

# Definitions and computation of main indicators

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## Food Security definitions and indicators

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security is divided into three aspects: food availability, food access and food utilization.

1. Food availability is the quantity of food that is physically present in a country or area through all forms of domestic production, commercial imports and food aid.
2. Food access is the households' ability to regularly acquire adequate amounts of food through a combination of their own stock and home production, purchases, barter, gifts, borrowing or food aid.
3. Food utilization refers to: a) households' use of the food to which they have access, b) intra-household food distribution, and c) individuals' ability to absorb nutrients – the conversion efficiency of food by the body.

Food security is an outcome of the **livelihood strategies** adopted by a household. It includes the activities required for a means of living. The livelihood strategies are based upon the **assets** or capital available to the household, which include its human, social, natural, physical and financial resources. A livelihood strategy is **sustainable** when “it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.”<sup>1</sup>

A **household** is a group of people who share their resources in order to jointly provide for their basic needs, at a minimum their food consumption (“eating from the same pot”), on a daily basis. Following the definition of the National Institute of Statistics, a household is composed of a person or group of persons living together during at least 6 months and sharing at least one meal a day. The NISR definition also considers as a household member somebody new in the household who plans to stay there more than 6 months and people who return in the household after having been away a long time.

**The head of the household** is the person who runs the household and looks after those living in it. In order to qualify as a head of household, the designated household must be located at the person's home. However, if this person stays temporarily outside of the household for specific reasons (for example in jail) the person is still considered head of household.

## Consolidated Approach for Reporting Indicators of Food Security (CARI)<sup>2</sup>

The CARI is a standardized approach for assessing and reporting household food insecurity. When the CARI is employed, each surveyed household is classified into one of four food security categories. This classification is based on the household's current status of food security (using food consumption indicators) and their coping capacity (using indicators measuring economic vulnerability and asset depletion).

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<sup>1</sup> DFID (1999) sustainable livelihoods guidance sheet

<sup>2</sup> For more information regarding the CARI refer to the publication: Technical guidance for WFP's Consolidated Approach for Reporting Indicators of Food Security (CARI)

The **food security console** (below) gives an overview of the indicators included in the CARI. It combines a suite of **food security indicators** into a summary indicator – called the **Food Security Index (FSI)** - which represents the population’s *overall food security status*. The console’s domains represent two key dimensions of food insecurity. The current status domain (top row of console) uses food security indicators which measure the adequacy of households’ current food consumption. This domain is based on the food consumption score. The coping capacity domain (bottom half of console) employs indicators which measure households’ economic vulnerability and asset depletion. This domain is based upon a combination of the livelihood coping strategy indicator and the food expenditure share indicator.

**Table 1 Food Security Console**

Domain		Indicator	Indicator score			
			1	2	3	4
Current status	Food consumption	Food consumption group	<i>Acceptable food consumption</i>		<i>Borderline food consumption</i>	<i>Poor food consumption</i>
	Economic vulnerability	Food expenditure share	<i>Low food expenditure share &lt; 50%</i>	<i>Medium food expenditure share 50-65%</i>	<i>High food expenditure share 65-75%</i>	<i>Very high food expenditure share &gt;75%</i>
Coping capacity	Asset depletion	Livelihood coping strategy categories	<i>No livelihood coping strategies used</i>	<i>Stress coping strategies used</i>	<i>Crisis coping strategies used</i>	<i>Emergency coping strategies used</i>
	<b>Food Security Index</b>		<b>Food Secure</b>	<b>Marginally Food Secure</b>	<b>Moderately Food Insecure</b>	<b>Severely Food Insecure</b>

## Calculation of the CARI

Once all the available food security indicators in the console have been converted to a 4-point scale, the overall food security classification for a household can be calculated.

The steps to calculate the overall food security classification for a household are described below.

1) Calculate the ‘summary indicator of Current Status’ by averaging the household’s console score (i.e. the 4-point scale scores) for available indicators in the Current Status domain (CS). In the case of the Rwanda CFSVA, the food consumption score alone will serve as the current status indicators and thereby not averaging is needed.

2) Calculate the ‘summary indicator of Coping Capacity’ by averaging the household’s console scores (i.e. the 4-point scale scores) for available indicators in the Coping Capacity domain (CC).

3) Average these results together:  $(CS+CC)/2$ .

4) Round to the nearest whole number (this will always fall between 1 and 4). This number represents the household's overall food security outcome.

The resulting four groups are: food secure, marginally food secure, moderately food insecure and severely food insecure. A description of the profiles of the groups can be found in the table below.

Food secure	The food secure are able to meet essential food and non-food needs without engaging in atypical coping strategies. These households have an acceptable food consumption and use a low share of their budget to cover food needs.	Food secure
Marginally food secure	The vast majority of the marginally food secure have an acceptable diet although a considerable number of households use high share of their budget to cover food needs and sometimes engage in negative coping strategies in order to acquire enough food.	
Moderately food insecure	The moderately food insecure have significant food consumption gaps. They use a high share of their budget to cover food needs and the majority of households have to use negative coping strategies in order to make a living, although few use the more serious coping strategies.	Food insecure
Severely food insecure	The majority of the severely food insecure have a poor food consumption and the majority of households are using a very high share of their budget to acquire food. Almost half of these households have used one of the most serious irreversible coping strategies with the resulting risk of further deteriorating food security situation.	

## Indicators included in the CARI

### Food Consumption Score (FCS)

The food consumption score is a food security indicator used widely across different countries and contexts to estimate the current food consumption among households. In the survey, households were asked what food items they had consumed in the past 7 days from a comprehensive list of food items.

The food consumption score (FCS) is a measure of:

- Dietary diversity: the number of food groups consumed by a household over a reference period of seven days
- Food frequency: the number of days food items from different food group are consumed and,
- the relative nutritional importance of the food consumed

The higher the FCS, the higher is the dietary diversity and the frequency of food consumed. A high food consumption score increases the possibility that a household achieves nutrient adequacy.

## Calculation of the FCS

Food items are grouped into eight standard food groups where each food item belongs to one of these groups.

The consumption frequencies of food items of the same group are summed and frequencies above 7 are recoded to 7 (to reflect the maximum number of days in a week items from a food group is consumed).

The number of days food items from each food group is consumed is multiplied by a weight (see table below).

	Food items	Food groups	Weight
1	Maize, sorghum, other cereals, cooking banana, cassava, other roots and tubers (sweet potato, yam, taro)	Cereals and tubers	2
2	Pulses (including beans, tofu, bean curd)	Beans	3
3	Vegetables (including green, leafy vegetables, shoots and mushrooms)	Vegetables	1
4	Fruits	Fruit	1
5	Meat (poultry, pork, beef), fish, eggs	Meat and fish	4
6	Milk / milk products	Milk	4
7	Sugar	Sugar	0.5
8	Oil, lard	Oil	0.5

The Sum the weighed food group scores, creating the food consumption score:

$$FCS = a_{staple}x_{staple} + a_{pulse}x_{pulse} + a_{veg}x_{veg} + a_{fruit}x_{fruit} + a_{animal}x_{animal} + a_{sugar}x_{sugar} + a_{dairy}x_{dairy} + a_{oil}x_{oil}$$

$x_i$  = Frequencies of food consumption

$a_i$  = Weight of each food group

The FCS have two standard thresholds to distinguish different food consumption levels. The score of 21 is representing a bare minimum: the value comes from an expected daily consumption of staples (frequency \* weight,  $7 * 2 = 14$ ) and vegetables ( $7 * 1 = 7$ ). Below 21, a household is expected to not eat at least staple and vegetables on a daily basis and therefore considered to have poor food consumption.

The second threshold is at 35, and represents a daily consumption of staples and vegetables complemented by a frequent (4 days/week) consumption of oil and pulses (staple\*weight + vegetables\*weight + oil\*weight + pulses\*weight =  $7*2+7*1+4*0.5+4*3=35$ ). Between 21 and 35, households can be assumed to have borderline food consumption, meaning that they are vulnerable to become food insecure should a small decrease in their access to and availability of food occur. Households that score above 35 are estimated to have an acceptable food consumption consisting of sufficient dietary diversity for a healthy life.

Food consumption score (FCS)	Consumption profiles (diversity and nutritional density)
0-21	Poor
21.5-35	Borderline
> 35	Acceptable

### Food expenditure share

Economic vulnerability is measured using the ‘food expenditure share’ indicator. This indicator is based on the premise that the greater the importance of food within a household’s overall budget (relative to other consumed items/services) the more economically vulnerable the household.

The ‘food expenditure share’ indicator is constructed by dividing the total food expenditures by the total household expenditures. The denominator and numerator both include the value of non-purchased foods consumed.

By including both non-purchased foods and purchased foods within the overall food expenditure share estimate, the indicator considers households with different food access situations similarly. The measure of economic vulnerability is mainly concerned with how much (proportionately) of the household’s total expenditures, is directed to non-food items. In other words, how big role does food play with respect to the consumption of other non-food items.

Households are divided into four groups according to the percentage of their budget that they spend on food:

Low food expenditure share	<50%
Moderate food expenditure share	50%-<65%
High food expenditure share	65%-<75%
Very high food expenditure share	>75%

### Livelihood coping

The CARI uses the **Livelihood Coping Strategies** indicator as a descriptor of a household's *coping capacity*. The **Livelihood Coping Strategies** indicator is derived from a series of questions regarding the household’s experience with livelihood stress and asset depletion during the 30 days prior to survey. Responses are used to understand the stress and insecurity faced by households and describes their capacity to cope with future food shortages. All strategies are classified into three broad groups, including stress, crisis and emergency strategies.

Stress	Crisis	Emergency
Sold household assets	Harvested immature crops	Sold last female animals
Sold more (non-productive) animals than usual	Consumed seed stock that were to be saved for the next season	Entire household migrated
Spent savings	Decreased expenditure on fertilizer, pesticide, fodder, animal feed, veterinary care, etc.	Begging
Purchased food on credit or borrowed food		

Households engaging in routine economic activities that did not involve any of these strategies would be considered equivalent to **food secure** on this indicator.

## Other food security indicators

### Household dietary diversity score (HDDS)

The household dietary diversity score<sup>3</sup> is based on food items consumed the day before the survey grouped into 12 groups. The score is calculated by first adding the different food items to one of the twelve groups and then sum the number of groups. The score reflects from how many food groups food items were consumed the day before the survey with a minimum number of 0 and maximum number of 12.

HDDS food groups	
1	Cereals
2	White tubers and roots
3	Vegetables
4	Fruits
5	Meat
6	Eggs
7	Fish and other seafood
8	Legumes, nuts and seeds
9	Milk and milk products
10	Oils and fats
11	Sweets
12	Spices, condiments and beverages

<sup>3</sup> For more information regarding the HDDS and WDDS, refer to the FAO guidelines for measuring household and individual dietary diversity

## Women's dietary diversity (WDDS)

The women's dietary diversity score is calculated the same way as the HDDS, by simply adding the number of food groups consumed the day before the survey. However, the food items included in the score are slightly different.

WDDS food groups	
1	Starchy staples
2	Dark green leafy vegetables
3	Other vitamin A rich fruits and vegetables
4	Other fruits and vegetables
6	Meat and fish
7	Eggs
8	Legumes, nuts and seeds
9	Milk and milk products
10	CSB

This is an adjusted version of the WDDS. In the original WDDS guidelines, organ meat is in its own group and there is no separate group for CSB.

## Nutrition definitions and indicators

**Nutritional Security:** is achieved when a household has a secure physical, economic and environmental access to a balanced diet and safe drinking water, a sanitary environment, adequate health services, and knowledgeable care to ensure an active and healthy life at all times for all its members.

**Nutritional status:** is the balance between the intake of nutrients by an organism and their expenditure in the processes of growth, reproduction, and health maintenance. Consequently, **malnutrition** is any condition caused by excess or deficient nutrient intake. The indicators used to assess the nutritional status of children aged between 6 and 59 months old in this survey were based on anthropometric measurements of the mid-upper arm circumference (MUAC) and Z scores of anthropometric indices (weight-for-height, weight-for-age or height-for-age) with or without bilateral pitting oedema.

### Anthropometric Measurements

The variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition. Common anthropometric measurements include weight and length or height.

**Mid-Upper Arm Circumference (MUAC):** is a measurement of the circumference of the mid-upper arm and an indication of upper arm muscle wasting. MUAC is a common measure of child nutritional status that is fast, does not hinge on the accuracy of age reporting, and is quickly interpretable using a MUAC tape with colours for severe acute malnutrition (RED or a measurement <11.5cm), moderate acute malnutrition (YELLOW or a measurement between 11.5 - 12.5cm) and normal nutritional status (GREEN or a measurement of >12.5cm). MUAC is also used to measure wasting for pregnant women.

**Weight-for-Height (wasting):** an indication of the current nutritional status of a child and reflects recent nutritional intake and/or episode of illness. Severe wasting is often linked to acute food shortage.

**Weight-for-age (underweight):** a measurement that combines information from stunting and wasting. Children can therefore be underweight because they are stunted, wasted or both.

**Height-for-age (stunting):** a measure of linear growth, and as such, an indicator of long term effect of under nutrition not affected by seasonal changes.

**Standard Deviation (SD) or Z score:** is the measure of an individual's value (based on their anthropometric measurement) with respect to the distribution of the reference population, i.e., the deviation of the individual's measure (of weight-for-height, weight-for-age and height-for-age) from the reference median. To classify children according to the severity of the malnutrition, -2SD is classified as moderate malnutrition and -3SD is classified as severe malnutrition.

**Cut off values used for the calculations of women malnutrition.**

<b>Stunting</b>	Height < 145 cm
<b>Underweight*</b>	Weight < 45 kg
<b>Wasting (BMI)*</b>	BMI= 18.5 -24.9 Kg m <sup>-2</sup>
GRADE I	BMI = 17.0-18.4 Kg m <sup>-2</sup> (Mildly thin)
GRADE II	BMI = 16.0-16.9 Kg m <sup>-2</sup> (Moderately thin)
GRADE III	BMI < 16 Kg m <sup>-2</sup> (Severely thin)
<b>Overweight (BMI)*</b>	BMI > 25 Kg m <sup>-2</sup>
<b>Wasting (MUAC)</b>	MUAC < 221 mm
SEVERE:	MUAC < 214 mm
For pregnant women	MUAC < 221
*not valid for pregnant women	

### Infant and young child feeding practices (IYCF)

Indicators calculated from the IYCF module include the minimum dietary diversity, minimum meal frequency and minimum acceptable diet. This data was collected for children aged 6-24 months.<sup>4</sup>

- Minimum Dietary Diversity: Consumption of 4 or more food items out of 7 food groups
- Minimum Meal Frequency: For breastfed children, 2 times if 6–8 months and 3 times if 9–24 months. For non-breastfed children, 4 times for all children 6–24 months
- Minimum Acceptable Diet: Meeting the requirements for both minimum acceptable diet and minimum meal frequency

<sup>4</sup> For more information, refer to the WHO/UNICEF publication: Indicators for assessing infant and young child feeding practices



# Livelihoods, coping and wealth definitions and indicators

## Livelihood groups

Livelihoods are the resources used and the activities undertaken in order to live. The resources can consist of individual skills and abilities (human capital), land, savings, and equipment (natural, financial and physical capital, respectively) and formal support groups or informal networks that assist in the activities being undertaken (social capital). Livelihood strategies are activities and choices that people make, using their asset base, in order to achieve the most optimal livelihood outcomes. Such livelihood outcomes may include food security, general well-being, ensuring schooling for children, or being able to afford or access health services. A livelihood group is composed of people who utilize similar livelihood strategies.

For the CFSVA and Nutrition Survey 2015, households with similar main livelihood activities were grouped to reduce the number of livelihoods in the analysis. The groups were created primarily based on the main income generating activity of the household. Factors taken into consideration in the grouping were similarities in the nature of the activity in itself as well as similarities in per capita expenditure and different food security outcomes between households engaged in the different activities. Based on this information, households were classified in eight groups according to their main livelihood activity. In addition, those with agriculture as main activity were divided into purely crop-growing farmers and agro-pastoralists, getting at least 10% of their income from livestock. The group of agriculturalists was divided further, based on their level of expenditure, used as a proxy for income. Agriculturalists with an annual per capita expenditure less than 118,000 RWF (the national poverty line) were classified as low-income agriculturalists, while those with a higher annual per capita than 118,000 were classified as medium/high income agriculturalists. This resulted in ten final livelihood groups: (1) low income agriculturalists (2) medium/high income agriculturalists (3) agro-pastoralists (4) agricultural daily labour (5) skilled labour (6) formal/informal trade and petty trade (7) salaried work and own business (8) transfers/support/begging and (9) artisanal work and other activities.

## Vulnerability

Vulnerability is “the probability of an acute decline in access to food, or consumption, often in reference to some critical value that defines minimum levels of human wellbeing”.<sup>5</sup> It is a function of:

1. **Exposure to risk:** the probability of an event that, if it did materialize, would cause a welfare loss (e.g. drought)
2. **Risk management:** the ability to mitigate the possible consequences of a probable event. This can in turn be divided into ex-ante risk management (preparedness) and ex-post risk management (ability to cope). The ability to cope is the response after an event occurred; it can be negative and affect the resource base of the household, such as the selling of assets, or positive (non negative response such as migration). The ability to cope is undermined by the intensity of the event itself but also by poor structural and societal conditions such as poverty.

**Coping strategies** are the ways a community, household, or individual adjusts their livelihood strategies in response to a shock or risk. This does not describe a regular situation but a response to a shortfall of food that can be described as a shock. These coping strategies can be short-term alterations of consumption patterns or one-off responses such as asset sales. Long-term alterations of income earning or food production patterns might also be a response to a shortfall of food, but will not be included in the term “coping strategy” in this report.

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<sup>5</sup> WFP 2002, VAm standard analytical framework

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.

**Coping Strategies Index (CSI):** The CSI is a continuous variable based on the frequency and severity of coping strategies for households reporting food consumption problems. Households are asked to report how many days in the 7 days preceding their interview they used each mentioned coping strategy. The sum of the weighed frequencies (see table below) is the household’s CSI score. CSI scores are often used as a proxy variable for food insecurity. 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.

*Coping strategy weights for calculation of the reduced CSI*

Coping strategies		Weight
1.	Rely on less preferred and less expensive foods	1
2.	Borrow food, or rely on help from a friend or relative	2
3.	Limit portion size at mealtimes	1
4.	Restrict consumption by adults in order for small children to eat	3
5.	Reduce number of meals eaten in a day	1

## Livelihood zones

Since many districts have large geographical differences, an additional geographical grouping of the survey results was considered beneficial. Thus, based on a FEWS NET livelihood map, Livelihood zones are used to present results. These zones are based on sectors, where sectors are assigned to a zone based upon indicators related to agricultural potential and ecological similarity.

## 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. 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.

The method is employed in WFP food security assessments and follows techniques used in DHS surveys. It involves Principal Component Analysis (PCA) of variables relating to ownership of assets and housing conditions. The PCA method is a form of data reduction which attempts to describe the underlying relationship between a series of variables. The PCA creates a continuous variable which explains the underlying relationship and can be used as a proxy for household wealth. As the continuous variable alone is not easily interpreted, it is used to rank households and divide them into quintiles which are more easily describable. These wealth quintiles allow for descriptive analysis of relative poverty. Thus, unlike a poverty line, is not an absolute measure of poverty or wealth. When referring to the wealth of households based on the wealth index we can talk about poorer and wealthier households but we cannot conclude who is absolutely poor and wealthy.

The selection of variables was based up on a low level of both under- and over-correlation between variables as well as a sufficient proportion of households with presence of the attribute (>5 % of households and <95%). Livelihood specific assets were not included in the index, nor were variables showing small variance across the wealth quintiles.

For the 2015 CFSVA the wealth index took into account the ownership of the following items: ownership of iron, ownership of tape/CD player, ownership of mobile phone, improved lighting, improved floor, improved walls, improved toilet and more than two sleeping rooms in the house.