously, nutrition surveys have often attempted to include a food security component based on recommendations provided from WFP and NGO partners, including Action Against Hunger, CARE, and World Vision. However, given their focus on obtaining a precise estimate of malnutrition within a well-defined population, the findings of these surveys are often of limited use in explaining the wider issues related to household food security, since the scope of nutritional surveys often leaves less time to spend with a household to gather an equal breadth of food security–related information.

The preferred method of integrating analysis of nutritional status and household food security is to include health and nutrition modules in a household food security and vulnerability survey questionnaire. The majority of questions in these modules are adapted from Demographic and Health Surveys (DHSs) or from Multiple-Indicator Cluster Surveys (MICSs). The benefit of using these pre-formulated questions is that they help to standardize the information collected to enable comparison across diverse groups and regions, and they ensure that analysis of nutrition- and health-related indicators is consistent.

When collecting information on nutrition- and health-related indicators, it is important to keep two key objectives in mind, both of which have significant implications for the design of the CFSVA:

**Primary objective:** To link food security with nutritional outcomes, controlling for other influences (health/hygiene, caring practices).

**Secondary objective:** To provide indicative levels of key nutritional outcomes by zone, administrative boundary, or other grouping, as appropriate.

If nutrition information is collected to provide data on prevalence of malnutrition by certain strata, then strict sampling protocols will need to be observed. If nutrition information is collected only to link with measures of food security, sampling restrictions will likely be less significant.

Specific objectives for the collection and analysis of nutrition data as part of CFSVA will depend on the programming context, the availability of reliable secondary data, and a variety of other factors. Given the implications for sampling and other technical considerations, it is critical that the objectives of nutrition data collection be clearly stated, agreed upon by WFP and partner organization staff, and technically supported prior to the initiation of field activities.

#### 6.2.2.3 Anthropometric indicators of malnutrition

A number of well-established anthropometric indicators exist for measuring physical status, growth, etc., whether from macro- or micro-related malnutrition.[87] These measures typically require collecting data on weight, height, or length; gender; and age of a subset selected from the population of interest.

When accurately taken, these measurements serve as reasonably accurate indicators of chronic malnutrition reflecting past growth failure, and indicators of acute malnutrition reflecting current macronutrient nutritional well-being (WFP 2005). For an in-depth review of these and other key nutrition and health indicators and definitions, please refer to A Manual: Measuring and Interpreting Malnutrition and Mortality.[88]

#### Indicators for measuring malnutrition among children[89]

For children, the following four main indicators of malnutrition are frequently used in CFSVAs (WFP 2005). They are all measures of growth (i.e. stunting measures linear growth; wasting and MUAC measure thinness due to lack of growth or actual tissue loss, and underweight is a composite of both).

- **Stunting** (low height for age, "shortness for their age") is a measurement of chronic malnutrition characterized by a slowing in the growth of a foetus or child and resulting in a failure to achieve expected length in comparison to a healthy, well-nourished child of the same age. Stunting is an indicator of past growth failure, and is associated with a number of long-term factors, including chronically inadequate levels of protein and energy intake, micronutrient deficiencies, frequent infection, inappropriate feeding practices over a sustained period, and household poverty. It is not, however, an accurate measurement of short-term changes in nutritional status.

87. *Anthropometry* is the term used to describe measurement of the human body.
88. Published by CDC and WFP, July 2005, available at http://docustore.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp097839.pdf
89. Children 0 to 59 months of age.

- **Wasting** (low weight for height, "thinness") is a measurement of acute malnutrition characterized by considerable weight loss or failure to gain weight, which results in a child's weight being substantially below what would be expected of a healthy child of the same length or height. Wasting is an indicator of current malnutrition and is associated with inadequate food intake, incorrect feeding practices, disease, infection, or a combination of these factors. Wasting in individuals and population groups can change quickly, showing marked seasonal patterns associated with changes in food availability and access, as well as disease prevalence. Because we do not need the age of the child to calculate wasting, the difficulties encountered in contexts where exact age is difficult to determine do not affect the accuracy of wasting as a proxy indicator of acute malnutrition.

- **Underweight** (low weight for age) is a composite measurement of stunting and wasting as it is influenced by both height and weight. Although underweight is a good indicator for assessing changes in malnutrition over time, care must be taken in interpreting this indicator, as it reflects both chronic and acute malnutrition, which is both its strength and weakness as an indicator. Low weight for age is a composite measure of stunting and wasting, as it could be influenced by both height and weight (an underweight child is too thin and/or too short for his age, thus does not weigh what a child his age should). Hence, underweight does not provide the information needed to distinguish between the two.

- **Mid-upper arm circumference (MUAC)** is a measurement of acute malnutrition. Although wasting is the preferred measurement of acute malnutrition, MUAC offers a quick and easy predictor of immediate risk of death due to macronutrient malnutrition. As such, it provides a useful tool for screening cases of acute malnutrition among children 12 to 59 months, particular in emergencies. In some cases, MUAC for age offers a more refined version of this indicator of acute malnutrition. Recent thinking indicates that MUAC may be less of a blunt tool than previously thought, and could be used as a basic anthropometric measurement.

Age (all **children 0 to 59 months**) rather than the more common age range of 6 to 59 months should be included in the survey target population if there is reason to believe that children from 0 to 5 months are unusually vulnerable to malnutrition.[90]

### Indicators for measuring malnutrition among adults

For adults, there are two main indicators of (macronutrient) malnutrition:

1. **Chronic energy deficiency (CED)** is a measurement of underweight for non-pregnant adults determined by using the **body mass index (BMI)**.[91] An adult (18 years of age or older) with a BMI below 18.5 kg/m$^2$ is considered malnourished. CED can be used as a measurement of well-being and is a good proxy indicator for overall adult health. Low BMI is correlated with a large number of health-related outcomes, including early onset of chronic conditions and an increased risk of premature mortality.

90. Taken from: *A Manual: Measuring and Interpreting Malnutrition and Mortality*, CDC, WFP 2005.
91. Calculated by dividing weight in kilograms by the square of height in metres.

Pregnant women and those with oedema are excluded from surveys assessing BMI because of the bias introduced by weight gain not related to nutritional status.[92]

2. **Mid-upper arm circumference (MUAC)** can also be used for assessing acute adult malnutrition.

While the decision of which anthropometric measurement to use in a particular CFSVA will depend on a range of factors, some general guidance should be followed:

• ***Simple anthropometric measurements***

Where resources are limited, but nutritional indicators are considered critical to an assessment of food security, indicators such as MUAC of children under 5 (and possibly women of reproductive age) can be collected. These require less material cost, less training time for enumerators, and less time in the field than full measurements of weight and height.

• ***More complete anthropometric measurements***

Where time, resources, need, and expertise allow, it is recommended to collect:

- Age (children 0 to 59 months)
- Weight (children 0 to 59 months)
- Height/length[93] (children 0 to 59 months)
- Weight (women of reproductive age)
- Height (women of reproductive age)

MUAC of children and women of reproductive age may also be gathered, if this data is deemed useful by the country office and implementing partners.

**Table 6.3a: Classification of severity of malnutrition in a community for children under 5 years of age[94]**

| Severity of malnutrition | Acute malnutrition (%) (weight for height) < -2 z-scores | Chronic malnutrition (%) (height-for-age) < -2 z-scores | Underweight (%) (weight for age) < -2 z-scores |
|---|---|---|---|
| **Acceptable** | <5 | <20 | <10 |
| **Poor** | 5–9 | 20–29 | 10–19 |
| **Serious** | 10–14 | 30–39 | 20–29 |
| **Critical** | ⩾15 | ⩾40 | ⩾30 |

**Table 6.3b: Classification of malnutrition for individual children for mid-upper arm circumference (MUAC)[95]**

| | |
|---|---|
| **Well-nourished** | >13.5 cm |
| **Mild malnutrition** | 12.5–13.5 cm |
| **Moderate malnutrition** | 11.5<12.5 cm |
| **Severe malnutrition** | <11.5 cm |

92. Taken from: *A Manual: Measuring and Interpreting Malnutrition and Mortality*, CDC, WFP 2005.
93. Children 2 years and older are measured standing, while children under 2 years are measured recumbent.
94. This table is taken from *A Manual: Measuring and Interpreting Malnutrition and Mortality*, CDC, WFP, 2005. The information in the table is itself taken from WHO publication, *The management of nutrition in major emergencies*, Geneva, 2000.
95. Taken from *The revised selective feeding guidelines for the management of malnutrition in emergencies*, IASC, November 2008 (draft).

| Table 6.3c: Classification of adult malnutrition using body mass index (weight in kg/height in $m^2$)[96] | |
|---|---|
| **Mild thinness** | 17–<18.5 |
| **Moderate thinness** | 16–<17 |
| **Severe thinness** | <16 |

• ***Other anthropometric indicators***

Although not typically included in CFSVAs, other anthropometric indicators such as BMI of men or other growth indicators of children above 5 years of age could be included. This is generally not recommended or necessary, however, and should only be done in partnership with other organizations specializing in nutritional surveys.

• ***No anthropometric measurements***

In some contexts, it may not be feasible to collect any anthropometric indicators, due to the existence of recent nutrition surveys that WFP does not want to duplicate (such as a DHS or MICS), the non-interest of partners, or restrictions in budgets. In these cases, secondary data will be used in the analysis and presented in the report. However, using only secondary data will limit the ability to make subsequent linkages between household food security and nutritional outcomes.

#### 6.2.2.4 Indicators of micronutrient malnutrition

Micronutrient malnutrition indicators are more difficult to measure and diagnose than anthropometric measures of growth, and rely primarily on the presence of clinical symptoms. However, biological measures are more accurate indicators of malnutrition, and advances in technology now allow for field-based diagnostics to take place. It is especially important to monitor changes in micronutrient utilization among populations heavily dependent on food rations or in situations where individuals may be particularly sensitive to changes in ration composition (e.g. high HIV-prevalence areas). The three most common and preventable micronutrient deficiencies are those of iodine, iron and vitamin A. Table 6.4 describes each of these micronutrient deficiencies, its symptoms, and the common proxy indicators used to determine the micronutrient status of populations.

**Table 6.4: Common indicators of micronutrient malnutrition**

| Micronutrient | Deficiency disease | Symptoms | Food source | Proxy indicators |
|---|---|---|---|---|
| Vitamin A | Xerophthalmia | Night blindness, Bitot's spots | Red, orange, and yellow fruits and vegetables, pulses, green leafy plants, liver, fish oil | Vitamin A supplementation for children and lactating women, consumption of vitamin A–rich foods |
| Iron | Anaemia | Clinical signs of pallor, tiredness, headache, and/or haemoglobin test | Meat, liver, green leafy vegetables | Iron supplementation for pregnant women |
| Iodine | Goitre, cretinism | Swelling of thyroid gland in the neck | Iodized salt, seafood | Iodized salt testing |
| Vitamin C | Scurvy | Painful joints, swollen and bleeding gums, slow healing of wounds | Citrus fruits, green leafy vegetables | Prolonged absence of fresh foods |

96. Taken from the *Food and Nutrition Handbook*, WFP (no publication date).

#### 6.2.2.5 Indicators for assessing the health environment, care, and feeding practices

As mentioned earlier, the health environment and access to health services are closely linked with nutritional outcomes (see Figure 1.1, Food and Nutrition Security Conceptual Framework). Determining the prevalence of the primary public health illnesses and the available options for treatment are important for assessing vulnerability, and for determining the underlying causes of malnutrition. Feeding practices and food preparation are also key determinants of infant and child health, growth, and susceptibility to illness. Depending on the context, each of the following indicators may be appropriate for inclusion in a nutrition component of a CFSVA (Ruel 2002).

- ***Disease prevalence***

Often there is a correlation between illness and malnutrition, especially among children. CFSVAs should use a standard recall period of two weeks for determining the prevalence of diarrhoea, fever, and acute respiratory infection (coughing with faster than normal breathing).

- ***Hygiene practices***

Research indicates that domestic hygiene practices such as disposal of faeces and hand washing at critical times (e.g. after defecation, before meal preparation, before eating) are important for child health and nutrition.

- ***Treatment of illness***

CFSVAs can incorporate questions regarding the use of professional medical treatment to treat child illnesses. It is also important to inquire about other health-seeking behaviours and home treatment of illnesses, such as increasing breast milk feeding or the use of oral rehydration solutions (ORS) when a young child has diarrhoea.

- ***Immunization***

Immunization is one of the most important and cost-effective interventions that health systems can provide. CFSVAs can use household surveys and, in some cases, hospital immunization records to determine access to and utilization of child immunization services. CFSVAs could seek information on immunization coverage for the six major vaccine-preventable diseases: diphtheria, tetanus, pertussis (DPT), childhood tuberculosis (BCG), polio (OPV), and measles). When there is no health card readily available, this information takes a considerable time and effort to collect, so often the CFSVA gathers only measles as a proxy for immunization in general.

- ***Feeding/breastfeeding practices***

Information gained from household surveys on the types of food consumed by children and the frequency of feeding should be used to analyse causal links with nutritional outcomes. CFSVA questionnaires may also include questions related to the timing of initial breastfeeding, the frequency and exclusivity of breastfeeding, the use of bottles, and the duration of breastfeeding and weaning practices.

- ***Food preparation and storage***

Where possible, CFSVAs may obtain valuable information on food preparation and storage. This information can provide insight into whether specific social or cultural

issues affect food use. Information could come from secondary data or, when required, primary data collection (focus groups, household surveys, etc.).

#### 6.2.2.6 Issues to consider when conducting health and nutrition surveys as part of a CFSVA

There are many valid reasons for incorporating health and nutrition components into a CFSVA. Most important, collecting information on health and nutrition allows a more holistic analysis of food security by investigating food utilization in addition to food availability and access. In addition to the considerations for primary data collection mentioned in sections 4.1 and 4.2, several specific factors need to be considered when conducting an analysis of nutrition and health at the household level.

**Skills**

An experienced nutritionist or other qualified person in the team must assist with the study design and the training and supervision of the enumerators.

**Purpose of nutritional survey**

When designing and implementing a nutritional survey as part of CFSVA, it is important to remember its value as a programme design tool. The survey can also serve as a baseline for nutrition surveillance or as a monitoring round during the lifespan of an intervention. Consistent monitoring and reporting of standard indicators of nutritional status not only improves the management of food assistance programmes, but also uses anthropometric measurements to provide valuable insight into programme impact. Still, attribution will remain difficult (i.e. are the changes observed due to the project or to other factors?).

**Sampling**

Detailed information on sampling is provided in section 4.1 of these guidelines. There are, however, additional considerations when conducting nutritional surveys as part of a CFSVA.

- ***Avoid sampling bias***
  In conducting sampling for nutritional surveys, particularly those involving collection of anthropometric data, it is critical to take precautionary steps to avoid sampling bias. In CFSVAs, using the standard sampling approach, households are selected whether or not they have children under 5. In households that have children under 5, information is recorded for all children. Selecting only one child (the oldest, at random, etc.) in a household with multiple children under 5 will bias the sample.

- ***Determine sample size***
  For surveys designed to measure changes in specific indicators over time or differences in indicators between distinct groups, the required sample size will be calculated based on the sample size formula in section 4.1.3.1 and Figure 4.2.
  For prevalence, 30-by-30 design is often used: 30 children in 30 clusters per reporting domain. These measurements of 900 children would, at a malnutrition rate of 50 percent and with a design effect of 2, allowing for some non-respondents, give a precision of +/- 5 percent.

### References and standards

Nutritional surveys need to follow standardized methods in order to provide accurate data that can be compared across groups and over time. These methods must be assessed to ensure that the methods followed are in compliance with accepted standards. Evaluating each of the factors in Table 6.5 will allow for accurate interpretation and use of the nutrition and health surveys.

**Table 6.5: Reliability checks for nutritional surveys**

| Factor | What to check |
|---|---|
| Sampling procedure and size, and sampling bias | Stunting, wasting, underweight (children) or MUAC or BMI (adults):<br>• Ensure that a representative sample is taken (see Box 4.5).<br>• Check for sampling biases, such as not all children in a household being selected, high non-response.<br>• Check that the sample size and sampling methodology result in an acceptable 95 percent confidence interval of the reported prevalences.<br>• Check that the confidence intervals are reported and the design effect is accounted for and that sampling conditions will not largely inflate the design effect.<br><br>Standard procedures strictly applied everywhere:<br>• All selected households visited, low non-response<br>• All subject members of each selected household measured/interviewed; low non-response due to temporary absence from the home or other reasons |
| Measuring error | No systematic errors due to faulty measuring equipment, techniques, or recording:<br>• Accurate scales read to 0.1 kg<br>• Well-made height/length boards read to 0.1 cm<br>• Accurate MUAC tape reads to 0.1 cm<br>• Age data is not systematically rounded to the nearest year or 6 months. Reliable age estimation techniques used where birthdates are not reliably known/recorded.<br><br>Ensure that missing and flagged cases are reported, and that the % of missing/flagged is relatively low (MICS cites less than 10% missing as a general rule)[97]. |
| Measure to reduce bias and ensure accuracy and precision | All survey personnel trained following standard procedures and good practice guidelines:<br>• All survey personnel already competent, or received adequate supervised practical field training<br>• Competent and experienced trainers used<br>• Supervisors verify the standard measuring and recording |

### *Working with partners*

In addition to building the capacity of WFP staff, collecting nutritional information for CFSVA should be seen as an excellent opportunity to improve collaboration with implementing partners and specialized technical agencies (international or national NGOs, UNICEF, WHO, MoH, etc.). This is especially true given that other organizations will frequently be responsible for collecting nutrition information or will be well positioned to support WFP efforts related to nutrition. The process of designing nutrition surveillance instruments provides an opportunity for WFP staff to engage in dialogue with partners on data collection issues before surveys are undertaken. Similarly, the analysis of findings will provide information on the causes of malnutrition that can be used to persuade partners to focus their activities in ways supportive of or

97. UNICEF, 2006, *Multiple-Indicator Cluster Survey Manual 2005: Monitoring the situation of children and Women*. Division of Policy and Planning, New York.

complementary to WFP food security activities. Finally, involving partners in nutritional assessments enables WFP to ensure that information collected by partners conforms to WFP reporting needs, and is systematically collected using statistically appropriate methods (CDC/WFP 2005).

### Training of enumerators

Providing adequate training for enumerators in conducting household interviews and collecting anthropometric data is critical for ensuring accurate analysis of the links between household food security and nutrition. As with other aspects of a CFSVA, it is essential that all enumerators involved in nutritional data collection receive the same training, to ensure the quality and consistency of the data. At a minimum, training should include:

- Presentation of the objectives of the nutritional survey and explanation of the sampling method;
- Description of information requirements:
  - Overview of anthropometric measurements;
  - Achievement of a common understanding of all health and nutrition questions; and
  - Distribution of a written survey protocol guide to all enumerators.
- Demonstration of measuring techniques;
- Observation of repeated practice (using dolls, other enumerators, and children, when appropriate) of measuring techniques;
- Standardization exercise:
  - All enumerators should collect anthropometric measurements from the same set of children (usually around five). Measurements are then collated and compared to determine outliers and reasons for inaccuracies. This exercise should be repeated until an acceptable level of variation is achieved between enumerators.
- Field-testing:
  - It is important that pre-survey field testing is conducted (in areas not covered by the CFSVA) in order to practice household selection, anthropometric measurement, and completion of questionnaires; and
- Review:
  - Based on the results from the field test, survey supervisors should work with enumerators to review individual performance, relevance of the questionnaire, survey methodology, and logistics.

### Equipment

The validity of anthropometric measurements ultimately depends on the accuracy of the data collected. It is therefore essential that all enumerators have both the skills and equipment needed to maintain consistent measuring techniques as well as to accurately read and record anthropometric data. For instance, it is critical that the age of children is accurately determined and recorded in order to determine whether the child should be measured standing (24 to 59 months) or recumbent (0 to 23 months) for height/length and for converting height and weight into the standard indices.

Measuring boards for length/height can typically be obtained from NGOs or UNICEF, or they can be constructed locally. They should measure up to 120 cm for children (0 to 59 months) and be accurate to within 0.1 cm. Ideally, they should also be

lightweight, durable, and have few moving parts. Each team of enumerators should have their own board for measuring the length/height of children. Measuring tapes for collecting data on adult height can typically be obtained locally.

Hanging scales are often the most practical method of weighing children. However, where possible, WFP advocates the use of electronic scales. UNICEF and others have also found electronic scales to be durable and easy to use, especially given the option of weighing both mother and child. In addition to making the weighing process less stressful for infants and young children, electronic scales have the advantage of obtaining the weight of the mother for body mass index (BMI) calculations. Each field team should have their own scale, whether hanging or electronic. When UNICEF is present in the assessment area, there is often an agreement in place to allow WFP to borrow scales for use in anthropometric data collection.

Learning from experience:
- It can take months to purchase scales.
- Hanging scales need to be carefully zeroed/calibrated throughout the data collection.
- Bathroom scales are NOT acceptable for children.

#### 6.2.2.7 Analysing anthropometric data

Once anthropometric and other nutritional data have been collected, they must be carefully entered and appropriately analysed. Each of these tasks requires specific skills, which means it is preferable that they are conducted by individuals with previous experience. Those responsible for entering data must have the skills necessary to accurately enter health information collected at the field level into computer files for analysis. As such, they should have sufficient experience to ensure that health- and nutrition-related information is entered accurately. Section 4.3 of these guidelines provides more detailed information on data entry (CRS 2005).

It is critical that personnel responsible for data analysis have previous experience with the statistical software used to analyse health data and produce tables and graphs depicting averages and proportions. It is particularly useful if they have previous experience with at least one of the other software packages used for analysis of nutritional data described in Box 6.3. Data analysts will be expected to calculate confidence intervals and z-scores using analysis software, and must have the ability to account for the sampling methodology (design effect) when conducting the analysis. These complex sampling and analysis issues are covered in Chapter 4 - Household-Level Data in CFSVA.

All CFSVAs should use the new WHO reference standards. From the WHO website, download the software needed to calculate z-scores using a variety of statistical packages, including STATA and SPSS.

**Box 6.3: Nutritional analysis software for calculating z-scores**

**WHO Anthro**
This software is recommended for calculating both the NCHS and the new WHO reference curve z-scores. The WHO Anthro 2005 software has been updated and released as WHO Anthro, with updated manuals for PC and MD. The software consists of the following modules:
- Anthropometric calculator
- Individual assessment
- Nutritional survey

The software also flags outliers (usually the result of incorrect measurements, coding errors, or incorrect ages). The software produces complete tables of anthropometric outcomes, including confidence intervals of prevalences, which can take into account the sampling methodology. WHO Anthro can be downloaded free from:

http://www.who.int/childgrowth/software/en/

**Epi Info**
The Centers for Disease Control and Prevention (CDC) and WHO have developed a free software package called Epi Info that can be used for both the calculation of anthropometric indices and some of the necessary analysis.

The software transforms the age, gender, weight, and height data of children into indices and z-scores (NCHS reference only), and flags outliers (similar to WHO Anthro). Once the anthropometric indices have been calculated, they can be easily presented in simple tables using the specified cut-offs and age categories consistent with normative standards. The Epi Info software and manual can be downloaded free from www.cdc.gov/epiinfo.

**Nutri-survey**
This Windows-based software is available from www.nutrisurvey.de. The programme was designed specifically for nutrition surveys by the Work Group on International Nutrition of the University of Hohenheim/Stuttgart, in cooperation with the German Agency for Technical Cooperation (GTZ). The purpose of the programme is to integrate all steps of a nutrition baseline survey into a single programme. The programme contains a standard Nutrition Baseline questionnaire that can be easily customized for the specific site, a function for printing out the questionnaire, a data entry unit that controls the data being entered, a specially adapted plausibility check, a report function, and a graphics section. For further statistical evaluation, the data can be exported to SPSS or other statistical programmes. However SPSS, SAS, Stata, and other packages are not used for calculating z-scores unless using the specific scripts from WHO.

### A final note on collection of nutritional information for CFSVAs

While the nutritional indicators described in this chapter are powerful, useful, and well recognized measures, they are also difficult, time-consuming, and costly to collect. When included in CFSVAs (or any WFP data collection exercise), shortcuts should not be taken that will compromise data collection or analysis. Such compromises can result in data that is unreliable or, worse, that misdirects interventions.

Analysts of nutritional data will be expected to calculate average z-scores for height for age (HAZ), weight for age (WAZ), and weight for height (WHZ). They must also be able to calculate the proportion of children whose z-scores are -2 and -3. For each of these values, they will also need to calculate 95 percent confidence intervals. There are currently two different references commonly used to calculate z-scores for WAZ, HAZ, and WHZ. The first and most common are those established by the U.S. National Center for Health Statistics (NCHS). Alternatively, analysts may use the more recently established references developed by the WHO. Current recommended practice in

CFSVAs is to report basic results from both references and run analyses based on the new WHO reference. While Epi Info can only calculate comparisons to the NCHS reference, Anthro is capable of calculating comparisons to both the NCHS and the new WHO reference.

Again, the steps involved in analysis of nutritional data are relatively complex and involve rigorous statistical methods to ensure accuracy. This requires the direct involvement of individuals with significant experience in the management of nutrition and health information. Box 6.4 identifies several reference documents that may prove useful in incorporating assessments of nutrition into CFSVAs.

**Box 6.4: Additional sources of information on analysis of nutritional data**

**World Food Programme (WFP)**
Thematic Guidelines: Nutrition and Health, 2005
http://www.wfp.org/food-security

**Centers for Disease Control and Prevention (CDC)/World Food Programme (WFP)**
A Manual: Measuring and Interpreting Malnutrition and Mortality, 2005
http://www.unhcr.org/publ/PUBL/45f6abc92.pdf

**Food and Nutrition Technical Assistance (FANTA)**
Anthropometric Indicators Measurement Guide, revised edition, 2003
http://www.fantaproject.org/downloads/pdfs/anthro_2003.pdf

## Key references: Food security analysis

- CDC/WFP. 2005. *A Manual: Measuring and Interpreting Malnutrition and Mortality*.
- Cogill, Bruce. 2003. *Anthropometric Indicators Measurement Guide*. Revised edition. Food and Nutrition Technical Assistance (FANTA).

## 6.2.3 Market analysis

This section provides suggestions on the relevance of market information to the CFSVA process and what type of market information needs to be collected and analysed for a CFSVA. The goal is that such information will lead to a better understanding of the role of markets in food security in a specific country and will serve as a baseline for other outputs, such as emergency food security assessments (EFSA), food security monitoring systems (FSMSs), and local procurement assessments, and will contribute to better identifying recommendations for response options during crises.

As an integral part of CFSVA, market information and analysis is more likely to be scattered under different headings in the standard outline of a CFSVA, though a core part will remain in a market chapter.

#### 6.2.3.1 Importance of market information in food security and vulnerability analysis

Very few, if any, households produce all their food needs. Most households in urban areas and many (often vulnerable households) in rural areas, acquire much of their food and other necessities through market purchases or barter exchange,[98] depending on one market or another to gain income. In selected countries, WFP household surveys suggest that the majority of households consider markets as a main source of food, especially during the lean season (Table 6.6). Households with borderline food consumption tend to devote a larger proportion of their expenditures to food, compared to other food consumption groups. Vulnerable households are thus likely to be affected by changes in market prices, terms of trade, or wage rates, and they face difficulties regarding access to food, with the risk of falling into poor food consumption groups.

**Table 6.6: Household dependence on markets for food, in selected countries**

| Country | WFP household (HH) surveys | | | USDA estimates |
|---|---|---|---|---|
| | Food expenditure/total expenditure (%) | Market as a major source of food (% of HH) | Source and survey season | Food expenditure/total expenditure (%) |
| Mali | National average: 52<br>Borderline HH: 55 | 70 | WFP/CFSVA (2006)<br>HH survey in post-harvest (2,074 HH) | 53 |
| Nepal | National average: 50<br>Borderline HH: n/a | n/a | WFP/CFSVA (2006)<br>HH survey in lean season (1,676 HH) | 58 |
| Niger | National average: 63<br>Borderline HH: 72 | > 70 (excluding milk) | WFP/CFSVA (2005)<br>HH survey in lean season (1,800 HH) | n/a |
| Lao, PDR | National average: 65<br>Borderline HH: 68 | < 40 (cereals and pulses) | WFP/CFSVA (2007)<br>HH survey in harvest season (3,926 HH) | n/a |
| Liberia | National average: 66<br>Borderline HH: 72 | > 80 (cereals) | WFP/CFSVA (2006)<br>HH survey in post-harvest season (5,409 HH) | n/a |
| Rwanda | National average: 55<br>Borderline HH: 75 | 65 | WFP/CFSVA (2006)<br>HH survey in lean season (2,786) | n/a |
| Tanzania | National average: 63<br>Borderline HH: 64 | 66 | WFP/CFSVA (2006)<br>HH survey in lean season (2,772 HH) | 73 |
| Timor-Leste | National average: 55<br>Borderline HH: n/a | 59 | WFP/CFSVA (2006)<br>HH survey in lean season (1,700 HH) | n/a |

Baseline market information is considered very useful for providing answers to the main questions generally addressed by a CFSVA about vulnerable people: the "who, how many, where, why, and what" questions. Market analysis within a CFSVA has the following main objectives:

98. In exceptional cases, such as refugees living in closed camps, food aid may account for the total supply of food, but even in such cases, internal markets quickly emerge within the camps.

- Provides baseline information prior to emergencies against which the impact of various shocks can be compared.
- Analyses the effects of markets on food security and vulnerability.
- Predicts possible responses of markets to potential shocks in an emergency.
- Indicates the potential role of markets for food security interventions.

Market prices and the level of effective demand (purchasing power) can provide short-term incentives for commercial trade flows (imports) and, in the medium term, production. Merchants' stocks often serve as one form of local reserve (e.g. grain stores). Ideally, trade flows should enhance local market supplies and help stabilize prices when needed. Barriers to market functioning, however, can limit the effectiveness of markets, even in the presence of unmet demand, and markets can be manipulated for private gain (e.g. by hoarding). In addition, assistance interventions almost inevitably have an impact on markets, except when they are effectively timed and targeted to households that have no effective demand or when the aid volumes are very small compared to the regular trade flows.

Based on the analysis of market information, the findings can contribute to decision-making by:

- Better targeting needy households by distinguishing areas of good availability and functioning markets from other areas;
- Using the results of shock-response simulations to identify key market variables requiring monitoring in view of emergencies; and
- Improving situation analysis and appropriate decision-making during emergency needs assessments.

#### 6.2.3.2 Key market issues to be addressed by a CFSVA

Baseline information on markets is required to:

1. Analyse:
   a. **market environment:** external factors that affect market conditions;
   b. **market structure:** characteristics of the markets that significantly affect the behaviour and interaction of buyers and sellers; and
   c. **market conduct and performance:** the dynamic of market actors' behaviour and particularly price dynamics.

2. Identify the relationships between aggregate food availability, different categories of markets, and vulnerable people's food access (i.e. the physical access of households to food they purchase on the market and their economic access, which is determined by their purchasing power); and

3. Determine the potential threats/risks to markets' capacity to supply the necessary food and other basic goods at prices affordable by households.

As an integral part of a CFSVA, market baseline information will target the key aspects of these issues that may be relevant to food security and decision-making. In this context, key questions and their interpretation can be summarized in Table 6.7.

**Table 6.7: Key market issues to analyse**

| Key issue | Interpretation |
|---|---|
| **Market structure, conduct, and performance**<br>How do markets function, and what are the main characteristics of market actors? | • Establishes marketing channels through which food flows.<br>• Evaluates whether markets are integrated.<br>• Identifies market power and interests of actors. |
| **Food availability**<br>Are markets capable of supplying food commodities in sufficient quantity all the time? | • Evaluates various sources of food supply and other essential goods (production, stocks, imports, food aid, etc.), the regularity of supplies, and impediments to food availability on markets.<br>• Identifies potential threats that would affect food availability on markets. |
| **Food access**<br>How do households depend physically and economically on markets? | • Evaluates whether households can afford food commodity prices on the markets, using their income sources and how price changes affect their effective demand (purchasing power) throughout the year.<br>• Anticipates potential threats that would affect households' access to food sourced from markets. |
| **Shock response**<br>How is the market likely to respond to a shock, and what are the likely consequences for different types of household vulnerability? | • Simulates the impact of shocks on household food security and vulnerability.<br>• Identifies significant market variables that may be disrupted by an emergency and therefore may affect household food security and vulnerability. |

### 6.2.3.3 Market data collection and analysis

#### Market data collection and sampling issues

From a food security analysis perspective, market data collection is most useful in areas where a significant proportion of the community is partly or largely dependent on market transactions, as is now the case in most areas.

Market data collection usually takes place through various sources:

- At a macro-level, **secondary data** are useful for time series (trend and seasonality) analysis of production, prices, and the macro-economic background (trade policies, regulations, institutions).

- At a meso-level, trader questionnaires help capture specific issues related to market structure, conduct, and performance as defined in Table 6.7. Trader interviews can help give an idea about whether and why markets are not working. In surplus areas, market data can provide useful information on whether there is local purchase capacity. In deficit areas, it provides indications on whether non-food options such as cash and vouchers can be considered, provided markets are functioning (i.e. food flows in to meet demands, and prices are stable) notwithstanding operational constraints. "Open" key informant interviews — such as with large importers or cereal traders — are useful for triangulating information on market structure and performance.

- At a micro-level, **community interviews** are key for explaining other factors affecting market environment (infrastructure, transport, communication, physical access, seasonality), demand, and supply issues faced by communities.

- **Household surveys** are a part of the micro-level analysis of markets that helps capture households' interactions with markets (actual and potential buying and selling behaviour, marketable surpluses, and incomes). Knowledge on households' market participation can help in an analysis of their market dependence with regard to their food security status. Such knowledge can also inform local purchase decision-making, especially when purchases are targeted to smallholders. In order to meet such objectives, household survey questionnaires are expected to include questions on production quantities for the main food commodities (cash or staples) and livestock, share of production stored for either consumption or seeds, share of production used to reimburse debts, share of production for sale, quantity of food commodity purchased, and periods of sales and purchases. Household surveys usually include questions on income and food sources (including from markets).

It is desirable to code the location of households, communities, traders, and markets so that the results can be linked with each other.

While sampling methods are clearly established for community and household questionnaires through representative random sampling, it is rather difficult to fully randomize trader samples because there is hardly any record of the number and type of private traders operating in each market. Expert judgement and key informants are therefore crucial to building trader samples.

Purposive sampling is generally used for trader surveys to ensure that predefined categories are included (e.g. small traders/retailers versus wholesalers; grain traders versus fruit/vegetable/livestock traders) according to survey objectives. Market types are also generally targeted accordingly. For instance, rural or village markets are likely to coincide with small traders and assemblers who interact mostly with farmers and consumers, whereas urban markets (at district and regional levels) are likely to incorporate more stakeholders starting from farmers, assemblers/collectors, wholesalers, and retailers.

In rural settings, trader surveys take place preferably on the main market day of the week. In urban settings, trader surveys take place on almost any day of the week. It is therefore useful to have some knowledge of where markets are physically located so that several markets and different market stakeholders (i.e. retailers, wholesalers, transformers, assemblers, transporters or collectors) can be visited. This will ensure that the diversity of the region surveyed is represented.

The sample scheme of the trader survey is generally stratified *ex ante* by type of trader, but the sample size is large enough to offer sufficient representativeness within the limited financial and logistic means of a study. There is no predefined sample size. Once a sample size is chosen, including market and trader types, enumerators are asked to interview traders randomly, following the instructions given by the team leader. Box 6.5 provides an example of sample size constructed in Timor-Leste.

**Box 6.5: Trader survey in Dili, EFSA 2007: Sampling locations and sample sizes**

A purposive sampling method was used in the market survey following the geographic distribution of dominant traders (i.e. wholesaler dry food, wholesaler fresh food, retailer, and petty trader). There are five major market locations/clusters in Dili (Halilaran, Audian, Comoro, Mercado Lama, and Taibesi). The sample sizes and target groups in each cluster were drawn purposively, taking into account the limited number/availability of the target groups. The total number of respondents in the survey was 117 traders. Had there been a great number of wholesalers, their total number would have been increased, as the ultimate goal was to interview a significant number of traders to be able to make more sense out of their perceptions.

| Type of trader | Number of market locations | | | | | Total |
|---|---|---|---|---|---|---|
| | Halilaran (wholesale market) | Audian (wholesale market) | Comoro (retail market) | Taibesi (retail market) | Mercado Lama (retail market) | |
| Wholesaler dry food (cereals and pulses) | 8 | 4 | 0 | 0 | 0 | **12** |
| Wholesaler fresh food (fruits and vegetables) | 15 | 0 | 0 | 0 | 0 | **15** |
| Retailer (small shops) | 14 | 0 | 6 | 6 | 12 | **38** |
| Petty trader (vegetables, fruit, fish, meat, chicken) | 14 | 0 | 15 | 14 | 9 | **52** |
| **Total** | 51 | 4 | 21 | 20 | 21 | **117** |

A structured and pre-tested questionnaire was used in the survey. Three teams of three people each (a total of nine people) from the Department of Statistics collected the market data over two days. A two-day training session was given to enumerators prior to data collection. Subjects were randomly selected and interviewed in the sampling locations.

### Market data analysis in a CFSVA

When analysing market data within the Food and Nutrition Security Conceptual Framework, it is important to make a clear distinction between cause/effect relationships. Empirical evidence indicates that households' capacity to buy food depends on variables at the household and macro level (national, regional, and sub-regional).[99] The macro dimension is mainly about food availability and supplies. At the microeconomic level, households and individuals have at their disposal assets such as labour, human capital, physical capital, social capital, common and public goods. These assets are used to generate income in various forms, including through production, earnings, and returns to assets, sale of assets (including livestock), and remittances. Households have access to food through markets, such as sale of agricultural produce.

99. See literature review in *World Hunger Series: Hunger and Markets*, WFP (due for publication, 2009).

Annex 11 provides an indicative outline, detailing the issues mentioned in 6.2.3.3, with some suggestions on the analytical contents, indicators, tools, and source of secondary and primary data. In addition, it proposes the location of such information in the general outline of a CFSVA. The most common topics suggested for inclusion in the analysis concern:

- The **economic background and market environment**, including trade policies, regulations, and institutions;
- **Availability** and diversity of major food crops (especially cereals) and livestock that are normally traded nationwide and at the sub-national level;
- **Market structure**, including marketing chains of main commodities, trade flows (including cross-border trade), and traders' selling and buying behaviour (including seasonal patterns, i.e. during harvest, post-harvest and lean seasons);
- **Market conduct and performance**, including producer and retail prices of major commodities (e.g. staple food, cash crops, animals and livestock products) and price trends analysis (e.g. import parity prices and seasonality); market integration analysis (e.g. price differentials and transaction/transport costs between regions). Annex 12 provides further details, especially on market integration and price analyses;
- **Market participation of households** (including the seasonality thereof), including household selling and buying behaviours and household purchasing power (e.g. skilled and unskilled wage rates, agricultural incomes, transfers and remittances, terms of exchange of cash or livestock into staple food); and
- **Market-related risks analysis** (income and price shocks).

### Macro environment

Information on macro-economic performance and policies affect food security at the national as well as the household level through markets. A brief overview of such information is important for helping us understand, first, the nature of and changes in policies affecting the incentives of the actors (traders and consumers) and their ability to respond to those incentives (e.g. key factors such as trade policy measures can undermine food availability to households due to high transaction costs), and, second, the impact of business environment changes on domestic commodity markets and the food security situation of vulnerable population groups. Notwithstanding emergency situations (natural or man-made disasters), market failures generally occur when the market environment is distorted. Food may therefore be available, but not necessarily where households need it the most, even if they can afford the price.[100]



100. Bonnard P., 2001, *Improving the Nutrition Impacts of Agricultural Interventions: Strategy and Policy Brief*, Washington, D.C.: Food and Nutrition Technical Assistance (FANTA) Project, Academy for Educational Development.

Policy measures that affect markets and food security are multi-dimensional:

- **Sector-specific policies**: labour market (wage rate and training policies), capital market (credit and interest rate policies), land market (property rights and rental markets), social sectors (government social protection and safety net policies), and government public investment in roads and transport.

- **Macro-economic policies**: exchange rate policies (e.g. effects of exchange rate misalignment), trade and border policies (tariffs, non-tariff and subsidy measures), domestic market interventions (price interventions on domestic markets, e.g. taxes, subsidies, government food purchases and price controls), and general price level and price stability (measures affecting inflation).

- **Regulatory environment**: food quality (rules and regulations, implementation of both product processing and conservation standards and enforcement), food health and safety (sanitary standards, foodborne diseases).

### Aggregate food availability

The analysis of food availability, especially at the sub-national level, captures surplus/deficit areas. Whether food is available to households depends not only on production and stocks, but also on whether markets make food available in a particular region through flows from other regions (domestic markets) or through imports, including aid (international or regional markets).

It is therefore desirable to analyse production patterns in combination with stocks, national reserves, imports, internal trade flows, and food aid. Adequate food availability at the aggregate level is considered a necessary condition for household food security, but insufficient for achieving adequate food access at the household level.

### Market structure, conduct, and performance

The ways in which markets work to smooth out supply/demand pressures and the impacts of the shocks or seasonal patterns can be understood through the market conduct and performance analysis. The functioning of markets is generally based on information on market chains, competition, and price patterns (price differentials between regions, seasonality, and volatility margins). This analysis can help us understand issues related to the movement of food commodities. For example, baseline information on market integration can help identify the main functions of markets that can be affected by a crisis.

In a crisis situation, comparison with the baseline can help actors decide whether the scope of the impacts distorts markets to the point that interventions are required. The analysis of price patterns (differentials, seasonality, cycles, and volatility) can provide an understanding of the potential impacts of price shocks on household food security (see 6.2.4).

### Market participation of households

Household market participation can be analysed through income sources, purchases from markets, reported food sources, sales on markets, and periods of sales/purchases. Households' market participation is determined both by marketable surplus/deficit status (net buyer/seller) and their ability to physically and economically access markets. Physical access indicators such as distance, travel time, means of transport, and transport costs to markets are factors that can undermine household income opportunities and food access through market purchases. Households' economic access to markets depends mainly on their purchasing power, which is influenced by prices and incomes (generated from production, assets, labour, transfers, and remittances) and the availability of own production and stocks. All those factors, and thus economic access, show seasonal patterns. Prices are determinants of a household's real income and directly influence the level of food purchases.

To the extent possible, participation in the (casual and permanent) labour market can also be covered because of its role as an income source as well as a coping mechanism. An example of household casual labour market participation is given in Box 6.6.

**Box 6.6: Labour market participation of rural households in Lao, PDR**

The Lao PDR CFSVA finds that casual labour is an important part of income sources of villages, especially during the lean season and for non-farm activities. The existing demand is for unskilled labour, mostly agricultural work (bush cleaning, paddy land maintaining, or land fencing) for neighbours. The practice of agricultural casual labour or labour exchange is common in the wet season and mainly during the lean season to meet household food needs. In general, payments are made either in kind, with some 5 kg of paddy rice per day, or in cash. According to the community survey, the daily wage rate of unskilled labour is kept at between 10,000 and 20,000 Kip, with large variations among villages in each province. The highest rates are paid in Vientiane and Bolikhamxay provinces, while the lowest are paid in Pongsaly and Luang Prabang provinces.

Non-farm activities offer limited employment opportunities and cash income but are less preferred than permanent agricultural activities because they are considered by villagers as temporary and risky, hence low paying relative to the effort expended. In general, the lack of skills put villagers at a disadvantage in both finding and keeping employment opportunities in non-farm activities such as mining, logging, and road and house construction.

*Source*: WFP, 2007, CFSVA Lao, PDR.

### Markets and household vulnerability and risk

Household vulnerability refers to how a household's livelihood system would be exposed if a market shock occurred and to the capacity of that household to cope with or withstand the effects of the shock. Market analysis is expected to highlight risk factors (possible shocks and hazards related to markets), provide some indicators of household capacity to cope, and the implications for their food security situation. The analysis of supply shocks (e.g. drought, floods, and pests), demand shocks (e.g. price and income

seasonality and volatility), market-related coping mechanisms (e.g. sales of assets, daily labour, purchases using credit, debts), and their actual impact on household food security can inform decision-making. If a household is vulnerable and, at the same time, likely subject to a market shock, it is considered "at risk for food security."

On the demand side, price changes have a direct impact on households' real incomes, all things being equal. Notwithstanding data limits, the analysis of the impact on household vulnerability is crucial. Box 6.7 provides arguments on the importance of price analysis as part of household vulnerability analysis.

### Box 6.7: Potential impacts of price increases on household vulnerability

Price shocks have direct implications on food-insecure populations. Prices are determinants of a household's real income and directly influence the amount of food it can purchase. Food price volatility is cause for concern because of its direct impact on household food security. Low food commodity prices are generally seen as a stress on incomes of farmers, who are net sellers. Price increases are expected to propagate both the incidence and depth of poverty and food insecurity as many households are net buyers of food, including small farmers. Usually both urban and rural households depend on markets, though to a greater degree for urban households. Rural households depend on income-generating activities, such as subsistence agriculture, seasonal agricultural wage labour, and various forms of off-farm self-employment. The resources generated through these activities are often very low, thus contributing to food insecurity. When under stress, various coping mechanisms are employed to reduce the severity of deprivation and avoid more irreversible processes of destitution.[101] Low incomes, combined with the volatility of agricultural incomes and production that depends on weather conditions, prompt rural households to resort to markets to meet their food needs. They can therefore face deteriorating conditions due to price increases.

In the poorest households, there is a direct and immediate negative impact on their food security. The degree of being affected by food price fluctuations is to a large extent dependent on livelihood, gender, the number of dependants to be supported by economically active household members, the degree of dependence on markets, the degree of integration into social networks, and income levels. In general, the poorest households consume predominantly cereals and only very small quantities of other foods. Higher prices can therefore result in a poorer diet and nutritional status, as families allocate more of their incomes to purchases of energy-dense cereals and less expenditures on nutritious food and health care.

| | Poor food basket (%) | Borderline food basket (%) | Fairly good food basket (%) | Good food basket (%) | Total per region (%) |
|---|---|---|---|---|---|
| Assaba | 0.0 | 5.8 | 0.5 | 0.1 | **6.4** |
| Adrar | 0.0 | 0.3 | 0.0 | 0.2 | **0.5** |
| Brakna | 0.0 | 0.2 | 2.1 | 7.2 | **9.5** |
| Gorgol | 0.7 | 3.7 | 0.9 | 0.7 | **6.0** |
| Guidimakha | 0.2 | 9.3 | 1.2 | 3.7 | **14.4** |
| Hodh El Charghi | 0.0 | 0.0 | 0.3 | 0.1 | **0.4** |
| Hodh El Ghardi | 0.0 | 0.0 | 0.1 | 0.0 | **0.1** |
| Inchiri | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| Tagant | 1.1 | 2.7 | 0.1 | 0.1 | **4.1** |
| Trarza | 0.0 | 1.0 | 2.0 | 11.4 | **14.4** |
| Nouakchott | NA | NA | NA | NA | **NA** |
| **Total population (%)** | **0.2** | **2.5** | **0.9** | **3.2** | **6.8** |

101. Davis B. et al., 2007, *Rural Income Generating Activities: A Cross-Country Comparison*, EFSA Working Paper 07-16, FAO, Rome.

For example, using the 2005 CFSVA data for Mauritania, a study by WFP concluded that about 7 percent of the total population is at risk, as they would not be able to afford the same food basket as in 2005 with December 2007 food commodity prices (see table above). The most affected households are primarily food-deficit farmers who are vulnerable to erratic weather conditions (droughts and floods) and with low incomes from livestock. This estimate is based on the cost-of-food-basket approach, which estimates the proportion of vulnerable households (HH), i.e. that cannot afford the cost of a baseline food basket anymore as a result of higher food prices. The CFSVA usually classifies households into food consumption groups (poor, borderline, acceptable, and good). This grouping is based on diet diversity and a frequency score (food consumption score). The underlying rationale of the cost-of-food-basket approach is that households might not be able to afford the cost of their previous food basket anymore and are at risk of dropping from one food consumption group to a lower one. This would happen if their current real food expenditure was above the baseline figures as a result of higher food prices.

### 6.2.4 Risk analysis

Individuals, households, communities, and even nations face multiple hazards from different sources. Risks are the combination of the probability or frequency of occurrence of a defined hazard and the magnitude of the consequences (Benson 2005). Hazards often cannot be prevented, and if they materialize, they can generate a shock that affects individuals, households, and communities in both predictable and unpredictable ways (TANGO, 2004).

In the last two decades, more than 1.5 million people have been killed by natural disasters. Worldwide, for every person killed, about 3,000 more people are exposed to hazards. Natural disasters and other hazards have a significantly greater impact on lesser-developed countries than on more developed countries.[102]

The objective of food security risk analysis is to identify populations and regions likely to experience serious declines in their future food security status (i.e. food consumption, livelihoods disruption) due to effects of a particular hazard. Within the context of CFSVA, risk analysis combines hazard analysis with vulnerability analysis. There are both advantages to and limitations in performing risk analysis as part of a CFSVA.

***Risk analysis and scenarios can:***

- Identify geographic areas and populations at risk, enabling decision-makers to define proper strategies and interventions;
- Highlight the key factors contributing to increased vulnerability among households; and
- Evaluate the potential effects of these factors on households.

***Risk analysis and scenarios cannot:***

- Accurately predict or quantify the magnitude or extent of a shock;
- Accurately predict or quantify the effect on households and their capacity to cope; or
- Accurately predict or quantify the resulting impact on food security.

102. UNDP Bureau for Crisis Prevention and Recovery, 2004, *A Global Report: Reducing Disaster Risk: A Challenge for Development,* New York.

***Food security risk analysis consists of the following steps:***

- Identify the main risks a given community faces;
- Assess the probability and intensity of these hazards occurring;
- Assess the vulnerability of households and communities becoming food insecure because of these hazards; and
- Assess multi-hazard risks and hazard hotspots at the sub-national level.

Combining information on multiple hazards and vulnerability gives an indication of the likelihood that each of these hazards may result in food insecurity.

#### 6.2.4.1 Definitions relevant for WFP risk-reduction activities

The degree of vulnerability depends on the nature of the risk, how it would impact community and household resilience, or the "ability to bounce back or recover after adversity or hard times, to be capable of building positively on these adversities" (Mission 2005).

A household's resilience often is related to:

- The magnitude of the shock a household or community can absorb and still remain viable;
- How well a household or community can self-organize after the exposure to the hazard to maintain an acceptable level of functioning and structure;
- How well a household or community can learn from these difficult circumstances; and
- The household's characteristics, notably its assets and livelihood strategies.

When exposed to a shock, households often see a decline in welfare levels, which can include overall reductions in food availability, loss of or diminished access to food, fluctuation in income streams, and poor nutrition. The greater the share of household resources devoted to food and health service acquisition, the higher the vulnerability of the household to food and nutritional insecurity.

Households who are able to minimize the loss of welfare resulting from shock exposure by employing livelihood and risk management strategies are likely to be **less vulnerable** than those who cannot cope with, or mitigate, the effects of risks. Therefore, livelihoods are secure when households have secure ownership of, or access to, resources (both tangible and intangible) and to income-earning activities that can off-set risks, ease shocks, and meet contingencies. When households are able to acquire, protect, develop, utilize, exchange, and benefit from assets and resources, livelihoods are secure (CARE 2002). To some degree, certain shocks – such as annual flooding and drought – can be anticipated by households. In these situations, households engage in risk-reduction strategies such as rehabilitation of flood banks, planting drought-resistant crops, or seasonal migration.

Other types of risks preclude preventive planning. Policy failures or economic downturns, civil conflict, and epidemics are generally unpredictable. In such circumstances, households typically engage in **risk-mitigation** and **risk-coping strategies**. Examples of the former include greater deployment of adult household labour, use of informal credit systems, and reduction of non-essential expenditures. Risk-coping measures are used in extreme situations, when strategies are not feasible or possible. Common examples include drastic reductions in food intake,

selling/mortgaging of productive assets (livestock in particular), borrowing from neighbours, and deploying child labour.

The following definitions may prove useful in incorporating risk analysis into CFSVAs and have been adapted from the United Nations International Strategy for Disaster Reduction (UN-ISDR) terminology.

**Food security risk analysis:** A methodology to determine the nature and extent of risk to food security by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a threat to household food security.

**Hazard:** The potential to cause harm; also, the probability of a potentially damaging phenomenon occurring within a given time period and area. Hazard can be expressed mathematically as the probability of occurrence of an event of certain intensity, in a specific site, and during a determined period of exposure.[103]

**Hazard analysis:** Identification, studies, and monitoring of any hazard to determine its potential, origin, characteristics, and behaviour.

**Vulnerability to food insecurity:** The conditions that increase the susceptibility of a household to the effect of hazards on its food security. Vulnerability is a function of a household's exposure to a specific hazard (e.g. flood, drought) and its coping capacity (or the direct impact of the hazard on the household, mitigated by its coping capacity).

**Coping capacity:** The means by which households use available resources, and their ability to face adverse consequences that could lead to a disaster.

**Risk to food insecurity:** The probability of food insecurity resulting from interactions between a natural or human-induced hazard and vulnerable conditions. The probability of a loss of food security depends on the hazard, vulnerability of households, and the number of households in the affected area. This relationship can be represented by the following equation:[104]

***R = H · Pop · Vul***
Where
**R** is the **risk** for food insecurity (in number of HH/year in a sub-area)
**H** is the **hazard**, which depends on the probability of a given hazard of a certain intensity in that area (in percentage)
**Pop** is the **population** living in a the area (in number of HH)
**Vul** is the **vulnerability** of the population (a function of the exposure of lives and livelihoods and household resilience with regard to the effects on their food security) (as a percentage of all HHs in the sub-area)

The risk to food insecurity from multiple concurrent hazards is obtained by aggregating the risks from each individual hazard.

103. United Nations University, Institute for Environment and Human Security (UNU-EHS).
104. Adapted from: UNDP, 2004, "*Reducing Disaster Risk: A Challenge for Development*."

### 6.2.4.2 Hazard analysis

Individuals, households, communities, and even nations face multiple hazards from various sources. Hazards often cannot be prevented, and if they materialize, they can generate a shock that hurts individuals, households, and communities in both predictable and unpredictable ways (TANGO 2004). Hazard analysis is an assessment of the level and type of hazard exposure experienced by a population. These hazards can come from exogenous climatic or environmental sources, institutional constraints, economic changes, political edicts, and conflict or social change. Valid hazard analysis is central to conducting an accurate and informative vulnerability analysis. Key to this type of analysis is consideration of:

- Policy-relevant categorization of hazards;
- The history of hazards, which includes the frequency of occurrence and severity of impact;
- The type of exposure to such hazards; and
  - Covariate (collective): these include many natural hazards (droughts, floods), but also price changes, where most households or communities are exposed; covariate hazards affect groups of households, communities, regions, or nations;
  - Idiosyncratic: these hazards have a more random and individual distribution, such as accidents, injury, theft, or human lifecycle events such as (non-communicable) disease and death; they may occur for individual households but not whole communities.

Whether the hazard is collective or individualistic will determine the type of risk-management strategies required to manage the risk.

### Hazard/Risk Inventory

A hazard inventory identifies the types of shocks that have a possibility of occurring in a given region. For each shock, the frequency, magnitude, duration, timing, speed of onset, correlation, and geographic location are specified. Different hazards may result in similar shocks, which means that the particular challenges faced by populations may come from a variety of unrelated sources. (Table 6.8, on page 249, presents four categories: environmental, social, economic, and conflict hazards/risks).The list of hazards/risks should be as comprehensive as possible and should reflect the hazards/risks most likely to produce the shocks that incur the most severe impacts.

The **frequency** of a particular hazard, its **spatial dimensions**, and its **timing** need to be assessed. Some hazards, such as earthquakes, may strike infrequently, while a hazard of low rainfall may be experienced almost every year. Timing refers not only to periodicity but also to how the hazard relates to impacts during the course of a year. For example, floods/droughts will have differential impacts on an agricultural population depending on when they occur in relation to the agricultural calendar. In addition, there may be periods of the year when exposure to several shocks increases, simultaneously increasing the likelihood that a household will experience difficulties.

**Example of Drought Hazard Analysis: Water Balance Model**

An appropriate example of drought hazard analysis is provided by the FAO Water Balance Model, which is particularly applicable in countries relying on rain-fed agriculture where insufficient availability of water presents a major constraint to food security.[105] The water balance model is typically used to estimate yield reduction due to water stress.

Water balance follows the principle of supply and demand: water is supplied to a crop in the form of precipitation or irrigation soil water retention; demand is created by requirements for water in the crop, soil, and atmosphere. When demand exceeds supply, the crop does not have enough water for its optimal development and is stressed. In order to accurately gauge crop water requirements, FAO developed the water balance model.[106]

The most important inputs to the model are precipitation and potential evapo-transpiration (PET). FEWS NET at the United States Geologic Survey (USGS) calculates daily PET values for Africa at 1.0 degree. Rainfall estimate (RFE) images for the African continent are obtained from NOAA at 0.1-degree (~10 km) spatial resolution. In addition, the Water Requirement Satisfaction Index (WRSI) model uses relevant soil information from the FAO (1988) digital soils map and topographical parameters from Digital Elevation Model (DEM)–derived data. Key for drought risk analysis is that a reduction in WRSI leads to reduced productivity of a crop.[107]

### Box 6.8: EM-DAT and natural hazard statistics

Since 1988 the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED) has been maintaining an Emergency Events Database, EM-DAT (http://www.emdat.be/). EM-DAT was created with the initial support of WHO and the Belgian Government.

The main objective of the database is to serve the purposes of humanitarian action at national and international levels. Three groups of disasters are distinguished in EM-DAT: natural disasters, technological disasters, and complex emergencies. For a disaster to be entered into the database, at least one of the following criteria must have been met:

- 10 or more people were reported killed;
- 100 people were reported affected;
- a state of emergency was declared; and
- there was call for international assistance.

Risks of mortality and economic losses are calculated as a function of the expected hazard frequency and expected losses per hazard event. The database obtains global hazard data on cyclones, drought, earthquakes, floods, landslides, and volcanoes from a variety of sources.



***Drought Hazard Identification***

Based on the definition of hazard given in section 6.2.4.1, drought hazard could be defined as the probability of occurrence of a drought of a certain intensity, in a specific site during the growing season. The approach followed is to look at the historical WRSI for a number of points in the country, obtain a frequency distribution, and compute the probability that a certain threshold has not been reached.

The WRSI can be computed for points on the map for every year for which sufficient input data are available. For example, in Sudan, it is calculated for the period 1996–2006, for points 0.5 degrees apart. A higher-density grid is recommended if computing power allows. If we defined a drought as a season when the WRSI was less than 80, we could obtain for every location the frequency that such a drought season occurred over the number of years studied. We could then assume that this frequency equalled the probability that drought would occur in the future in this geographical location. Values for areas in between these points are obtained by interpolation (kriging), and a

105. *Crop Forecasting Philosophy of FAO: An Overview,* http://80.69.76.153/wiki/index.php?title=Chapter2&redirect=no.
106. See Frere and Popov, *"Agrometeorological Crop Monitoring and Forecasting."*
107. Based on FEWS NET.

map can be constructed giving the probability that the WRSI will remain below 80. The probability ranges from 0 percent (zero of the years observed were wet, with a WRSI of "always >80") to 100 percent (every single year observed was too dry, with a WRSI "always <80"). Using the same process, a probability map can be constructed for "severe drought" (defined as a season when the WRSI is less than 50).

**Box 6.9: Calculation of Water Requirement Satisfaction Index (WRSI) (FEWS NET)**

WRSI calculation requires a start-of-season (SOS) and end-of-season (EOS) time for each modelling grid cell. The onset of rains is determined using a threshold amount and distribution of rainfall received in three consecutive decades. SOS is established when there is at least 25 mm of rainfall in one decade followed by a total of at least 20 mm of rainfall in the next two consecutive decades. The length of growing period (LGP) for each pixel is determined by the persistence, on average, above a threshold value of a climatological ratio between rainfall and potential evapo-transpiration. Thus, EOS was obtained by adding LGP to the SOS decade for each grid cell. The WRSI model is capable of simulating different crop types whose seasonal water use pattern has been published in the form of a crop coefficient. Such crops include maize (corn), sorghum, millet, and wheat.

At the end of the crop growth cycle, or up to a certain decade in the cycle, the sum of total actual evapo-transpiration (AET) and total water requirement (WR) is used to calculate WRSI in a Geographic Information System (GIS) environment at 0.1 degree (about 10 km) spatial resolution. A case of "no deficit" will result in a WRSI value of 100, which corresponds to the absence of yield reduction related to water deficit. A seasonal WRSI value less than 50 is regarded as a crop failure condition (Smith 1992).
http://earlywarning.usgs.gov/CentralAmerica/dailywrsirm.php

**Box 6.10: Useful Internet resources for drought hazard analysis**

http://www.hoefsloot.com/agrometshell.htm
http://earlywarning.usgs.gov/Global/index.php
http://www.em-dat.net/
http://www.fao.org/ag/agl/agll/gaez/index.htm
http://edc.usgs.gov/products/elevation/gtopo30/hydro/index.html
http://igskmncnwb015.cr.usgs.gov/adds/
http://www.proventionconsortium.org/?pageid=17

### 6.2.4.3 Vulnerability analysis

Vulnerability to food insecurity is defined as increased susceptibility of a household to the effect of hazards on its food security. Vulnerability is a function of a **household's exposure** to a hazard and its resilience or **coping capacity**. Through vulnerability analysis we want to arrive at a reasonably accurate estimate of how many households in a certain area would become food insecure if a specific hazard event occurred in that area.

The first task in conducting a vulnerability analysis is to assess the types of shocks communities and households are typically exposed to and how effective their strategies for managing risk are. Much of this information can be obtained through qualitative interviews with community leaders and households. Table 6.8 offers a partial list of the impacts of various shocks on the range of assets that typically support household livelihood strategies.

**Table 6.8: Examples of the association between hazards, shocks, and various forms of livelihood capital**

| **Hazards/risk:** | Drought, storms, flooding, land degradation, pests, animal disease, earthquakes, volcanoes | Disease epidemics (malaria, cholera, dysentery), AIDS, injuries | Policy changes, discrimination, unequal access to resources | Macro-economic policies, market and trade, recession | War, violence, discrimination |
|---|---|---|---|---|---|
| **Sector:** | **Environmental** | **Health** | **Social** | **Economic** | **Conflict** |
| **Livelihood capital** | | | **Shocks** | | |
| **Physical capital** | Climatic activity destroys physical infrastructure | Asset divestiture, loss of capacity to provide public services | | Asset divestiture | Conflict leads to destruction of physical infrastructure, assets stolen or destroyed |
| **Natural capital** | Destruction of land and resources | | Appropriation and loss of common property resources, increased theft | Price shocks, rapid inflation, food shortages | Conflict leads to loss of land, assets, and theft |
| **Social capital** | Recurring environmental shocks break down ability to reciprocate | Morbidity and mortality affect networks | Breakdown of labour reciprocity, breakdown of sharing mechanisms, lack of social cohesion, reduction in safety net support | Shift to institutional forms of trust, stricter loan collateral requirements, migration for employment | Communities displaced by war, theft leads to breakdown in trust |
| **Economic capital** | Seasonal climatic fluctuations reduce employment; morbidity and mortality of income earner; loss of crops | Employment policies, declining subsidies or inputs, poor investment in infrastructure, taxes | | Unemployment, falling real wages, price shocks | Marketing channels disrupted by war |
| **Human capital** | | Declining public health expenditures, user charges, declining education expenditures | Breakdown in community support of social services, unequal access to services | Privatization of social services, reduction in labour opportunities | Conflict destroys social infrastructure, mobility restrictions |

Once the inventory and categories of risk are determined, the level of risk exposure must be assessed. Risks are not felt evenly among all households, and there are several ways the population may be disaggregated to look at specific exposure levels. Exposure to various types of hazards can often be identified according to livelihood group, but also by socio-economic group, ethnic group, or gender, among others. Risk exposure can be explored in questionnaires at the household level, especially through the livelihoods section or with qualitative instruments such as key informant interviews, focus group discussions, or structured community discussions.

#### 6.2.4.4 Risk management analysis

Risk management strategies can be thought of as falling into one of three basic categories. Activities undertaken by households and communities to reduce the likelihood of exposure to a shock are defined as **risk-reduction** strategies. Those taken to minimize the impacts of a shock before it occurs are defined as **risk-mitigation** activities. **Risk-coping** responses are the strategies initiated post-shock. The post-shock responses initiated by households are usually referred to as coping strategies. Post-shock responses initiated by communities are informal safety nets, while those carried out by governments and NGOs are formal safety nets. A thorough understanding of risk-management responses identifies entry points for appropriate programming that supports and enhances the positive activities already taking place and fills in gaps where additional support is needed. This approach re-emphasizes the key role of risk reduction and mitigation due to its functional relationship with vulnerability.

It is important to collect information on risk management at all three levels (risk reduction, risk mitigation and risk coping). Information on risk management at the household level is gathered through household surveys focusing on particular activities and behaviours. Risk-reduction and -mitigation activities are best understood as they apply to particular livelihood strategies. Household coping strategies generally begin with the short-term strategies and transition to longer-term strategies as the impact of the shock continues.

The latter type are often referred to as distress strategies; they are more detrimental to household livelihoods and will slow the process of recovery. Households using a larger array of coping strategies and/or strategies considered more severe in their impacts are usually more vulnerable.

**Box 6.11: Household coping strategies**

**Short-term coping strategies**

- Migration of household members to look for work
- Searching for wild foods
- Selling non-productive assets
- Reducing number and size of meals
- Changes in diet to less preferred or less nutritious foods

**Unviable (distress) coping strategies**

- Selling productive assets
- Household dissolution
- Theft
- Prostitution
- Mass migration
- Begging

The degree of vulnerability depends on the nature of the risk and a household's resilience, or "ability to bounce back or recover after adversity or hard times, to be capable of building positively on these adversities" (Mission 2005). A household's resilience for a given magnitude of shock often is related to:

- How well a household or community can self-organize after the exposure to the hazard to maintain an acceptable level of functioning and structure;
- How well a household or community can learn from these difficult circumstances and adapt; and
- The household's characteristics, notably its assets and livelihood strategies.

The risk of livelihood failure determines a household's level of vulnerability. When exposed to shock, households often see a decline in welfare levels, which can include overall reductions in food availability, loss of or diminished access to food, fluctuation in income streams, and poor nutrition. The greater the share of resources devoted to food and health service acquisition, the higher the vulnerability of the household to food and nutritional insecurity. Households able to minimize loss of welfare resulting from shock exposure by employing livelihood and risk management strategies are likely to be less vulnerable than those who cannot properly cope with or mitigate the effects of the risk. Therefore, livelihoods are secure when households have secure ownership of, or access to, resources (both tangible and intangible) and income-earning activities that can offset risks, ease shocks, and meet contingencies. When households are able to acquire, protect, develop, utilize, exchange, and benefit from assets and resources, livelihoods are secure (CARE 2002).

Information on risk-coping strategies at the household level can be obtained through surveys by including questions that enable calculation of a **coping strategies** index (see section 4.2, "Household Questionnaire"). Risk-coping responses at the community level (informal safety nets) can also be gathered during village surveys, using focus group discussions. Information on formal safety nets can be gathered through secondary data and from government and NGO key informants.

In general, community informal safety nets deal better with idiosyncratic shocks. Covariate or collective shocks tend to overwhelm community-level resources and often require an external response in the form of a formal safety net from the government or NGOs. Since households often turn to neighbours and communities for help in times of need, the diminished capabilities of the community may leave households more vulnerable as they struggle to cope with the shock on their own.

A number of community-level institutions operating in any given locale can play a role in helping manage risk. These institutions can be either formal or informal groups or organizations and include religious groups, social clubs, savings and credit groups, funeral societies, and service delivery institutions focusing on health or education. The focus of the CFSVA is not simply to document the existence of these groups but to determine to what extent they contribute to the ability of households to manage risk.

External or formal means of risk management can address both idiosyncratic and covariate forms of risk. More frequently the formal management activities deal with covariate shocks. The types of activities may range from formal safety nets, to deal with shocks such as crop loss, to market subsidies of staple crops, to address soaring

prices. At the same time, policy programmes that encourage ready credit opportunities help individuals respond to idiosyncratic shocks such as illness or death.

### Determining Trends to Understand Vulnerability

Vulnerability to food insecurity is a forward-looking concept related to people's proneness to future acute loss in their capability to acquire food. For this reason, it is important to identify trends in livelihood strategies and changes occurring in internal household dynamics related to risk management. For example, are households pursuing certain livelihood strategies more likely to sell off assets in the event of a shock? In addition, it is important to determine the role of social networks, institutions, and inter/intra-community dynamics and the ways in which each of these influence the ability of individual households to cope with a particular shock. For example, HIV has had a significant negative impact on community informal safety nets in southern Africa. The breakdown of these informal safety nets will make HIV-affected households more vulnerable. In many countries, repeated surveys permit assessment of change over time. Several rounds of DHS and/or poverty surveys may have been conducted. Some data from routine information systems permit time series analysis; this includes price series, climate data, and sometimes anthropometric data from clinics/health facilities.

### Opportunity Analysis

In addition to analysing risks and vulnerabilities, it is also important to take into account the opportunities available to communities, households, and individuals within the programme setting that can contribute to risk management. For example, many households devise positive responses to constraints that could form the basis for interventions aimed at increasing food security among the target population. These households are often more resilient. Such households can be identified through the use of a positive deviance approach, which seeks to promote adoption of the successful practices of resilient households among the wider food-insecure population.

Opportunities for risk management may also be derived from efforts being promoted by community-based organizations and local NGOs. Such groups may be operating effective programmes that future projects can build upon. Enabling conditions for supporting such opportunities may exist at the policy level through changes promoted by the Government. Finally, a coalition of organizations can collaborate in a complementary way to scale up risk-management approaches. Positive deviant households are typically identified through a combination of qualitative approaches, including focus group discussions, key informant interviews, transect walks, and community ranking exercises.

### Quantifying household vulnerability

Incorporating quantitative methods into an analysis of vulnerability allows for more precise description and appropriate targeting of populations vulnerable to food security. In order to objectively quantify vulnerability, information on proxy indicators related to risk exposure and risk management must be collected. By combining this information with expected future food security trends, CFSVA teams can arrive at reasonable predictions regarding which households are more likely to be affected by a specific shock. Box 6.12 provides an example of how quantitative analysis was used to predict household food insecurity in Burundi.

## Box 6.12: Food Security Monitoring System (FSMS) data from Burundi

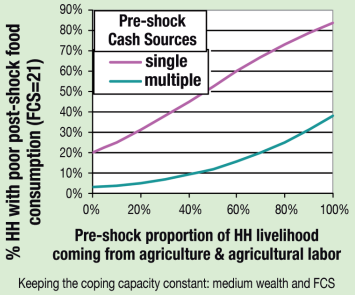
In 2005–2006, the Plateau Nord and Sud Ouest areas of Burundi were affected by severe drought. In the immediate wake of the drought, data from 135 agricultural households was collected and analysed in order to gauge the effect of the drought on household food security. Pre-shock data (2004–2005) was used to estimate household wealth and sources of livelihood. The FSMS monitored the food consumption of the same households before and during the crisis (April 2006).

Through logistic regression ($R^2$ = 0.42), the research team was able to determine the elements that contributed to increased levels of household food insecurity resulting from the drought.

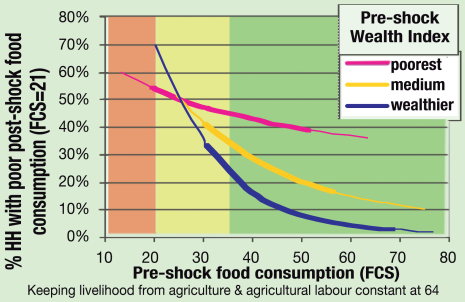
The team found that the more households' livelihoods depend on agricultural production and agricultural labour (pre-shock), the higher the probability they will suffer poor food consumption during the post-shock crisis. This reflects the dimension "exposure." The "risk management aspect" is shown by the fact that (all other factors being equal) households with only a single source of cash income rarely manage to keep good food consumption after the shock, whereas households with several cash sources fare much better.

| | B | S.E. | Wald | df | Sig. |
|---|---|---|---|---|---|
| FCS_Oct05 | -0.06 | 0.02 | 10.64 | 1 | 0,001 |
| Wealth index | 0.70 | 0.69 | 1.03 | 1 | 0,310 |
| (FCS_Oct05*wealth index | -0.03 | 0.02 | 4.00 | 1 | 0,045 |
| Part from agri/agri labour | 2.89 | 1.23 | 5.54 | 1 | 0,019 |
| More than 1 source of cash | -2.04 | 0.52 | 15.71 | 1 | 0,000 |
| Constant | 1.22 | 1.04 | 1.37 | 1 | 0,241 |

Households with acceptable pre-shock food consumption *and* higher pre-shock wealth were less likely to fall into poor post-shock consumption (all other factors being equal). These households clearly have a better capacity to mitigate and cope with the effects of a shock. Relative wealth seemed to be especially important for households with adequate pre-shock food consumption, to avoid poor consumption after the shock.




Keeping the coping capacity constant: medium wealth and FCS




Keeping livelihood from agriculture & agricultural labour constant at 64

### Exposure of household livelihoods

Based on the qualitative analysis, one can foresee which livelihood activities are typically affected by a certain hazard. For instance, high price inflation would have a significant effect on households that purchased their food and less on those producing their own food; drought during the growing season affects farmers, but livestock may be affected only in the case of extreme drought. These "qualitative" findings will be used to estimate, using the livelihoods section of the HH questionnaire, how much the primary effect of a shock would be.

For instance, we assume that a drought would reduce agricultural production by 50 percent (based on the Water Balance Model, a WRSI of about 80 percent leads to a harvest of only 50 percent). A household depending 70 percent on agriculture would hence, as a primary effect, lose 35 percent of its livelihood because of the drought. Using SPSS, this can easily be estimated for all households.

### Risk management

The capacity of households to manage (prevent, mitigate, and cope with) a shock depends on the use of more "resistant" strategies, alternative sources of income, reserves, savings, social networks, etc. Some households will cope with a certain loss better than others. Risk management can be very complex, and the analyst will use proxy indicators to estimate risk management in a simplified way, assuming that he/she can capture the big picture. The Burundi example shows that with only a few determinants, already much of the food consumption outcomes can be explained.

In the vulnerability analysis, we are considering several intertwined elements. First, it is less likely that households with adequate food consumption (as measured by the **food consumption score**) will slide into poor food consumption due to a shock than those households with borderline food consumption. Second, some households have better risk-prevention, -mitigation, and -coping strategies to help them avoid reducing food consumption than others. Although this is hard to measure directly, the **asset wealth index** turns out to be a good proxy of this.

Based on the relationship between asset wealth and coping capacity, the wealth indices appear to be strong determinants of coping capacity. Tercile groupings have been commonly used; however, the specific categories should be determined based upon exploratory analysis. As the Burundi example illustrates, other indicators, such as multiple sources of cash income, help households better cope with the effects of drought than others.

The cut-offs could be set as in Box 6.13.

**Box 6.13: Effect of shocks on household access to food and coping strategies**

The fact that a certain household reports a covariate shock indicates how poorly it can deal with the same situation compared with a neighbouring household, with the same livelihood strategies, who did not report the situation as affecting its customary ability to consume food. In every region in Sudan, and for every livelihood group, poor households (as measured through asset wealth) are much more likely to report shocks than rich ones. From this we conclude that asset wealth is a good proxy for the risk management capacity of households, since rich households manage risk so well that they do not even consider the situation as a "shock," in comparison to what their neighbours report. This relation still holds when controlled for other factors, such as the region and the livelihood group the households belong to.

Factor analysis reveals three different categories of coping strategies:

1. The first category is an inferior category and could be called "suffering the consequences of the shock, because no positive action can be taken, or deploying desperate ways to obtain additional food." These are compensation strategies employed by the households, such as: fasting one day, eating fewer meals, eating less and lower quality of food, taking no action at all, scavenging for food, or working for food only.
2. The second category of coping mechanisms could be labelled as "generating extra income, including credit, or cutting expenditures." This category includes migration of household members, working for money, purchasing food on credit, borrowing food, and cutting health or education expenditures.
3. We call the third category of coping "reliance on own household reserves." This typically involves using the household savings, selling or slaughtering livestock, and selling "other" assets.

With increasing asset wealth, the coping strategy of choice would typically include less severe measures. Fasting an entire day or scavenging for food is almost exclusively done by households belonging to the asset poor wealth deciles. It is also the poorer deciles who often report eating less. Selling assets and spending savings, on the other hand, is a strategy chosen by households with higher levels of assets as measured by the asset index. This again highlights the fact that asset wealth is a good proxy indicator of coping capacity. The poorer a household is, the more desperate and ineffective its measures for compensating for a shock are.

Conclusion: wealthy households do not only utilize effective coping strategies more often, but they also only rarely feel that a certain situation affects their customary ability to procure or consume food. In short, they are more resilient.



## Estimation of vulnerability

Vulnerability of a household to a certain hazard is defined by how much the household's livelihood would be affected (first proxy indicator: part of total revenue lost) by the hazard taking place and how well the household could cope with the effects of the shock (second proxy indicator: the food consumption score; and third: the wealth index).

Table 6.9 shows how this information is typically combined to define a household as vulnerable.

**Table 6.9: Percentage lost revenue (in cash or in kind) that defines various wealth groups as vulnerable to a shock**

| | Current food consumption | | |
|---|---|---|---|
| | Poor FCS<=21* (%) | Borderline 21<FCS<=35 (%) | Adequate FCS>35 (%) |
| Poor coping strategies† (poorest wealth group) | 10 | 20 | 25 |
| Mediocre coping strategies (middle wealth group) | 10 | 20 | 35 |
| Good coping strategies (highest wealth group) | 10 | 20 | 55 |

* Refer to Box 6.1 and Table 6.1.

† In the Sudan example – poor coping strategies: households from wealth deciles 1–4; mediocre coping strategies: households from wealth deciles 5–7; good coping strategies: households from wealth deciles 8–10; additional indicators, such as the diversity of income sources, could be used.

The thresholds set in the table signify that households with good coping strategies and adequate current food consumption are considered vulnerable to a hazard only if 55 percent of their usual revenue is lost because of that hazard. Households with poor coping capacities and borderline food consumption are already considered vulnerable if 20 percent of their revenue is lost. The table is based on observations in Burundi; however, these relationships could well be different in other contexts. Households whose current food consumption is already "poor" would most likely still have poor food consumption after a shock. We can consider them chronically food insecure (if data were collected during the "good season") or at least cyclically food insecure (if data were collected during the lean season).

One could debate the levels of these thresholds. Setting them higher or lower would result in fewer or more households identified as vulnerable to a certain shock. Hence, the absolute number of households found vulnerable through the analysis is only an indicative one. On the other hand, since these thresholds are systematically applied to all households in all regions, this approach to vulnerability can be used very well to observe regional differences and differences between livelihood groups vulnerable to a certain shock.

#### 6.2.4.5 Bringing it all together: risk to food security

Risk to food security is defined as "The probability of food insecurity resulting from interactions between natural or human-induced hazards and vulnerable conditions." The questions to be answered are: "Is it likely that vulnerable households will be confronted with the hazard they are vulnerable to?" And "How many such households are there (proportionately or in absolute numbers) in a particular region or sub-population?"

As described in the previous sections, vulnerability analysis can indicate if a household is vulnerable to a specific hazard; hazard analysis can indicate the likelihood of a hazard occurring in a certain location. By merging both data sets, one can identify households that are both vulnerable to a specific hazard and living in a hazard-prone region and thus at risk of becoming food insecure.

The ideal way would be to multiply, for each household, the probability that the household will be vulnerable to a shock (see Burundi example: this can be calculated if adequate panel data is available) by the probability of a specific hazard's occurring during a certain time period: Risk = VulnerableProb * HazardProb. Practically speaking, a less subtle approach is used to classify a household as either "vulnerable" or "not vulnerable." Using SPSS, an expression as below would then be used to identify a household as being at risk for the hazard. A region where the specific hazard strikes at least once every ten years is, in this case, considered hazard prone:

If (Vulnerable = 1 and HazardProb> = 0.1) At_Risk = 1.

The expression selects all households that will become food insecure at least once every ten years because of a specific hazard. Prevalence of households at risk can be studied by region or by group, such as livelihood or ethnic background. A similar result can be obtained visually, by overlaying a vulnerability map with a hazard map. Areas in the overlaid map that are hazard prone and where many vulnerable households live (proportionately or in absolute numbers) are considered at risk: food insecurity will likely occur for these households in the not so distant future. For more on GIS and remote sensing data used for risk analysis, refer to Annex 10.

#### 6.2.4.6 Key references: Risk analysis

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### 6.2.5 Analysis of gender-disaggregated information

#### 6.2.5.1 Quantitative data analyses

Food security and vulnerability analyses rarely use gender as the sole criteria for defining groups for analysis (although such estimates are likely to be generated for reporting purposes), because the distinction between male/female or male-headed household/female-headed household rarely defines homogenous groups. Rather,

gender should be viewed as a cross-cutting theme that can be combined with other criteria for comparative purposes. However, analysis of anthropometric data should be disaggregated by sex to understand gender dimensions in food consumption, access to health services, and so on. To understand the determinants of malnutrition, a regression model could be applied using sex as an exogenous variable.

#### 6.2.5.2 Qualitative data analysis

While quantitative data may be used to test hypotheses concerning the causes of negative outcomes and the extent to which gender appears to be a causal factor (e.g. incidence of malnutrition is higher among girls than boys), qualitative data is critical for generating hypotheses about the underlying causes of food security and vulnerability and the relationship of gender to these outcomes. Continuing with the malnutrition example in the previous paragraph, qualitative data may provide some indication of whether and how boys and girls from the same household adopt different coping (food adjustment) strategies in the event of household-level food shortages.

### 6.2.6 Including HIV/AIDS in WFP food security and vulnerability analysis

In countries with high prevalence of HIV/AIDS, geographic targeting should combine data on food insecurity with data on HIV prevalence to identify food-insecure areas where HIV prevalence is particularly high. However, including HIV/AIDS in the food security and vulnerability analysis goes far beyond simply overlapping these data.
When HIV/AIDS indicators are integrated into a food security and vulnerability analysis, findings can strengthen the country-specific empirical evidence on the interaction between HIV/AIDS and household food security and enhance the understanding of the role of food assistance in mitigating the impact of HIV/AIDS. In particular, data can be used to:

- explore the relationship between HIV/AIDS, food consumption, and nutritional outcomes;
- compare the livelihood assets and strategies both of households living with HIV/AIDS and of non-affected households; and
- highlight the coping strategies frequently adopted by affected households.

When information is collected on children orphaned or made vulnerable by HIV/AIDS, data can be used to:

- identify OVC shortcomings in education and nutrition and determine whether they are more likely to be involved in working activities (child labour); and
- compare the food security status, livelihood assets, strategies and coping mechanisms of households with orphans and households without orphans.

Not only can such findings increase the country-specific evidence on the link between HIV/AIDS, livelihood, and food security, but they can be used to guide other steps of targeting (e.g. development of beneficiaries' selection tools).

#### 6.2.6.1 General challenges in analysing the impact of HIV/AIDS

While WFP CFSVA has proven to be a useful tool for identifying traditional causes of food insecurity, a number of critical challenges arise in assessing the bi-directional relationship between vulnerability to food insecurity and HIV/AIDS. These challenges include:

**Lack of longitudinal data**
A deep understanding of the inter-relationships among HIV/AIDS, livelihoods, and food security can be reached only by analysing longitudinal data. CFSVAs are not meant to provide panel data. Even in countries where food security assessments have been conducted several times, survey instruments are not necessarily developed to provide repeated cross-sectional data. As a consequence, CFSVAs are more suitable for capturing key disparities in livelihood assets, strategies, and outcomes at a certain point in time rather than exploring dynamics.

**Lack of country-wide results**
CFSVAs are usually conducted in rural areas. The exclusion of urban areas represents a serious challenge to HIV/AIDS analysis because HIV prevalence is often higher in urban settings, and services for people living with HIV/AIDS are more frequently provided in such areas.

**Inference to the population**
As a general rule, food security and vulnerability analyses sample villages through a probability-proportional-to-size approach and then select households randomly. The percentage of affected households that can be expected in a CFSVA depends on the HIV prevalence in the country or region surveyed. In countries with low or medium prevalence, the number of households in the sample affected by HIV/AIDS can be very low. This increases the chance of findings that are not statistically significant and limits the possibility of conducting multivariate analysis.

### 6.2.6.2 Chronic illness a proxy indicator for HIV/AIDS

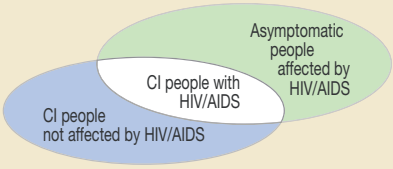
Most of the empirical studies on HIV/AIDS consider a household as affected by HIV/AIDS if:
- one or more adult members are infected by HIV/AIDS; and/or
- one or more adult members died recently (over the past 12 months) from AIDS.

There are practical constraints to identifying households affected by HIV/AIDS. In particular, (1) it is difficult to test for HIV antibodies; and (2) it is challenging to ask an individual directly if she/he is sero-positive. (People either do not know or prefer not to disclose their status.) Because of these problems, proxy indicators are necessary for identifying households living with infected individuals.

In high-prevalence countries, chronic illness (CI) is typically used to identify HIV/AIDS-affected households. In particular, a household is considered affected by HIV/AIDS if:
- there is at least one chronically ill adult (e.g. aged 18 to 59; age range can be context-specific) in the household; and/or
- the household experienced recently (over the past 12 months) the death of one or more adult members (e.g. aged 18 to 59; age range can be context-specific) from chronic illness.

The term chronic illness easily can be misunderstood; it is therefore crucial to agree on a definition. An individual is usually considered “chronically ill” if she/he lives in a condition or with a disease that has prevented her/him from being fully functional for at least 3 out of the past 12 months. Using chronic illness as a proxy indicator for AIDS leads to inclusion and exclusion errors (see Figure 6.1).

**Figure 6.1: Chronic illness as proxy for HIV/AIDS**




Alternative ways of identifying people living with AIDS continue to emerge, but the results are not appropriate for a CFSVA.[108] In the absence of clear guidance from such alternative methods, chronic illness remains the most common proxy indicator for HIV/AIDS.

As a general rule, chronic illness is appropriate if:

- HIV/AIDS prevalence in the country is high (e.g. official thresholds do not exist, but in most of the southern African countries, HIV prevalance justifies using chronic illness); and
- there are no other factors or illnesses leading to high incidence of chronic illness.

If these circumstances are not met, chronic illness should be interpreted as an indicator of a health-related shock within the household, rather than as a proxy indicator for HIV/AIDS. From this perspective it is still useful to understand the impact of prolonged illness on food security (see Box 6.14).

**Box 6.14: Assessing the validity of chronic illness**

In some countries, Demographic and Health Surveys (DHSs) include blood tests for HIV antibodies and questions about chronic illness. This makes it possible to assess the validity of chronic illness as a proxy indicator for HIV/AIDS.

During the Cameroon CFSVA 2007, a secondary data analysis on DHS 2004 data showed that only 12 percent of the chronically ill adults (aged 15 to 49) were HIV-positive and 87 percent of the HIV-positive adults (15 to 49) were not chronically ill. As a consequence, chronic illness (and death from chronic illness) was analysed to explore the impact of prolonged illness on household food security.

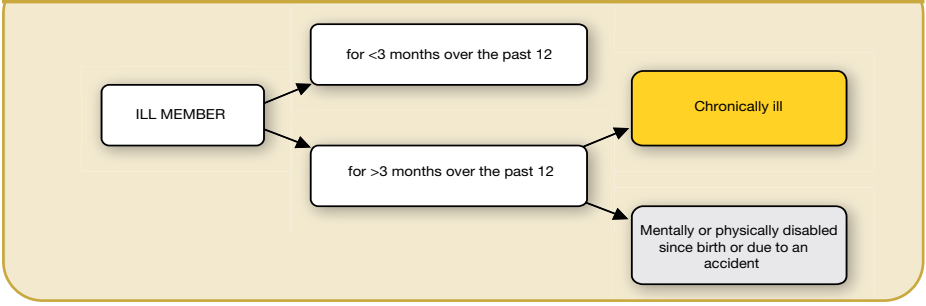
Inclusion and exclusion errors cannot be entirely eliminated, but they can be reduced by improving data collection. With this regard, it is important to:

- Be cautious in using methods based on a verbal autopsy or list of symptoms until solid evidence emerges that such methods are effective. Such methods deserve attention and need more investigation, but they require careful training of enumerators.
- Make sure the questionnaire distinguishes between individuals who are mentally or physically disabled (due to accident or since birth) and those who are chronically ill.
- Provide the enumerators with a clear definition of chronic illness. They should understand that different stages of chronic illness exist and that a CI individual can be bedridden; not bedridden, although completely unable to work; or not bedridden and able to work for a few hours or days. Also, months of inactivity can be non-consecutive.

108. Some instruments, such as the checklist-type tool developed by the Catholic Relief Services (CRS), are not suitable for a population-based survey. Other tools (e.g. the verbal autopsy method developed by Ainsworth and Semali, 1998) do not require medically skilled enumerators, but they do require careful phrasing of the questions and direct access to people who live or have lived in close contact with the chronically ill.

- Urge the enumerators to rephrase the term chronic illness during data collection, adopting terms more suitable to the local context. For instance, enumerators can substitute "to be fully functional" with other terms, such as "to engage in daily activities as usual" or "to be operational." The important thing is to convey the meaning of the term "fully functional," not to use the same terminology everywhere.

**Figure 6.2: Avoiding misunderstanding of the term "chronic illness"**




As mentioned earlier, it is important to determine if other factors exist that may cause a high incidence of chronic illness. If they do, they may compromise the effectiveness of the proxy indicators.

A more detailed list of illnesses has been adopted in some surveys.[109] Along with the distinction "ill for less than three months/chronically ill/disabled," some surveys have included specific illnesses in their list of possible answers, such as malaria, asthma, TB, cancer, and AIDS. The purpose is to improve the ability to distinguish between people suffering from HIV/AIDS and people who have been sick for more than three months due to other problems. The main challenge of this approach is that interviewees usually have no competence in medicine and are rarely aware of which illness they experience. If this approach is used, it is crucial to train the enumerators to describe the main symptoms of all the listed illnesses. Also, it is advisable in the analysis to consider individuals affected by TB as persons living with HIV/AIDS, since TB is frequently associated with AIDS.

The way we capture the presence and key attributes of chronically ill or deceased household members depends on how demographic data are collected during the household survey. Examples of data collection modules are provided on pages 30–36 of the HIV/AIDS technical guidelines summarized in section 4.2 of the present guidelines ("Household Data Collection").

### 6.2.6.3 Analysing food consumption in the context of HIV/AIDS

Proxy indicators for HIV/AIDS are typically reported at the household level (e.g. percentage of households with at least one CI adult member or percentage of households with one orphan). Food security and vulnerability analyses collect data at the household level on food consumption, food sources and stocks, livelihood assets, and strategies. As a consequence, **analysis of the interaction between HIV/AIDS, food security, and livelihoods has to be conducted at the household level**.

To understand the relationship between HIV/AIDS and food security, analyses should focus on the key issues usually considered in food security analysis: current food

consumption, dietary diversity, sources of food, food reserves, etc. The purpose is to identify differences in food security between affected and non-affected households.

#### 6.2.6.4 Analysing nutritional outcomes

The unit of analysis for nutritional outcomes (e.g. women's and children's nutritional status) is the individual. **The interaction between HIV/AIDS and nutritional outcomes can therefore be analysed at the individual level**. In general, household-level factors have an impact on individual status. Thus, the analysis can control for the presence of HIV/AIDS proxies to assess the impact of HIV/AIDS on women's and children's nutritional status.

#### 6.2.6.5. Consideration of livelihood assets and strategies

In order to have a complete understanding of the impact of HIV/AIDS on household food security, it is crucial to consider livelihoods in the analysis. HIV/AIDS literature highlights the main effects of HIV/AIDS on livelihoods. Some indicators typically collected during CFSVAs can be used to explore the interaction between HIV/AIDS and livelihoods and analyse data through an HIV lens. These are listed in Table 6.10. The list can be useful also during questionnaire design, to help ensure that the HIV/AIDS component is included in the assessment. This list is the result of a comprehensive review of household questionnaires used in CFSVAs over the past two years, and community and household surveillance (CHS) questionnaires.

**Table 6.10: Analysing HIV/AIDS impact: indicators available from CFSVAs**

| | |
|---|---|
| **Human capital** | • Household size<br>• Household composition (gender)<br>• Household headship (gender and age)<br>• Orphans (presence of, number of)<br><br>• Migration in (and reason)<br>• Migration out (and reason)<br><br>• Prevalence (%) of effective dependents<br>• Decrease in amount of land cultivated<br>• Reasons for not cultivating land (or for cultivating less land)<br><br>• Children's enrolment in school<br>• Children dropping out from school (and reason)<br>• Children's absenteeism (and reason) |
| **Financial capital** | • Expenditure on health, medicines, transport, and funerals (e.g. per capita and household expenditures as percentage of total expenditure)<br>• Expenditure on seeds, fertilizers, etc.<br>• Income-generating activities and their contribution to total income<br>• Access to credit<br>• Borrowing money (primary reason and source of credit) |
| **Social capital** | • Material support received from relatives or friends (e.g. money, food, clothing, and agricultural inputs) |
| **Natural capital** | • Kind of irrigation system, fertilizers, and pesticides used<br>• Quantity and kind of crops cultivated<br>• Access to land<br>• Proportion (%) of land cultivated (out of total land owned)<br>• Proportion (%) of land rented or lent out (out of total land owned)<br>• Selling land (and reason) |
| **Physical capital** | • Assets and livestock owned<br>• Selling or bartering livestock (by kind of livestock and reason for selling or bartering)<br>• Selling assets (and reason for) |

109. See 2006 Mozambique Baseline Report (December 2006).

It is extremely important to note that:

- WFP food security and vulnerability assessments help identify differences between affected and non-affected households. Since CFSVAs are not meant to be longitudinal studies, they face challenges in understanding the vicious circle between HIV/AIDS and livelihoods. CFSVA household data alone cannot answer questions regarding processes.
- Some effects mentioned in the HIV/AIDS literature do not have a related indicator in the food security and vulnerability studies.[110]
- Some of the indicators reported in the table help identify negative consequences (e.g. disparities in labour force), while others highlight coping strategies (e.g. migration of household members). Still, coping mechanisms can serve as indicators for HIV/AIDS impact because as the impact becomes more severe, household strategies tend to become more desperate.

#### 6.2.6.6 Capturing the process

As mentioned earlier, CFSVA data can be used only for a cross-sectional analysis. To obtain insight into the process it is necessary to include explicit questions about consequences and coping mechanisms. There are three options for how to do this:

1. Ask respondents to identify and rank strategies adopted by the household to minimize the effects of chronic illness and death.[111]
2. Include questions on specific coping strategies in the appropriate sections of the questionnaire and use those questions to compare actions taken by the affected and non-affected households.
3. Look at the Coping Strategy Index (see example in Box 6.15, page 264).

#### 6.2.6.7 Shortcomings of orphans and other vulnerable children (OVC)

Within the context of a CFSVA, OVC are operationally defined as children under 18 years old who are orphaned, or who live in a HH with a chronically ill adult, or who live in a HH where an adult member has recently died from chronic illness. The presence of one of these attributes is sufficient to classify a child as an OVC. The analysis can focus only on orphans or be extended to vulnerable children. Vulnerable children can be included in the analysis only if proxy indicators for HIV/AIDS have been collected through the household questionnaire.

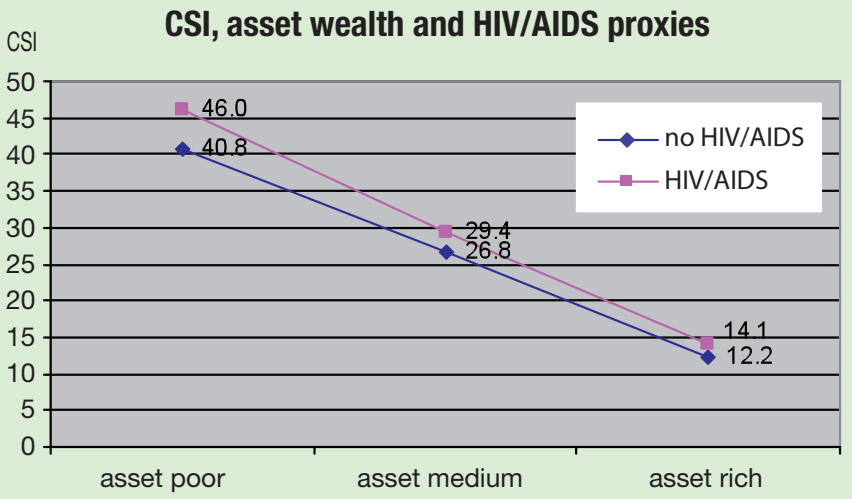


110. Indicators of human capital that are usually *not* available in the CFSVA are: "time available for domestic labour and child-care," "loss of agricultural knowledge, practices and skills." Indicators of financial and social capital usually *not* available are: "liquidation of savings accounts," "pledging of future crops," "increased reliance on community willingness to support educational/nutritional needs of orphans," "decrease in time to participate in social/cultural activities." Impacts on natural and physical capital usually *not* considered include "reduction in soil fertility," "fallow land returning to bush," and "appropriation of land by relatives."

111. This kind of approach has been adopted by the food security group working at Michigan State University in several survey instruments (http://www.aec.msu.edu). Details and examples are reported in the technical guidelines *Integrating HIV/AIDS in WFP Food Security and Vulnerability Analyses.*

**Box 6.15: Coping Strategy Index (CSI)**

Households living with chronic illness or with a recent death from chronic illness are more likely to adopt strategies to cope with a decline in food consumption. This is true for all the asset categories and becomes more evident among asset-poor households.




*Source:* Regional analysis undertaken on the Community and Household Surveillance (CHS) survey data, Round 8, Lesotho, Malawi, Mozambique, Swaziland, Zambia, and Zimbabwe, 2007.

Most of the studies suggest analysing the impact of HIV/AIDS on OVC by considering education, labour, nutritional, and health status. Food security and vulnerability analyses also allow consideration of food consumption, livelihood assets, and strategies. Box 6.16 includes an example of findings related to orphans.

Data analysis can be conducted both at the individual and the household level. It is not advisable to impose a universal rule on what should be analysed at which level, as the choice depends upon the kind of indicators and the objective of the research.

As a general rule, individual-level analysis is more appropriate for exploring individual attributes (e.g. shortcomings in education and nutritional status and exposure to labour). Household-level attributes (e.g. food consumption, livelihoods, and coping mechanisms) can be analysed both at the individual and the household level.

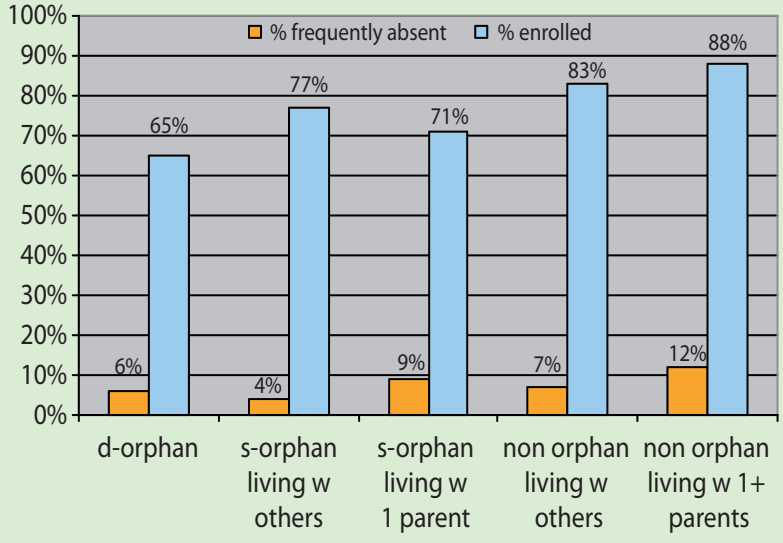
**Box 6.16: Greater Monrovia Comprehensive Food Security and Nutrition Survey (CFSNS) - Education, by parental status**

The CFSNS conducted in Greater Monrovia in 2006 found that 10 percent of children (ages 0–17) are orphans; 18 percent have both parents alive but do not reside with the biological parents, and 72 percent have both parents alive and reside with at least one of them. The high prevalence of non-orphans living with relatives or acquaintances is a consequence of the social disruptions Liberia faced during the civil war.

Overall, 85 percent of children (ages 6–17) are in school. The percentage decreases among orphans, and reaches 65 percent among double orphans. Single orphans living with others are more likely to be enrolled than single orphans living with the surviving parent.

The chance of being enrolled in school increases among non-orphans, and is as high as 88 percent among non-orphans living with at least one biological parent.

Even when taking into account their more frequent absences, non-orphans are more likely to attend classes than orphans.




## 6.3 COMMON KEY INDICATORS IN FOOD SECURITY ANALYSIS

### 1. Size of household

The number of people living in a household, with household defined according to country-specific standards.

**Calculation:** n/a

**Key concerns:** Outliers can include large extended families; definition of HH used during data collection must be considered.

**Reporting:** Mean number of household members (usually to the tenth); median number of household members. Also possible by percentage of HHs above a certain cut-off, particularly if there are many outliers. Rarely graphed.

**Descriptive procedure:** Descriptive statistics compare means.
**Interpretation:** Mean and median; care should be taken to evaluate the two (looking at S.D., frequencies, etc.) to arrive at the best descriptive statistic.
**Type of variable:** Continuous (can be transformed to categorical ordinal).
**Importance to food security analysis:** Larger households may be more vulnerable to food insecurity, although this is not a rule. The size of the household is sometimes used in calculating food rations. For a more vulnerability-related indicator, see item 2, "Age dependency ratio."

**2. Age dependency ratio**

**Calculation:** The age dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, expressed as a percentage.

A measure of the portion of a population composed of dependents (people too young or too old to work).

Dependents: no. of people < 15 and >64
Independents: no. of people ≥15 and ≤64
The formula is:

$$= \frac{\text{Number of dependents}}{\text{Number of independents}} \text{ X } 100$$

(Age 15-64)

The young dependency ratio includes children ages below 15 years, and the elderly dependency ratio focuses on those ages over 64 years. For example, if in a population of 1,000 there are 250 people under the age of 15 and 500 people between the ages of 15-64. The youth dependency ratio would be 50% (250/500).
**Key concerns:**
This indicator gives insight into the number of people of non-working age compared to the number of those of working age. A high ratio means that those of working age – and the overall economy – face a greater burden in supporting the young and the ageing population.

This indicator is useful at the aggregate level (country, region, state, etc.) but not at household level, because if a household has no independent people (denominator equal to zero), then the dependency ratio will be an invalid number. For this reason the percentage of dependent people (see following indicator) is used.
**Reporting:** Ratio and comparison between different levels (when possible).
**Descriptive procedure:** Compare means.
**Interpretation:** The higher the ratio, the higher the dependent population. If the ratio is 100 percent, then there is the same number of dependent and independent people. The interpretation of the different ratio should be contextualized with the analysis.
**Type of variable:** Continuous
**Importance to food security analysis:** Population groups or regions with a high age dependency rate are generally less food secure. A rising age dependency ratio is a concern in many countries facing an ageing population, since it becomes

difficult for pension and social security systems to provide for a significantly older, non-working population. In many countries where WFP is active, a high dependency ratio is due to a high number of children, including orphans, and to the mortality of adults due to violence or diseases such as AIDS.

### 3. Percentage of dependents[112]

Number of dependent people in a household based on household size.

**Formula:** (Number of dependents/household size) x 100
**Key concerns:** This indicator should be used at the household level.
**Reporting:** Compare means of the various food security or livelihood groups in order to describe the demographic profile.

**Descriptive procedure:** Mean; compare means.
**Interpretation:** A total of 0 percent means that no member in the household is of a dependent age, while a number equal to 100 percent means that all members of the household belong to the dependent age category. Table 6.11 provides an example of dependency ratio and percent of dependents.

**Table 6.11: Example of proportion of dependents and dependency ratio calculation**

| No. of dependents | No. of independents | Household size | Percentage of dependents | Dependency ratio (%) |
|---|---|---|---|---|
| 1 | 2 | 3 | 33 | 50 |
| 2 | 1 | 3 | 67 | 200 |
| 4 | 2 | 6 | 67 | 200 |
| 5 | 6 | 11 | 45 | 83 |
| 6 | 5 | 11 | 55 | 120 |
| 2 | 2 | 4 | 50 | 100 |
| 13 | 11 | 24 | 54 | 118 |
| 4 | 2 | 6 | 67 | 200 |
| 5 | 1 | 6 | 83 | 500 |
| 8 | 4 | 11 | 73 | 200 |

**Type of variable:** Continuous, ratio.
**Importance to food security analysis:** This information can be considered a vulnerability indicator. If the percentage of dependents in the household is very high (>70 percent), then there is a serious vulnerability problem in that household.

112. In countries with high prevalence of HIV/AIDS, it might be interesting to look at the percentage of effective dependents instead of limiting the analysis to the percentage of dependents. The formula is: (no. of effective dependents/household size) x 100. The effective dependents include the dependents and the persons who are of working age but are either chronically ill or disabled.

**4. Crowding Index**

The average number of people per room in a dwelling

**Calculation:** For each household, the crowding index is calculated as the number of household members per number of rooms in the dwelling.
**Key concerns:** Multiple-dwelling households (as with extended families, polygamy, etc.), nomadic populations living in tents, large huts without internal separations, and other atypical housing situations, may give results that are difficult to interpret.
**Reporting:** Mean occupation ratio; rarely graphed.
**Descriptive procedure:** Compare means.
**Interpretation:** Larger ratio means a larger number of people per room.
**Type of variable:** Continuous; may or may not be normal.
**Importance to food security analysis:** Can be an element in the construction of a wealth index.

**5. Child-headed households or elderly-headed households**

Households with a household head aged less than 18 years or aged 60 years and older.

**Calculation:** Age of household head must be converted to a categorical (bivariate) variable.
**Key concerns:** Be sure the HH head age data is clean and that missing values (e.g. 99, 999, etc.) are not recoded into age categories. In some cultures the eldest (male) in the household is almost automatically considered the household head, making the indicator less meaningful.
**Reporting:** Reported as a percentage of households.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As a simple percentage.
**Type of variable:** Categorical, bivariate.
**Importance to food security analysis:**
Child-headed or elderly-headed households are usually more food insecure.

**6. Marital status of household head**

A person's marital status describes his/her relationship with a significant other. Some common statuses are: married, single, separated, divorced, widowed, cohabiting.

**Calculation:** n/a
**Key concerns:** Make clear distinction among marital status categories in the questionnaire according to the local context (e.g. include "cohabiting" if this is a relatively common practice; reporting cohabiting people as married or single would be misleading).
**Reporting:** Reported as a percentage of households.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As a simple percentage.
**Type of variable:** Categorical, nominal.
**Importance to food security analysis:** Food insecurity is often found to be related to certain marital status categories. For example, in many contexts widows/widowers or single mothers are expected to be more prone to food insecurity. Marital status can be

used as a criterion for targeting programme options if CFSVAs give evidence that it affects household food security status.

**7. Literacy rate**

Being able to read and write a simple sentence.

**Calculation:** Simple calculation of percentage.
**Key concerns:** Be sure the proper population is selected. The question is typically applicable to all members aged 15 years and older in the household roster.
**Reporting:** Reported as a percentage.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As a simple percentage.
**Type of variable:** Categorical (bivariate); nominal.
**Importance to food security analysis:** Literacy is often positively correlated with improved food security.

**8. Physically challenged members of a household**

With respect to an individual, a physical or mental impairment that substantially limits one or more of the major life activities of that individual.

**Calculation:** Simple calculation of percentage.
**Key concerns:** Physical challenge should be clearly defined to avoid different interpretations among enumerators and interviewees. Especially in countries with high prevalence of HIV/AIDS, it is crucial not to confuse chronic illness and mental/physical disability:

- Chronic illness is a prolonged illness that does not allow individuals to engage in normal activities for at least 3 months (over the past 12).
- Physical challenge limits the capabilities of individuals, but is the effect of an accident, illness, etc. An individual can be disabled from an illness even when the illness is over.

**Reporting:** Reported as a percentage (of people and of households with disabled heads/adult members).
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As a simple percentage.
**Type of variable:** Categorical (bivariate); nominal.
**Importance for food security analysis:** Disabilities, limiting an individual's capacity to perform normal activities, augment people's exposure to food insecurity. A high incidence of physically challenged individuals could indicate a deterioration in the surveyed population's capacity to participate in certain types of humanitarian assistance programmes such as labour-intensive food-for-work.

**9. Sex of household head**

The sex of the head of the household.

**Calculation:** Simple calculation of percentage.
**Key concerns:** There should be very little, if any, missing data. Miscoded cases should be set to "missing," when unable to correct. When calculating from the household roster, households reporting more than one head of HH should be set to "missing" when heads are of the opposite gender.

**Reporting:** Percentage female-headed households; percentage male-headed households.
**Descriptive procedure:** Frequencies, cross-tabs (may require data transformation from individual data to HH data).
**Interpretation:** Interpreted as a simple percentage.
**Type of variable:** Categorical, bivariate.
**Importance for food security analysis:** Sex of household head is often correlated with food security. In many cultures, female-headed households are found to be (but are not always) more food insecure, because these households lack an income earner. High levels of female-headed households may indicate some underlying problem (conflict, migration, etc.).

**10. Age of household head**

**Calculation:** n/a
**Key concerns:** Outliers, missing data; definition of HH head.

The age of the household head (regardless of sex) should be in completed years.

**Reporting:** Mean age of household head, percentage of household heads under the age of x years (cut-off defined on a country-by-country basis, but is usually less than 18 and over 60).
**Descriptive procedure:** Compare means; descriptive statistics.
**Interpretation:** Mean (watch for outliers), possibly median.
**Type of variable:** Continuous (can be transformed to categorical, hierarchical)
**Importance for food security analysis:** Sometimes older or very young household heads are more vulnerable to food insecurity.

**11. Years of schooling**

**Calculation:** n/a if the years of schooling of the HH members are kept separated; however, sometimes calculated as the sum of years of education of the HH head and his/her spouse if summarizing the information into one indicator.

Total years of education, by individual member in the household roster.
Often surveys collect this information only for household heads and their spouses.

**Key concerns:** If the HH member repeated grades, the years of education increase, but not his/her level of education.
**Reporting:** *For the HH head:* (1) mean number of years of education; (2) median number of years of education; (3) percentage of HHs where the years of education of the HH head is above a certain cut-off (e.g. number of years required to complete the primary cycle).
*For the spouse of the household head*: Report mean and median number of years of schooling. If the years of education of the HH head and spouse are combined into one indicator, report: (1) the mean of the combined indicator; (2) the median of the combined indicator; (3) the percentage of HHs where the years of education of the HH head and her/his spouse is above a certain cut-off.
**Descriptive procedure:** Descriptive statistics (mean, SD, shape of the distribution, frequency distribution, etc.); compare means.
**Interpretation:** Carefully interpret the mean, the median, the shape of the distribution. Take care in identifying outliers and extreme cases.

**Type of variable:** Continuous (can be transformed to hierarchical).
**Importance for food security analysis:** HHs where the level of education of the HH head (and his/her spouse) is poor can be more vulnerable to food insecurity and are more likely to have children out of school or not completing the primary cycle (thus reinforcing the cycle of poverty and vulnerability).

### 12. Level of schooling

Level of schooling attained by the HH member. Usually this indicator is collected for the HH head and his/her spouse. Typically the following answers are provided: no education, did not complete primary cycle, completed primary cycle, did not complete secondary cycle, completed secondary cycle, had vocational training, did not complete university, completed university.

**Calculation:** n/a (if levels of schooling of the HH head and his/her spouse are kept separated); level of schooling of the HH head and his/her spouse can be combined into one indicator in order to have one proxy of the educational status of the HH.
**Key concerns:** Poor sensitivity of the indicator (e.g. behind a "did not complete primary cycle" we may find different levels: people who almost completed the cycle and people who attended for only one year). How to treat Koranic schools, non-formal education, and vocational education.
**Reporting:** (1) percentage of HHs by the level of schooling of the HH head, (2) percentage of HHs where the level of schooling of the HH head is above a cut-off (e.g. primary cycle completed), (3) percentage of HHs by the level of schooling of the spouse of the HH head, (4) percentage of HHs where the level of schooling of the spouse of the HH head is above a cut-off, (5) percentage of HHs by the combined indicator.
**Descriptive procedure:** Descriptive statistics (frequency distribution, mode, etc.), cross-tabulations.
**Interpretation:** Caution in interpreting the results of the cross-tabulations and Chi-square, especially with a low number of cases.
**Type of variable:** Categorical ordinal.
**Importance for food security analysis:** HHs where the level of education of the HH head (and his/her spouse) is poor may be more vulnerable to food insecurity and are more likely to have children out of school or not completing the primary cycle (thus reinforcing the cycle of poverty and vulnerability).

### 13. Net enrolment

*For primary school:* The number of primary school–age children enrolled in primary school out of the primary school–age children living in the area. For secondary school – if information is available: the number of secondary school–age children enrolled in secondary school out of the secondary school–age children living in the area.
*Net enrolment range:* From 0 (none of primary school–age children living in the area attend school) and 1 (all the primary school–age children living in the area attend school). NER can be expressed in decimals or with percentages.

**Calculation:**
*Option A for each HH:* The number of **primary school–age children** living in the HH who are enrolled in primary school divided by the number of primary school–age children living in the HH. This calculation gives the NER of each HH.
*Option B at the aggregate level:* The total **number of primary**

**school–age children** included in the sample who are enrolled in primary school divided by the number of primary school–age children of the area. This calculation gives the overall NER of the children.
**Key concerns:** The term enrolment is different from the term attendance. A child is enrolled if his/her name is on the school register. A child is attending if he/she is actually going to school. Considering that the main purpose of WFP School Feeding activities is to increase access to education, enrolment should be a priority instead of attendance. However, it is suggested not to use the term enrolment in the questionnaire because people may not understand its meaning. It is suggested to simply ask, "Is [...] going to school?" It is better to calculate NER at the aggregate level.
**Reporting:** The average NER of the HHs, the median NER of the HHs, the overall NER of the children.
**Descriptive procedure:** Descriptive statistics, compare means.
**Interpretation:** Take care in interpreting the mean, the median, and assessing the shape of the distribution. Distinguish clearly between the average (or mean) NER of the HHs and the overall NER of the children (different level of aggregation; both statistics are valid and they complement each other).
**Type of variable:** Continuous.
**Importance for food security analysis:** Poor educational status increases vulnerability to food insecurity.

### 14. Gross enrolment rate

The number of children enrolled in primary school (disregarding their age) out of the population of the age group that officially corresponds to the level of education shown. Gross enrolment rate: GER is 0 if none of the children living in the area is going to school; GER could be higher than 1 if there are pupils still enrolled in primary school even if they are already of an age to be in secondary, or if there are those too young to officially enter primary education. GER can be expressed in decimals or with percentages.

**Calculation:** The total **number of children (disregarding their age)** living in the sample HH who are enrolled in primary school divided by the number of the population of the age group living in the area that officially corresponds to the primary education level.
**Key concerns:** The term enrolment is different from the term attendance. A child is enrolled if his/her name is on the school register. A child is attending if he/she is actually going to school. Considering that the main purpose of WFP School Feeding activities is to increase access to education, enrolment should be a priority instead of attendance. However, it is suggested not to use the term enrolment in the questionnaire because people may not understand its meaning. It is suggested to simply ask, "Is [...] going to school?" It is better to calculate NER at the aggregate level.
**Reporting:** The average GER of the HHs, the median GER of the HHs, the overall GER of the children.
**Descriptive procedure:** Descriptive statistics, compare means.
**Interpretation:** Interpreting gross enrolment is not as easy as interpreting net enrolment. Both high and low gross enrolment rates are undesirable. High gross enrolment levels (over 100 percent) indicate large numbers of overage children in primary school, indicating poor academic progress and a high level of repetition in the school system. Low gross enrolment rates reflect low net enrolment rates from lack of

school attendance because children either have poor access to schools or are kept away by their parents.
**Type of variable:** Continuous.
**Importance for food security analysis:** Poor educational status increases vulnerability to food insecurity.

### 15. Housing construction materials

Major material of house roof, wall, and flooring.

**Calculation:** n/a
**Key concerns:** Appropriate material definitions. The list of possible options must be tailored to the local context; try to identify materials that can distinguish households on the basis of their wealth.
**Reporting:** Reported as percentage of households.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As a simple percentage.
**Type of variable:** Categorical, nominal.
**Importance for food security analysis:** Aside from a simple description of the household status from single house features, determined material categories could be used in the construction of the wealth index, an indicator that aims to synthesize different components of the household-level wealth (see Wealth Index in Annex 3).

### 16. House ownership

Legal title or other right to use the house. Three broad categories are usually present as minimal differentiation: ownership, rental payment, or staying for free without owning the house.

**Calculation:** n/a
**Key concerns:** The concept of ownership differs from context to context. Even if house ownership is more of a concern than speaking about land ownership (with diverse land tenure legislation in different countries and in different society organizations) house ownership, based on local knowledge, has to be clearly defined and commonly understood by survey designers, enumerators, and interviewees.
**Reporting:** As percentage of households.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical, nominal
**Importance for food security analysis:** In certain contexts, especially urban and peri-urban, where housing is commonly accepted to be a problem, house ownership provides a common measure of wealth and stability. House ownership can also be used in creating a wealth index.

From the food security perspective, house ownership should be analysed by taking gender into consideration. In some contexts, when the man dies, the wife loses both the land and house. Such inheritance practices may start a destitution process in which households headed by widows face strong challenges to maintaining their livelihood assets.

### 17. Toilet/sanitation

| Improved sanitation facilities | Unimproved sanitation facilities | No facilities |
|---|---|---|
| Connection to a public sewer<br>Connection to a septic system<br>Pour-flush latrine<br>Simple pit latrine<br>Ventilated improved pit latrine | Public or shared latrine<br>Open pit latrine<br>Bucket latrine | |

Access to sanitary means of excreta disposal is estimated by the percentage of the population using improved sanitation facilities. Improved sanitation facilities are those more likely to ensure privacy and hygienic use. WFP adopts the definition from UNICEF and WHO, which have teamed up to track progress on global water and sanitation goals through the Joint Monitoring Programme (JMP) for Water Supply and Sanitation.

**Calculation:** Usually collected using multiple options; categories are recoded into three main groups, improved versus unimproved sanitation facilities or no facilities.
**Key concerns:** Measuring "basic sanitation" is complicated. Ideally, the definition of this term would encompass critical components of what sanitation services should aim for: privacy, dignity, cleanliness, and a healthy environment. From a monitoring point of view, however, such characteristics are difficult to measure. To resolve these issues, the UNICEF/WHO JMP classifies sanitation facilities and water supply sources as either "improved" or "unimproved." In doing so, it makes the assumption that those classified as "improved" are likely to be more sanitary than "unimproved" ones.

Not all people with access to improved facilities or sources actually use them. Consequently, the JMP has adopted "use" as the primary indicator for monitoring progress in both water and sanitation. (http://www.unicef.org/wes/mdgreport/monitoring1.php).
**Reporting:** Coverage estimates are expressed as percentage of households using improved sanitation facilities.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical, nominal.
**Importance for food security analysis:** "Use of improved sanitation" is a commonly used indicator to assess hygiene at the household level. Access to a sanitary latrine is a proxy indicator to measure vulnerability to diarrhoea and other diseases; hence this indicator is a proxy measure of food utilization. It is crucial to collect this indicator whenever anthropometry is included as part of the survey, as the relationship between level of malnutrition and poor hygiene can be explored. The use of selected improved sanitation facilities can also be used in the construction of the wealth index.

### 18. Water source (drinking, other)

| Improved drinking water sources | Unimproved drinking water sources |
|---|---|
| Household connection<br>Public standpipe<br>Borehole<br>Protected dug well<br>Protected spring<br>Rainwater collection<br>Tubewell/hand pump | Unprotected well<br>Unprotected spring<br>Rivers or ponds<br>Vendor-provided water<br>Bottled water*<br>Tanker truck water |

*Bottled water is not considered improved due to limitations in its potential quantity, not quality.

Access to safe drinking water is estimated by the percentage of the population using safe drinking water sources (definition from UNICEF/WHO Joint Monitoring Programme for Water Supply and Sanitation).

**Calculation:** Usually collected using multiple options; categories are recoded into two main groups, improved versus unimproved drinking water sources.

**Key concerns:** Existing surveys do not provide information on the quality of water, either at the source or in households. Improved water sources may still contain harmful substances, and water can be contaminated during transport and storage. Although "safe drinking water sources" provides a good indicator for progress, it is not a direct measure of it. Dangerous levels of chemicals, such as the arsenic and fluoride, increasingly found in groundwater in South and South East Asia, are of growing concern, along with infectious or other toxic substances. The proportion of the population using safe drinking water is therefore likely to be lower than that using improved drinking water sources.
(http://www.unicef.org/wes/mdgreport/monitoring1.php).
See number 17, "Toilet/sanitation," for discussion on improved/unimproved water sources and concept of use versus that of access.

**Reporting:** Coverage estimates are expressed as percentage of households using improved drinking water sources.

**Descriptive procedure:** Frequencies, cross-tabs.

**Interpretation:** As simple percentage.

**Type of variable:** Categorical, nominal.

**Importance for food security analysis:** The use of unsafe drinking water is directly related to water-related diseases such as diarrhoea, cholera, and typhoid. These types of diseases are often found to be a cause of malnutrition. The use of selected improved water sources can also be used in the construction of the wealth index.

### 19. Distance from water source

Time or distance from the house to the main water point.

**Calculation:** If time or distance is collected as a continuous variable, values can be recoded into categories. Cut-offs should be decided inspecting the shape of the distribution in order to avoid having disproportionate categories.

**Key concerns:** Time or distance can be reported as "one way" or "round trip." If the aim is to estimate the overall time spent to access water (exclusively dedicated to fetch water), "round trip" seems to be more appropriate. If the aim is to carry out a spatial analysis between water point distance and other food security indicators, the indicator should be collected as "one way."

**Reporting:** Mean and median of the distance/time. Pay attention when calculating mean of time, if values are recorded in hours. The values should be recorded in the same way consistently by all enumerators (e.g. 1h30, 1h15, etc. or 1.5 h, 1.25 h, but not a combination of the two). The data entry programme can, if necessary, convert to the decimal notation. If the indicator is collected using categories, it is reported as percentage of households.

**Descriptive procedure:** Descriptive statistics, compare means; frequencies and cross-tabs, if categories are used/constructed.

**Interpretation:** Take care to carefully interpret the mean, the median, the shape of the distribution. Take care also in the identification of outliers and extreme cases. Take care

in the appropriate selection of cases, when values are entered as missing (e.g. 999) or non-applicable (e.g. water on premises 888, which would mean 0 minutes as timing or 0 metres as distance). Appropriate selection must also be performed according to the aim of the analysis: if the aim is to estimate the overall average time in a certain location (village, district, province, country), households that have water on premises (time to go to fetch water = 0) should be included as part of the population of that area. If the aim is to estimate the time needed to fetch water for households that have to walk/move to get water, households with water on the premises should be considered as non-applicable and hence excluded from the calculation.
**Type of variable:** Continuous or categorical (ordinal).
**Importance for food security analysis:** Access to water is a key element for food security and human life in general. The time household members have to invest to obtain water cannot be allocated for other activities such as household care or income generation.

**20. Source of light, cooking fuel**

Main source of light and main cooking fuel used.

**Calculation:** n/a
**Key concerns:** These indicators are fairly straightforward, with limited possibility of misunderstanding. Attention must be paid during the construction of the option lists: options must be limited but also vary enough to differentiate among households.
**Reporting:** Reported as percentage of households.
**Descriptive procedure:** Frequencies, cross-tabs.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical, nominal.
**Importance for food security analysis:** The source of light could be an indicator of social status. However, use of certain facilities depends not only on household well-being, but also on those facilities' general availability. For example, if electricity is not present in a rural area, using it as a category to identify better-off households would be futile.

The source of cooking fuel could be a wealth indicator at the household level, but is probably more useful at an aggregated level, when the extensive use of particular items, such as firewood, could damage the natural environment. Pay particular attention to the use, availability, and deterioration of stock of natural cooking fuel when population density is high or suddenly increases, as in areas with IDPs or refugees, both in and outside camps, or urban and peri-urban areas.

Selected categories from both source of light and cooking fuel could be used in the construction of the wealth index.

**21. Assets (household, physical)**

Number of wealth and production assets.

**Calculation:** Ownership is collected in numbers. The asset index can be calculated in different ways. However, the most common method is either to collect

the value of each asset and then monetize the assets, or to assign a weight to each of the assets based on its relative value. The final stage is to sum them.

**Key concerns:** Listed assets must be typical for the context but allow for inter-household differences to be captured. Knowing the condition of the asset can significantly help to put a correct monetary value on it. Sometimes, what is generally considered an asset to the household could, instead, be a liability. For example, a recent study in the West Bank reported that having cattle is considered a liability for Bedouin households, as cattle feed is more expensive than the price realized when cattle are sold. In this type of situation, cattle should not be included in the asset or wealth index.

**Reporting:** Mean and median value of asset or mean/median index value of asset, and percentages of households owning important productive assets (e.g. land, plough, tools, net, boat).

**Descriptive procedure:** Important productive assets – frequency and cross-tabs; asset or wealth index – compare means.

**Interpretation:** Key productive asset ownership interpreted as simple percentage. The asset index can be constructed in different ways. Generally, the higher the score, the wealthier the household.

**Type of variable:** Categorical (bivariate: yes/no) or continuous when number of each single asset is recorded.

**Importance for food security analysis:** Ownership of selected assets may be a sign of wealth or social status. Also, certain items, such as jewellery, household assets, land, and livestock, may be sold in case of difficulties. Consistent depletion may cause the household to slide into deep poverty, preventing them from coping with future emergencies.

### 22. Household shocks

Shocks are defined as events that have negative consequences for individuals, households, or communities. They can be of a natural, economic, political, or social nature. Usually analysis differentiates between covariate and idiosyncratic shocks. Covariate refers to shocks that affect a number of households, whole communities, or geographically defined areas, such as natural disasters, pandemics, or civil insecurity. Idiosyncratic shocks affect individual households and their members, such as loss of employment or the illness/death of a household member.

**Calculation:** n/a

**Key concerns:** Shock depends on household perception, and intensity is not measured.

**Reporting:** Percentage of households reporting specific shock(s)

**Descriptive procedure:** Frequency, cross-tabs.

**Interpretation:** As simple percentage.

**Type of variable:** Categorical (bivariate: yes/no).

**Importance for food security analysis:** Shocks, by definition, imply a negative consequence on individual, household or community welfare status. Shocks can lead to increased vulnerability and a decrease in food security at the individual and household levels.

### 23. Coping strategies

The ways a community, household, or individual adjusts their livelihood strategies in response to a shock or risk.

**Calculation:** n/a
**Key concerns:** The concept of coping strategies is sometimes not well distinguished from activities undertaken in normal day-to-day life. Coping strategies should be reported when something extraordinary (a shock) occurs that worsens the ability of households to maintain their usual standard of life. An effort should be made to distinguish livelihood activities from coping strategies in both questionnaire design and enumerator training. For example, seasonal migration in some communities is a part of a livelihood strategy; hence it should not be considered a coping strategy. In other communities, seasonal migration is not a common livelihood strategy and should be considered a coping strategy.
**Reporting:** Percentage of households reporting specific coping strategies.
**Descriptive procedure:** Frequency, cross-tabs.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical based on frequency.
**Importance for food security analysis:** Coping strategies may involve short-term changes in behaviour, such as switching diets, consuming less expensive foods, or borrowing money. When normal coping and response strategies are exhausted, households will use negative crisis strategies, such as selling productive assets (e.g. female livestock). Repeated shocks and the use of crisis strategies to manage their effects can lead to increased vulnerability and a decrease in food security at the individual and household levels.

### 24. Coping Strategies Index (CSI)

CSI scores are often used as a proxy variable for food insecurity. The CSI is based on the frequency and severity of coping strategies for households reporting food consumption problems. Higher CSI scores indicate a more serious food security situation, and lower scores, a better one. Typical coping strategies include "changing the diet to less preferred food types," reducing portions, and reducing the number of meals.

**Calculation:** Refer to the manual, *The Coping Strategy Index: Field Methods Manual.* (CARE/WFP, 2008).
**Key concerns:** Proper weighting of coping strategies by severity is required.
**Reporting:** Mean score; presented as a table, or bar graph.
**Descriptive procedure:** Compare means.
**Interpretation:** A higher score indicates more frequent and/or use of more severe coping strategies.
**Type of variable:** Continuous; normality of the distribution has to be checked before performing statistical analysis.
**Importance for food security analysis:** The CSI is a particularly powerful tool for monitoring the same households or populations over time.

### 25. Access to agricultural land

Legal title or other right to use agricultural land. Usual response options are: ownership, renting land, tenant farmer (who gives a share of the crop to the landlord), borrowing land, or use of land for free.

**Calculation:** n/a
**Key concerns:** Rules and regulations to access land depend on the local context. Uniformity across a country has to be confirmed when a country-wide survey is planned. Possible options must be clearly defined and commonly understood by survey designers, enumerators, and interviewees, on the basis of local knowledge.
**Reporting:** (1) percentage of households with access to land, and (2) percentage of households accessing land through each specific option.
**Descriptive procedure:** Frequency, cross-tabs.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical, nominal.
**Importance for food security analysis:** The way people access land may influence their use of it. For example, in many contexts, people are more likely to invest in their land (irrigation, terracing, land maintenance, etc.) if they have ownership or secure long-term use of it. In many countries, access to land is one of the key determinants of food security for rural communities.

### 26. Amount of agricultural land/farm size

Area of land cultivated regardless of tenure status.

**Calculation:** Area of land information is collected by asking about land cultivated under each crop. In order to arrive at the total cultivated land size, a simple sum is required.
**Key concerns:** Farm size could differ by agricultural season, which should be taken into account.
**Reporting:** Mean score; presented as a table, or bar graph.
**Descriptive procedure:** Compare means.
**Interpretation:** Generally speaking, in rural areas, the more land available, the better the household wealth status. However, this parameter must be carefully interpreted, together with other information on livelihood activities. Average land cultivated in a defined geographical area is also used to estimate the population pressure on available land.
**Type of variable:** Continuous.
**Importance for food security analysis:** Land availability, under the definition of "owned" and "cultivated," is a key factor for many people in rural areas in terms of food availability.

### 27. Main crops cultivated

Main crops cultivated as declared by the households.

**Calculation:** n/a
**Key concerns:** There are two possible ways to collect this information. One, list all possible crops and have the households rank, in descending order of importance, those they cultivate. According to experience, few households report more than three or four crops, and the additional information is usually of little value because of the small prevalence of extra crops. However, if the aim of the data collection is to carry out an agriculture survey, this approach may be worth following.

The second option: limit the number of main crops reported to three or four.
**Reporting:** (1) percentage of households that cultivate crop "xx" as the main crop, second crop, third crop, etc.; or (2), using a multiple response analysis, to report (a) percentage of households that cultivate a specific crop regardless of its ranking (percentage of cases), and (b) which crops are most often reported as cultivated (percentage of responses) regardless of their importance.
**Descriptive procedure:** Frequency, cross-tabs, multiple response.
**Interpretation:** As simple percentage.
**Type of variable:** Categorical, nominal.
**Importance for food security analysis:** Information on the main cultivated crops is important and must be linked with other data on livelihood activities. Growing food crops versus cash crops can indicate different income strategies/opportunities. Cash crops and food crops are generally specific to each country. Examples of commonly grown cash crops include jute, cotton, sugar cane, chili, onion, coffee, cocoa, banana, and oranges. Examples of commonly grown food crops include paddy, wheat, maize, cassava, sorghum, millet, and barley.

**28. Agricultural production**

Produced quantity of each cultivated crop.

**Calculation:** n/a
**Key concerns:** Quantities are self-reported and may not be accurately measured. Underestimation/overestimation might be an issue. Also, estimating quantities of crops that are not harvested in bulk at a specific time of the year, such as cassava, which is dug out from the ground all year round when needed, is particularly difficult, and reported quantities are therefore questionable. Outliers have to be carefully checked against other variables, such as cultivated land size.
**Reporting:** Total household crop production, per capita crop production.
**Descriptive procedure:** Mean.
**Interpretation:** Average produced quantities are usually compared among geographical areas, livelihood groups, male/female-headed households per each reported crop. Attention has to be paid to the selection of appropriate households (all households versus households that cultivate that particular crop only), according to the CFSVA's needs. For example, if the aim is to compare the average production of maize by region, households that do not produce maize have to be included in the "compare mean" computation, because the regional figure requires the inclusion of all sampled households selected in each region. If the aim is to compare the level of productivity of one crop among two groups of households that grow that crop, the number of valid cases (households) in each of the two groups has to be reported.
**Type of variable:** Continuous.
**Importance for food security analysis:** Agricultural production is one of the pillars of food availability, both at the geographical and household levels, even if it is not the only availability factor. Crop production has to be analysed together with price trend and other market information.

### 29. Food stocks

Usually recorded as number of months a particular crop harvest is supposed to last for household consumption.

**Calculation:** n/a

**Key concerns:** Duration of stock is self-reported. Under- and overestimation might be an issue. Rarely, duration of stock is calculated comparing an average needed per capita per day quantity and figures from crop production. The key concerns reported for indicator 28, "Agricultural production," apply here. Another problem arises when duration of stock is enquired about for more than one crop. Global stock duration at the household level is rarely the simple sum of the duration in months of the two (or more) crops.

**Reporting:** Number of months crop stock is expected to last, as self-reported by households.

**Descriptive procedure:** Mean.

**Interpretation:** The longer the period of duration of the food stock, the better for a household's food security. However, this interpretation could be considered fairly rigid, as it does not take into account (a) trading part of the harvest (e.g. selling it right after the harvest, selling it when prices are higher), or (b) the possibility that households rely on different kind of livelihoods (e.g. commerce, salary).

**Type of variable:** Continuous (or categorical ordinal).

**Importance for food security analysis:** Food stocks may represent a safety measure for household food security in terms both of self-consumed food and of valuable items that can be sold in a time of crisis.

### 30. Ranked main and secondary livelihood activities

Primary, secondary, tertiary, and main, second, quaternary income activity as declared by the households.

**Calculation:** n/a

**Key concerns:** When reporting, it is imperative that interpretation take missing values for secondary and tertiary activities into account. The accompanying table here illustrates that 86 percent of households were engaged in a secondary activity. Because of the missing values, there is a great difference between reporting the percentage and the valid percentage. The percentage values refer to the percentage of households engaged in a particular secondary activity of all sampled households. The valid percentage refers to the percentage of households engaged in a particular secondary activity of only the households engaged in secondary activities. This is explained more in depth in "Reporting."

**Reporting:** Percentage of households reporting a certain activity as main, secondary, tertiary, etc.

**Example from the accompanying table:** Agriculture was the main livelihood activity for 57 percent of the households. Twenty-nine percent of households reported wage labour as their main livelihood activity. Eighty-six percent of households reported undertaking a second activity. There are two possible ways of reporting the figures: (1) "50 percent of HH (of the ones engaging in a second activity) are engaged in wage labour, 33 percent in agriculture," and so on; or (2) "while 14 percent of HHs are not engaged in a second livelihood activity, 29 percent of all HHs engage in wage labour, 29 percent in agriculture," and so on.

| Livelihood activities | Main activity | | Second activity | |
|---|---|---|---|---|
| | % | Valid % | % | Valid % |
| **Agriculture** | 57 | 57 | 29 | 33 |
| Wage labour | 29 | 29 | 43 | 50 |
| Fishing | 14 | 14 | 14 | 17 |
| **Subtotal** | **100** | **100** | **86** | **100** |
| Missing | 0 | | 14 | |
| **GRAND TOTAL (including missing)** | **100** | | **100** | |

**Descriptive procedure:** Descriptive statistics – frequencies.
**Interpretation:** Many different activities could be listed as a potential option. However, only the ones that record reasonable significant percentages are worth being mentioned.
**Type of variable:** Categorical, usually many categories.
**Importance for food security analysis:** Understand which activities are more important in a certain population and natural and social context. Specifically, these activities are ranked.

### 31. Contribution from the different livelihood activities (average percentage, average absolute value)

Contribution from the different livelihood activities.

**Calculation:** Average percentages or average absolute income values per each activity.
**Key concerns:** Outliers, missing data, activities repeated in more than one activity variable, percentages in the activity variables that do not add up to 100 percent.
**Reporting:** Average percentages or average absolute income values per activity.
**Descriptive procedure:** If the information is collected using four variables (first, second, third, and fourth activity), the data must be restructured creating one variable per each livelihood activity. In other words, a new variable needs to be created that is the sum of the percentage contribution or amount of income earned from each livelihood activity. Activity values should be percentage contribution or absolute value, in the case of income. The new variable computation would be a sequence of logical operations. The following example is an extract from a longer SPSS syntax:

```
compute act01 = 0 .
IF (Activity1 =1) act01 = act01+Activity1_Value .
IF (Activity2 =1) act01 = act01+Activity2_Value .
IF (Activity3 =1) act01 = act01+Activity3_Value .
IF (Activity4 =1) act01 = act01+Activity4_Value .

compute act02 = 0 .
IF (Activity1 =2) act02 = act02+Activity1_Value .
IF (Activity2 =2) act02 = act02+Activity2_Value .
IF (Activity3 =2) act02 = act02+Activity3_Value .
IF (Activity4 =2) act02 = act02+Activity4_Value .
And so on . . .
```

The syntax will create as many variables as listed livelihood activities.
As is easily seen, if an activity is listed in more than one activity variable, its values would be summed up, and not lost as if overwritten.

**Interpretation:** Interpret as a simple percentage or average. Information may be presented in a table or a graph (pie or bar chart for percentages, bar chart for absolute values).
**Type of variable:** Continuous.
**Importance for food security analysis:** Understand main livelihood patterns as combinations of activities undertaken. The values could be presented for the entire data set or for stratification, which would be a means comparison among categories of a certain categorical variable (e.g. provinces, districts, HH head's sex). This type of analysis is done to detect differences among categories in terms of livelihood activities' importance.

### 32. Livelihood groups

Groups of households characterized by different livelihood activities or combination of activities.

**Calculation:** Cluster analysis (could be preceded by principal component analysis) performed on a set of different livelihood activities structured as different variables. Each activity is a separate variable; it can be binomial (done/not done) or continuous (if the relative importance of the activity to the total income is collected).
**Key concerns:** Outliers, missing data, activities repeated in more than one activity variable, percentages in the activity variables that do not add up to 100 percent; manageable number of groups (not too high) versus internal homogeneity of the single groups (more groups would reflect a better homogeneity of characteristics). The number of final groups is not fixed but should represent an intrinsic property of the set to be clustered. The decision on the number of groups to ask should be guided by statistical similarity. Some groups might be merged at a later stage (e.g. "food crop farmers" and "cash crop farmers" into a general "farmers" category). The decision of regrouping is subjective, because, statistically, software packages cannot recognize that two different variables might be interpreted as providing similar (hence merge-able) information. This can be solved by merging the similar livelihood activities variables before clustering.
**Reporting:** Percentage of households in each livelihood group; cross-tab with other key variables.
**Descriptive procedure:** If the information is collected using four variables (first, second, third, and fourth activity), data must be restructured creating one variable per each livelihood activity, reporting percentage contributions or absolute income values. A cluster analysis is performed. Frequency on the categorical variable is obtained as a result of the cluster analysis.
**Interpretation:** Interpret as a simple percentage. Information may be presented in a pie chart to show the relative size (importance) of groups. A bar chart could be drawn, with absolute values showing the different income availability of different livelihood groups.
**Type of variable:** Input variables are continuous. Output variable is categorical.
**Importance for food security analysis:** Understand the main livelihood patterns as combinations of activities undertaken. Households with different livelihood strategies have different food security status and are also vulnerable to different types of shocks.

### *Household expenditures and access to credit*

The next group of indicators refer to household access to credit and household expenditure patterns.

### 33. Household expenditure indicators

- **Total cash expenditures on food items:** the total amount of cash allocated to specific food items on a monthly basis
- **Total cash expenditures on non-food items:** the total amount of cash allocated to specific non-food items on a monthly basis
- **Total monthly household cash expenditures:** the total amount of cash used to purchase both food and non-food items on a monthly basis
- **Total credit expenditures on food items:** the total amount of credit borrowed to purchase food items on a monthly basis
- **Total credit expenditures on non-food items:** the total amount of credit borrowed to purchase non-food items on a monthly basis
- **Total monthly household credit expenditures:** the total amount of credit used to purchase both food and non-food items on a monthly basis
- **Per capita total expenditure (always cash):** the average amount of cash a household can allocate/make available for each of its members
- **Per capita expenditure quintiles:** the distribution of expenditures across a sample population based on five groupings – with each group representing 20 percent of the population (weighted sample). The first quintile is considered to be the poorest 20 percent – in terms of the value of per capita expenditures – whereas the fifth quintile can be considered the richest 20 percent of the population.
- **Expenditure shares:** the proportion (or percentage) of expenditures devoted to (a) food; and (b) non-food items. Shares of expenditures have two dimensions. The first is the overall shares of household expenditures going towards food versus non-food; when both are combined, it equals 100 percent. The second dimension is the proportion of expenditures on specific food and non-food items (e.g. cereals, meat, education).

**Calculation:**

1. **The absolute values of all *expenditures collected on a semi-annual basis*** (both in cash and credit) should be divided by six. This step transforms the six-month cash (or credit) outlay on those non-food items into one-month values – allowing for comparison between food and non-food expenditures.
2. **Total *cash* expenditures on food items:** The sum of all the expenditure values for specific food items (e.g. wheat + rice + n = total food expenditures in cash).
3. **Total *cash* expenditures on non-food items:** The sum of all the expenditure values for specific non-food items (e.g. kerosene + education + health + n = total non-food expenditures in cash).
4. **Total monthly household cash expenditures**: Total cash expenditures on food items + total cash expenditures on non-food items.

The same formulae apply to the calculation of credit-based expenditures:

- **Per capita total expenditure:** Total monthly household cash expenditures (step 4) divided by total number of household members.[113]
- ***Per capita expenditure quintiles:*** Transform the variable "per capita total expenditures (cash)" using "rank" and "Ntiles" commands in order to obtain the quintile (or class/category) – from 1 to 5 – to which the household belongs based on their per capita expenditure values.

113. An alternative approach is to divide the expenditure by the number of adult equivalents in order to take into account economies of scale for large households and the lower needs (for food, housing space, etc.) of children.

- ***Overall share of expenditures on food:*** Total expenditures on food items (cash or credit) divided by total monthly household expenditures (cash or credit).
- ***Overall share of expenditures on non-food:*** Total expenditures on non-food items (cash or credit) divided by total monthly household expenditures (cash or credit).
- ***Share of expenditures on specific food items:*** The expenditure value of a specific food item (cash or credit) divided by the total expenditure on all food items (cash or credit).
- ***Share of expenditures on specific non-food items:*** The expenditure value of a specific non-food item (cash or credit) divided by the total expenditure on all non-food items (cash or credit).

**Key concerns:** The quality, reliability, and accuracy of expenditure data have often been questioned. As is the case with income data, respondents may "under-report" their real expenditures.

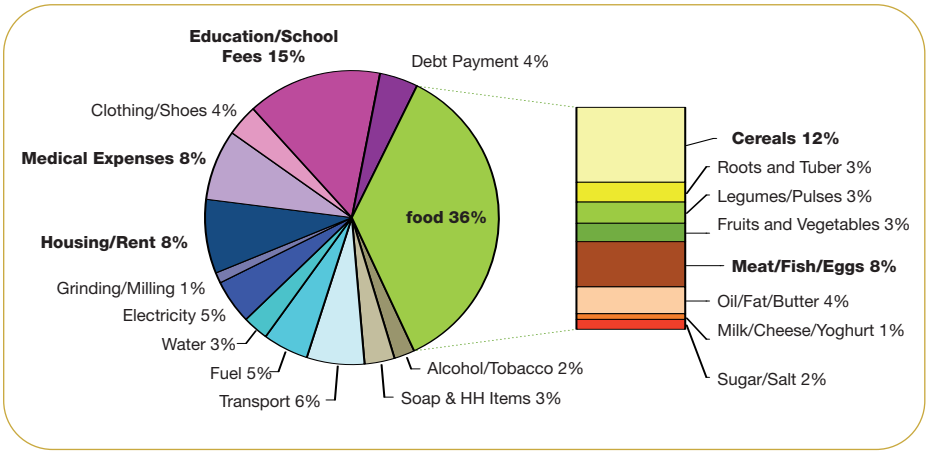
Expenditures on food – be they with cash or on credit – vary seasonally (e.g. bulk purchases of staple foods). Given that the current module does not capture these seasonal dimensions, interpretation of data needs to be conducted carefully – spelling out constraints.

Cleaning/checking expenditure data is very important – especially when it comes to identifying outliers.

**Reporting:** Mean (or median, if the distribution is not normal) for all the created expenditure variables that are continuous, i.e. total and per capita expenditure (food, non-food, total; cash, credit, total) and share of expenditure (food versus non-food; and specific food items).

When reporting expenditure quintiles, specify range values associated with each quintile (minimum and maximum).

Figures can be reported in a table or graph. Pie charts are recommended when reporting shares (or percentages) of particular expenditures because (a) one unique graph displays expenditure distribution by food and non-food and by specific item (see accompanying example ); and (b) it reminds one that the total is 100 percent.




Note that data on alcohol and tobacco – while collected as food expenditures – are normally reported as non-food outlays.

**Descriptive procedure:** Means comparison for continuous expenditure indicators; frequency and cross-tabs for quintiles.
**Interpretation:** Generally speaking, the higher shares of total expenditures going towards food, the greater the likelihood a household has poor food access. This is especially true if the household depends mainly on purchases for its food. Thus, for households with low levels of income who cannot produce enough food for themselves, buying food becomes, *de facto*, the main priority. As such, household resources will go towards ensuring that a minimum level of food is acquired to meet household needs. This, when compared to outlays on non-food priorities, will naturally result in a higher proportion of resources allocated to meet these food needs.
Care must be taken when interpreting outputs from food expenditure analyses as some households have a lower share of food expenditure because they rely on their own production. Similarly, better-off households may spend a high proportion on costly food items (e.g. meat), which might increase the percentage they spend on food. Therefore, it is important not only to understand the generalities of expenditure patterns, but also to investigate the types of items being prioritized.
**Type of variable(s):** Expenditure indicators can be continuous (total and per capita expenditures, shares of expenditure) and categorical (per capita expenditure quintiles).
**Importance for food security analysis:** Expenditures are useful as a proxy for wider purchasing power, which is an important component of food access. Moreover, understanding expenditures on specific items also allows the analyst to determine how households allocate scarce resources and give priority to competing needs.

### 34. Access to credit, sources of credit

The types of credit to which households have access; whether households use credit in order to purchase food. For CFSVAs, the following questions are used:

- Do you have access to credit or a source to borrow money from? (Circle all that apply):
  1. Yes – Relatives/Friends
  2. Yes – Charities/NGOs
  3. Yes – Local moneylender
  4. Yes – Bank
  5. Yes – Cooperative
  6. No access to credit
- Do you often purchase food on credit or borrow money to purchase food?
  0 = No
  1 = Yes
- If yes, in the last three months, how often did you borrow money or use credit to purchase food?
  1 = On one occasion
  2 = On two occasions
  3 = On three occasions
  4 = On more than three occasions

**Calculation:** Given that households can have more than one source of credit, the calculation is a simple count of how many different types of credit are accessible to a household.
**Key concerns:** There are two main concerns: (1) while it might be easy to gather data on the sources of credit, there is no information collected with regard to the "interest rates" charged to borrowers; and (2) there is usually no estimation of the amount borrowed.

Note also that in the first question, while options 1 to 5 are not mutually exclusive, option 6 indicates that the household does not have access to any credit source. Therefore it cannot be circled together with other options.

**Reporting:** there are four main ways of reporting outputs:

1. Percentage of households with access to specific types of credit.
2. Percentage of households with no access to credit.
3. Percentage of households that purchase food on credit.
4. Percentage of households that have purchased food once, twice, thrice, or more than three times in the last three months.

**Descriptive procedure:** Simple frequencies are the most common descriptive method. However, these frequencies can also be created for specific groups of households – e.g. those sharing the same livelihoods or food consumption patterns.

**Interpretation:** There are two main ways of interpreting credit data. The first is to look at whether the source of credit is formal or informal. Formal sources are usually banks and/or cooperatives. Informal sources are local moneylenders and/or friends and family. Poorer and food-insecure households tend to rely on informal sources of credit, as they do not always have the necessary collateral to borrow from banks. The second aspect of interpretation is to see how many times a household borrows on credit in a three-month period. If the frequency is high, then it is likely that this household will have problems both with food access and food consumption.

**Type of variable:** Categorical, bivariate.

**Importance for food security analysis:** Access to credit is important insofar as it can help households make productive investments and/or allow for asset accumulation. Households that do have access to credit are usually expected to be able to pay back the debt. At the same time, however, taking on credit – especially for food – can also translate into medium- and long-term debt if households are not able to generate sufficient income from their investments.

### *Nutritional status of children, women, and other nutrition-related indicators*[114]

These indicators usually come from the section on maternal and child health, section 4.2.4.3, and are individual-level indicators. These indicators are discussed further in the CFSVA guidelines on nutrition, section 6.2.2.

#### 35. Stunting

Low height for age for children over 2 years; low length for age for children under 2 years; a measure of chronic malnutrition characterized by a slowing in the growth of a foetus or child and resulting in a failure to achieve expected length in comparison to a healthy, well-nourished child of the same age.

**Calculation:** Measure a child's height and compare to a reference population; the most commonly used cut-off point with z-scores is -2 standard deviations (SD). For example, a child with a z-score for height for age of -2.56 is considered stunted, while a child with a z-score of -1.78 is not. If the z-score is less than -3 standard deviations, the child is considered severely malnourished.

114. Information in this section was obtained from Cogill, B., 2003, *Anthropometric Indicators Measurement Guide,* Washington, D.C.: FANTA Project.

**Key concerns:** Stunting is a measure of chronic malnutrition and therefore is not an accurate measurement of short-term changes in nutritional status.
**Reporting:** Results can be presented in table or bar graph format, disaggregated by age group and including frequency and percentage of children below the cut-off point of -2 SD.
**Descriptive procedure:** When using an anthropometric software package, there are three procedures to perform. First the raw data should be entered. Next the researcher(s) should combine the raw data on the variables (age, sex, length) to compute height for age. Third, the software should transform this data into z-scores so that the prevalence of stunting can be determined.
**Interpretation:** The percentage of children with z-scores of -2 SD or less represents the prevalence of moderate/severe chronic malnutrition in the sample population.
**Type of variable:** Continuous.
**Importance for food security analysis:** Stunting is an indicator of past growth failure and is associated with a number of long-term factors, including chronically inadequate levels of protein and energy intake, micronutrient deficiencies, frequent infection, inappropriate feeding practices over a sustained period, and household poverty.

### 36. Wasting

Low weight for height; a measure of acute malnutrition characterized by considerable weight loss or failure to gain weight, which results in a child's weight being substantially below that expected in a healthy child of the same length or height.

**Calculation:** Measure a child's weight and height and compare to a reference population; the most commonly used cut-off point with z-scores is -2 standard deviations (SD). For example, a child with a z-score for height for age of -2.56 is considered malnourished, while a child with a z-score of -1.78 is not. If the z-score is lower than -3 SD, the child is considered severely malnourished.
**Key concerns:** Because wasting is a response to short-term influences (see Importance for food security analysis below), it is highly sensitive to seasonality, and consequently should not be used for evaluation purposes.
**Reporting:** Results can be presented in table or bar graph format, disaggregated by age group and including frequency and percentage of children below the cut-off point of -2 SD.
**Descriptive procedure:** When using an anthropometric software package, there are three procedures to perform. First the raw data should be entered. Next the researcher(s) should combine the raw data on the variables (age, sex, length, weight) to compute weight for height. Third, the software should transform this data into z-scores so that the prevalence of wasting can be determined.
**Interpretation:** The percentage of children with z-scores of -2 SD or lower represents the prevalence of moderate/severe acute malnutrition in the sample population.
**Type of variable:** Continuous.
**Importance for food security analysis:** Wasting is an indicator of current malnutrition and is associated with inadequate food intake, incorrect feeding practices, disease, infection or a combination of these factors. Wasting in individuals and population groups can change quickly, showing marked seasonal patterns associated with changes in food availability and access, as well as disease prevalence. Because

wasting does not incorporate child age, the difficulties encountered in contexts where exact age is difficult to determine do not affect the accuracy of wasting as a proxy indicator of acute malnutrition.

### 37. Underweight

Low weight-for-age is a composite measure of stunting and wasting as it is influenced by both height and weight.

**Calculation:** Measure a child's weight and compare it to a reference population; the most commonly used cut-off point with z-scores is -2 standard deviations (SD). For example, a child with a z-score for height for age of -2.56 is considered malnourished, while a child with a z-score of -1.78 is not. If the z-score is lower than -3 SD the child is considered severely malnourished.

**Key concerns:** Although underweight is a good indicator for assessing changes in malnutrition over time, care must taken in interpreting this indicator as it reflects both chronic and acute malnutrition and does not provide the information needed to distinguish between the two.

**Reporting:** Results can be presented in table or bar graph format, disaggregated by age group and including frequency and percentage of children below the cut-off point of -2 SD.

**Descriptive procedure:** When using an anthropometric software package, there are three procedures to perform: First the raw data should be entered. Next the researcher(s) should combine the raw data on the variables (age, sex, length, weight) to compute weight for age. Third, the software should transform this data into z-scores so that the prevalence of underweight children can be determined.

**Interpretation:** The percentage of children with z-scores of -2 SD or less represents the prevalence of moderate/severe acute malnutrition in the sample population. It is important to remember that one cannot draw any conclusions with regard to whether or not the malnutrition is acute or chronic based on this indicator.

**Type of variable:** Continuous.

**Importance for food security analysis:** Prevalence of underweight children is commonly used as the indicator to assess changes in the magnitude of malnutrition over time.

### 38. MUAC

The circumference of the middle of the upper arm, measured in centimetres.

**Calculation:** Determine the middle of the upper arm by dividing the measured length of the upper arm from the tip of the shoulder to the tip of the elbow. Measure the MUAC at this point.

**Key concerns:** Inaccurate measurements.

**Reporting:** Findings can be reported in a bar graph or table.

**Descriptive procedure:** In general, for a child aged 6 to 59 months, if the MUAC is less than 11.0 cm, the child is severely malnourished. If the MUAC is between 11.0 cm and 12.5 cm, the child is moderately malnourished, and anything greater than 12.5 cm is considered good health. Generally, MUAC is recoded according to these categories and assigned a colour: red for severe malnourishment, orange for moderate malnourishment, and green for good health. Analysing the frequencies determines the prevalence of malnourishment in the sample.

**Interpretation:** The percentage of children with z-scores of -2 SD or less represents the prevalence of moderate/severe acute malnutrition in the sample population. It is important to remember that one cannot draw any conclusions with regard to whether or not the malnutrition is acute or chronic based on this indicator.
**Type of variable:** Continuous initially, recoded as categorical.
**Importance for food security analysis:** MUAC is a measure of acute malnutrition. Although wasting is the preferred measure of acute malnutrition, MUAC offers a quick and easy predictor of immediate risk of death due to macronutrient malnutrition. As such, it provides a useful tool for screening cases of acute malnutrition among children 12 to 59 months, particular in emergencies. In some cases, MUAC-for-age offers a more refined version of this indicator of acute malnutrition.

### 39. BMI of reproductive-age women

Index used to determine chronic energy deficiency (CED), a measure of underweight for non-pregnant adults[115]

**Calculation:** Weight in kilograms divided by height in metres squared. An adult (18 years of age or older) with a BMI below 18.5 kg/m$^2$ is considered to be malnourished.
**Key concerns:** Accuracy of measurement, difficulties in measuring the sick or disabled
**Reporting:** Table or bar graph reporting the percentage of women with a BMI below 18.5 kg/m$^2$
**Descriptive procedure:** Calculate weight divided by the height of the woman squared.
**Interpretation:** An adult (18 years of age or older) with a BMI below 18.5 kg/m$^2$ is considered to be malnourished. The percentage of women with a BMI above this cut-off point represents the proportion of women with good overall nutrition.
**Type of variable:** Continuous.
**Importance for food security analysis:** CED can be used as a measure of well-being and is a good proxy indicator for overall adult health. Research has also found associations between adult BMI and agricultural productivity. Low BMI is correlated with a large number of health-related outcomes, including early onset of chronic conditions and an increased risk of premature mortality.

### 40. Mortality rate (global, under-5, etc.)

The frequency of deaths in proportion to a population in a given period of time.

**Calculation:** For global mortality rates (GMR), the calculation is the number of deaths in the sample in a certain time period divided by the total sample and multiplied by 1,000. For children under 5, the calculation is the number of deaths in a certain time period divided by the mid-period population of children and the number of time units and multiplied by 1,000.
**Key concerns:** Comparisons between countries need to take into account the age structure of the population. Countries with higher percentages of the population aged 65 years and over could possibly have a higher mortality rate than a developing country with a relatively younger population (i.e. fewer people older than 65 years).
**Reporting:** Mortality rates are usually reported as simple fractions. Most often the denominator is 1,000 people and the timeframe is one year. Be sure to report these figures in order to avoid any misinterpretation.

115. Calculated by dividing weight in kilograms by the square of height in meters.

**Descriptive procedure:** See "Calculation."
**Interpretation:** High mortality rates can be indicative of crisis situations, whether they are disasters, conflict, or drought. As noted above, age structure also influences mortality rates.
**Type of variable:** Continuous.
**Importance for food security analysis:** Mortality indicators are used to assess the severity of a crisis, identify needs, and prioritize resources. They are also used to monitor and evaluate the extent to which the relief system is meeting the needs of affected populations and to gauge the overall impact and performance of humanitarian assistance in a given situation.

### 41. Disease prevalence

Often there is a correlation between illness and malnutrition, especially among children.

**Calculation:** CFSVA should use a standard recall period of two weeks for determining the prevalence of diarrhoea, fever, and acute respiratory infections (coughing with faster-than-normal breathing). This should be disaggregated by men and women over the age of 18 years, boys and girls under the age of 18 years but older than 5 years, and children under 5 years.
**Key concerns:** Inaccurate reporting from sampled households.
**Reporting:** Means or frequencies can be reported in a table format or cross-tabulated with sex or age group. Bar graphs are also useful for indicating significant health issues within the community.
**Descriptive procedure:** There are two methods of analysing this data: The first entails recoding the data into binomial 0/1 variables. Health issues within the community are then illustrated by analysing the frequency of households that have experienced a particular illness or health issue. The second method of analysis entails analysing mean number of episodes (e.g. diarrhoea) by sex and age group. This will illustrate any gender or age discrepancies in disease prevalence.
**Interpretation:** Greater mean or higher frequency indicate a significant health risk, depending on the disease or health issue; this often will relate to or impact nutrition issues.
**Type of variable:** Continuous initially; can be changed to categorical.
**Importance for food security analysis:** Health environment and access to health services are closely linked with nutritional outcomes. Understanding the prevalence of primary public health helps in determining the underlying causes of malnutrition.

## *Food Consumption Analysis*

The next group of indicators covers food consumption analysis. A more detailed description of the food consumption score and its relation to food consumption clusters is found in http://vam.wfp.org/MATERIAL/FCS_Guidance.

### 42. Food Consumption Score[116]

A composite score based on dietary diversity, food frequency, and relative nutritional importance (see section 6.2.1.1) of different food groups.

**Calculation:**
Regroup all the food items into specific food groups. Sum all the food items of the same group and recode the value above 7 as 7.

- Multiply the value thus obtained for each food group by its weight,[117] creating new weighted food groups.
- Create the food consumption score by adding the weighted food groups.

Once created, the thresholds of the food consumption score should be determined based on the frequency of the scores and the knowledge of the consumption behaviour in that country/region.

The standard thresholds are:

| FCS | Profiles |
|---|---|
| 0–21 | Poor |
| 21.5–35 | Borderline |
| >35 | Acceptable |

Using those thresholds, recode the variable food consumption score, from continuous to categorical.

**Key concerns:** There is no global agreement on thresholds or division into food groups and weights. This methodology should be validated and possibly adjusted in each country/situation based on the specific food consumption characteristics of each country or region, and culture.

The questionnaire should properly account for food items consumed in very small quantities. For instance, if a spoon of fish powder is added to the pot, this should be treated as a condiment rather than a day's consumption of fish. The same applies to a teaspoon of milk in the tea.

**Reporting:** Frequency of the profiles and diet composition of each profile (mean number of days); cross-tab with other key variables.

**Descriptive procedure:** Considering that we can have both a categorical and a continuous variable, there are many different possible analyses. The most common are: cross-tab, compare means, descriptive statistics.

**Interpretation:** Diet diversity is positively linked with adequacy of food intake. Hence, the smaller the value of the food consumption score, the worse the household food consumption.

**Type of variable:** Continuous, if considering only the food consumption score; categorical, if creating the food consumption profiles.

**Importance for food security analysis:** This can be considered the base of the food security analysis. The creation of the food consumption profiles is the first step in creating the food security profiles. It is a key variable because it helps us understand the food consumption gaps of specific groups.

116. Section 6.1.3 offers a detailed discussion on food consumption score.
117. See section 6.2.1.1, Box 6.1, and Table 6.1: Cereals, tubers and root crops = 2; Pulses = 3; Vegetables = 1; Fruit = 1; Animal protein = 4; Milk = 4; Sugar = 0.5; Oil, fats = 0.5.

### 43. Dietary diversity

The number of different foods or food groups eaten over a reference period (typically 24 hours), and without regard to frequency of consumption. The number of different food groups consumed over a given reference period is an attractive proxy indicator for the following reasons:

- A more diversified diet is an important outcome in and of itself.
- A more diversified diet is associated with a number of improved outcomes in areas such as birth weight, child's anthropometric status, and improved haemoglobin concentrations.
- A more diversified diet is highly correlated with such factors as caloric and protein adequacy, percentage of protein from animal sources (high-quality protein), and household income. Even in very poor households, increased food expenditure resulting from additional income is associated with increased quantity and quality of the diet.
- Questions on dietary diversity can be asked at the household or individual level, making it possible to examine food security at the household and intra-household levels.
- Obtaining these data is relatively straightforward. Field experience indicates that training field staff to obtain information on dietary diversity is not complicated, and that respondents find such questions relatively straightforward to answer and not especially intrusive or burdensome. Asking these questions typically takes less than 10 minutes per respondent.

For a detailed discussion on the dietary diversity indicator, visit the following website: http://www.fantaproject.org/downloads/pdfs/HDDS_v2_Sep06.pdf.

**Calculation:**
Regroup all the food items into specific food groups.

***Food Groups***

- Cereals
- Roots and tubers
- Vegetables
- Fruits
- Meat, poultry, offal
- Eggs
- Fish and seafood
- Pulses/legumes/nuts
- Milk and milk products
- Oils/fats
- Sugar/honey
- Miscellaneous

**Key concerns:** Dietary diversity score does not take into account the nutrient value of food items eaten.
The questionnaire should properly account for food items consumed in very small quantities. For instance, if a spoon of fish powder is added to the pot, this should be treated as a condiment rather than a day's consumption of fish. The same is true for a teaspoon of milk in tea.
**Reporting:** Mean dietary diversity score; compare mean between different groups.
Descriptive procedure: compare means; descriptive statistics.
**Interpretation:** Dietary diversity is positively linked with adequacy of food intake. Hence, a smaller value indicates poor quality of diet.

**Type of variable:** Continuous.
**Importance for food security analysis:** Quality of diet is equally as important as quantity of diet. It is one of the key variables because it helps us understand the food consumption gaps of specific groups.

### 44. Food consumption clusters

Clusters or classes based on the similarity of their food consumption patterns.

**Calculation:** You can base food consumption clusters on single food items or on the aggregate food groups.
Run **a principal component analysis** (PCA) to reduce the complexity of the data set, to uncover similar characteristics among households, and to reduce the importance of outliers without removing them from the analysis. The main purpose of a PCA in this analysis is to describe households on the basis of their consumption patterns of various food items.
To run a cluster analysis on the factors will create groups of households that share common underlying characteristics in their food consumption pattern. The number of clusters is not predefined and the analyst should determine it by:

- Maintaining a reasonable level of similarity within each cluster as measured by low cluster inertia; and
- Ensuring significant differences between clusters.

Once the number of the clusters is decided, the analyst can report on them separately, or categorize them into three or four food consumption groups.
**Key concerns:** PCA and clustering are exploratory techniques that help the analyst understand the data. The decision to categorize food consumption clusters into specific groups is still a subjective one, and the analyst will be able to do it if he/she has knowledge of local dietary habits. Specifically, there are no set guidelines for deciding which clusters are considered poor or good.
Table 6.12, opposite, from the Sudan CFSVA, 2007, looks at the average food consumption score for each cluster.
**Reporting:** Frequency among households and mean diet composition of each group; cross-tab with other key variables.
**Descriptive procedure:** Cross-tab, compare means, descriptive statistics.
**Interpretation:** The worse the category, the worse the food consumption.
**Type of variable:** Categorical variable.
**Importance for food security analysis:** It is a key variable because it helps us understand the food consumption patterns of specific clusters of households. It also indicates the specific food strategies of these households and allows for the building of scenarios.

**Table 6.12: Food consumption profiles for Sudan**

| No. | % | Cereals and tubers | Pulses | Veg. and fruit | Meat | Milk | Oil | Sugar | Dates | Overali dietary profiles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.144 | 5 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | Poor consumption |
| 997 | 4.4 | 7 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | |
| 1.357 | 5.9 | 7 | 1 | 1 | 2 | 7 | 5 | 7 | 1 | Low protein |
| 1.204 | 5.3 | 7 | 1 | 1 | 2 | 0 | 5 | 7 | 1 | |
| 1.010 | 4.4 | 6 | 4 | 6 | 2 | 1 | 1 | 1 | 0 | Pulses, no oil |
| 1.047 | 4.6 | 7 | 5 | 2 | 2 | 1 | 1 | 2 | 0 | |
| 599 | 2.6 | 2 | 3 | 2 | 2 | 5 | 6 | 7 | 1 | Low cereals, but diversified diet |
| 1.296 | 5.7 | 3 | 4 | 4 | 4 | 1 | 1 | 1 | 0 | |
| 1.038 | 4.5 | 7 | 1 | 1 | 6 | 3 | 1 | 2 | 0 | No oil and sugar, but good consumption |
| 1.527 | 6.7 | 6 | 6 | 5 | 6 | 1 | 2 | 2 | 0 | |
| 890 | 3.9 | 7 | 2 | 6 | 3 | 1 | 5 | 7 | 1 | All good consumption |
| 905 | 4 | 7 | 6 | 2 | 4 | 1 | 6 | 7 | 1 | |
| 1.420 | 6.2 | 7 | 2 | 2 | 7 | 6 | 6 | 7 | 2 | |
| 888 | 3.9 | 7 | 6 | 6 | 7 | 6 | 3 | 4 | 1 | |
| 1.052 | 4.6 | 7 | 6 | 6 | 5 | 1 | 5 | 6 | 1 | |
| 1.186 | 5.2 | 2 | 4 | 5 | 6 | 7 | 6 | 7 | 2 | |
| 974 | 4.3 | 7 | 4 | 6 | 2 | 7 | 6 | 7 | 2 | |
| 1.236 | 5.4 | 7 | 6 | 2 | 5 | 7 | 7 | 7 | 2 | |
| 1.123 | 4.9 | 7 | 2 | 6 | 7 | 7 | 6 | 7 | 2 | |
| 1.923 | 8.4 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 3 | |
| 22.816 | 100 | 6 | 4 | 4 | 4 | 4 | 4 | 5 | 1 | |

### 45. Sources of food

Source of each food consumed in the past seven days.

**Calculation:** Each source should be weighted on the frequency of consumption of that specific food item.

Each household is asked to report the main and secondary source of each consumed food item. All food items are coded as either "purchased," "produced," "gift," "borrowed," "food aid," and so on. The households can give two possible sources of food for the same food item: the main and secondary source of food.

- If only one source is mentioned for a food item, 100 percent of that item is attributed to that source.
- If two sources are mentioned, 60 percent of that food item is assumed to come from the main food source and 40 percent from the secondary source.

Usually, then, the number of responses for each source is weighted by the frequency of consumption of the foods accessed through a particular source. Subsequently the proportion of each source is calculated.

For example, over a week, if a household consumed:

7 times bread, from purchase and borrowing
2 times potatoes, from own production
6 times vegetable, from own production and purchase

7 times oil, from purchase
1 time meat from purchase

Purchase = bread (7*0.6) + vegetables (6 *0.4) + oil (7*1) + meat (1*1) = **14.6**
Borrowing = bread (7*0.4) = **2.8**
Own production = potatoes (2*1) + vegetables (6*0.6) = **5.6**

Total estimated consumption = **23**

**Purchase** = (14.6/23)*100 = **64%**
**Borrowing** = (2.8/23)*100 = **12%**
**Own production** = (5.6/23)*100 = **24%**

This computation will help to define the contribution of the various sources for the food consumption of each household. In some cases, when one or more sources are predominant, it could be useful to recode the source variable into a new categorical variable defining meaningful thresholds. For example, in the Darfur analysis, food aid as source of food was very remarkable. The analysis was focused on food aid. The percentage contribution from food aid was recoded into categories: no food aid, less than 50 percent food aid, and more than 50 percent food aid.
**Key concerns:** It is important to clean the data, especially when it is impossible to know the source of a specific food (e.g. meat from food aid).
The contribution of each food source is based on the frequencies of the different items. This is not necessarily the same as quantities or values.
**Reporting:** Tables, charts, cross-tabulation with other key variables such as the food consumption profiles or the livelihood groups

**Table 6.13: Example - Mozambique Community and Household Surveillance, Round 6**

| | % purchase | % food aid | % own production | % gift | % casual labour | % barter | % borrow | % other |
|---|---|---|---|---|---|---|---|---|
| 1 | Mean | Mean | Mean | Mean | Mean | Mean | Mean | Mean |
| 2 | 27 | 22 | 21 | 10 | 14 | 1 | 1 | 4 |
| 4 | 34 | 33 | 19 | 6 | 6 | 0 | 0 | 1 |
| 5 | 30 | 33 | 26 | 6 | 3 | 0 | 1 | 1 |

**Descriptive procedure:** Mean.
**Interpretation:** Sometimes some sources, such as food aid, borrowing, and gifts, are considered less reliable than others. There is no standard interpretation of these sources, but the analyst can use this information in his/her scenarios (e.g. "What will happen if the own production fails, or if purchases are impossible?"). It is important to check the sources with other key indicators, such as expenditure, agricultural production, or if the households actually received food aid.
**Type of variable:** Continuous or categorical.
**Importance for food security analysis:** This information is essential from the food security point of view because it gives information about food access.

### 46. Number of meals per day (adults and children)

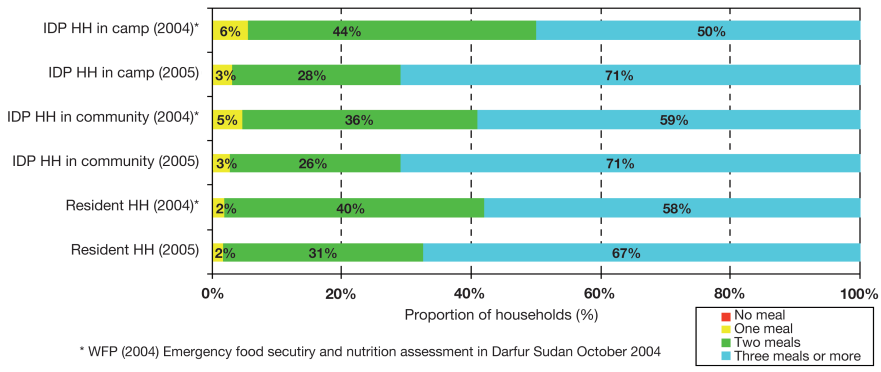
The number of meals consumed by the members of the household the day before the survey.

**Calculation:** This variable does not need a calculation; usually the data is collected separately for adults and children.

**Key concerns:** It is important to clean the data (e.g. if there are no children in a household, the value should be "not applicable," not "0"). Also of concern is how to define a meal (as compared to a snack). The number of meals can be different because of cultural reasons across countries, regions, and livelihood groups. For instance, some herdsmen might, even in good times, eat only one real meal a day.

**Reporting:** Tables (only if there are significant differences between the groups).

**Figure 6.3: Meal frequencies among children 0-15 years of age**




* WFP (2004) Emergency food secutiry and nutrition assessment in Darfur Sudan October 2004

**Descriptive procedure:** Compare means, frequencies.

**Interpretation:** It is often interesting to analyse this indicator by the food consumption groups/profiles.

**Type of variable:** Continuous.

**Importance for food security analysis:** This variable could help with recognizing households with extremely poor food consumption. However, do not use this variable alone to state the food security/insecurity level. This indicator could monitor changes over time.

### 47. Wealth index

Wealth is the value of all natural, physical, and financial assets owned by a household, reduced by its liabilities. Although measuring wealth is possible, it requires making assumptions about the value of assets.
The wealth index is a composite index that combines the ownership of key assets; it is used as a proxy indicator of household-level wealth.

**Calculation:** The calculation requires the various steps listed here. It is based on a principal component analysis.

**1.Select the variables.** Different kinds of variables can be included in the wealth index: productive assets, non-productive assets, household utilities, and others. The inclusion of productive assets/livestock and

land ownership should be reconsidered if a high percentage of households do not practice agriculture or live in urban areas.[118]

Box 6.17 offers a list of the key variables usually collected and used in the wealth index.

**Box 6.17: Typical variables used in a wealth index**

| | | | |
|---|---|---|---|
| Hand mill<br>Sickle<br>Axe<br>Livestock<br>Hoe<br>Tractor<br>Plough<br>Etc. | Radio<br>Refrigerator<br>TV<br>Bicycle<br>Motorbike<br>Phone/cell phone<br>Chair<br>Table<br>Bed<br>Etc. | Types of:<br><br>- Water supply<br>- Toilet<br>- Flooring<br>- Walls/house<br>- Roof<br>- Light source | Persons per sleeping room<br>Land ownership<br>Livestock |

2. **Explore the variables.** Running a frequency of each variable is useful to select the variables that should be included in the creation of the wealth index. The rule of thumb is that if a variable/asset is owned by more than 95 percent or less than 5 percent of the sample, it is excluded from the analysis. This is due to the fact that the wealth index is used to capture households with different wealth. For example, knowing that 98 percent of the sample owns a particular asset will not help the analyst characterize household asset ownership.
   Categorical variables should be recoded into one binary variable. For instance, if the light source has many options, such as "none," "wood fire," "oil lamp," "petrol light," "electricity," it might be appropriate in one country to recode this into "no/primitive," which would group the first two categories, and "with purchased energy source," which would regroup the remaining categories. In another country, the same options might be recoded differently: "no electric" versus "electric." The choice is based on the prevalence of both categories: if the prevalence is between 30 and 70 percent, then the indicator will probably help categorize more households than if the prevalence is only 5 percent. If necessary, two similar assets may be combined into one binary variable.

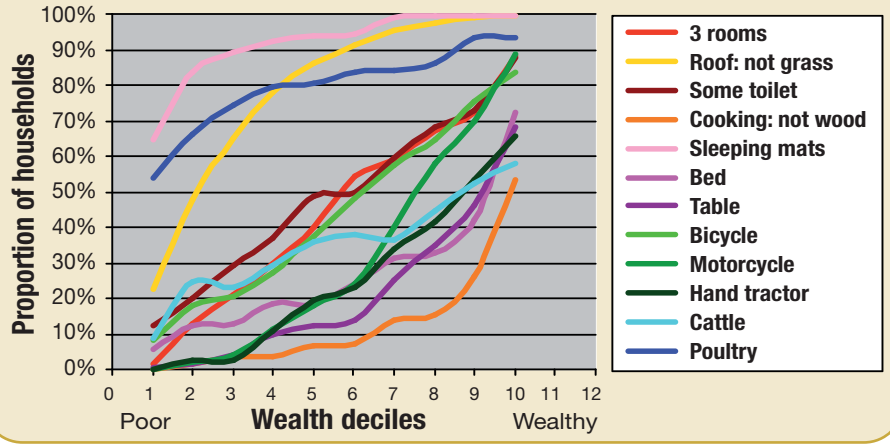
3. **PCA.** Once the variables have been selected, a principal component analysis must be run. For constructing the wealth index, the first principal component is taken to represent the household's wealth. This is an iterative process. Some variables that do not correlate well can be removed; if others do not behave as expected, one has to investigate this and maybe remediate the problem. For example, the possession of a radio turned out to be lower among the wealthiest in a country A, because these households often have radio-cassette players instead. The solution was to create a new variable: "radio or radio-cassette player."

118. The analyst should also bear in mind that if values are missing from any of the variables included in the PCA, the wealth index will not be calculated for that household.

4. **Recode the wealth index.** This variable (first principal component) can be used as a continuous variable — the higher the value, the higher the household's wealth index. It can also be recoded into categorical variable, usually terciles, quartiles, or quintiles ("ntiles").

5. **Graphing.** Graphing the "ntiles" by the variables included in the PCA will help the analyst understand if those variables are appropriate for the construction of the wealth index or if it is better to exclude/include other variables. The graph used for this is often called the "spaghetti graph," shown here:

**Figure 6.4: Example of asset ownership in wealth deciles***




*Example from Laos CFSVA (2006). Percentage of households in each wealth decile owning various assets, including productive assets.

6. **Index.** The construction of the index requires several **iterations** before final results are obtained.

**Key concerns:** The analysis varies from country to country and the choice of the variables should be done after a careful exploratory analysis.
**Reporting:** Graph the "ntiles" with the variables included in the PCA; graph with other key variables, such as FCS, FCSg, coping strategies, and geographical strata.
**Descriptive procedure:** Correlate; compare means, cross-tab with other key variables
**Interpretation:** It is very difficult to interpret this variable alone. There is no standard interpretation because the factor coefficients of each original variable change with each PCA conducted. On the other hand, the indicator describes relative wealth comparisons within one country very well. Generally, the lower the value of the index, the less wealthy the household.[119]
For one country, we can keep the formula (the factor coefficients of each variable) as a baseline against which later measures can be compared.
**Type of variable:** Continuous or ordinal categorical (after construction of "ntiles").
**Importance for food security analysis:** This variable can provide an idea of the relative wealth situation of a household. Often, the wealth index can be used as proxy for vulnerability/resilience.

119. Assuming the variables are coded as suggested.