WFP
World Food Programme

Thematic Guidelines

vam
vulnerability analysis and mapping

Guidelines for the Use of Nutritional Information in VAM

Nutrition and Health

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Introduction

In early 2004, there was an external audit of WFP's Vulnerability Analysis and Mapping (VAM) Unit activities around the world. From this audit came several observations and recommendations that provided valuable inputs on how VAM can standardize and improve its work within a de-centralized management system and across a range of contexts with varied information requirements. In April 2004, VAM convened a Global Meeting in Dakar, Senegal. During the meeting, VAM and program staff from all regional offices and several country offices agreed that there was a need for guidelines to be produced from VAM HQ in several topical areas. One of these topical areas was nutrition, corresponding with WFP Strategic Priority Number 3 – "*Support the improved nutrition and health status of children, mothers and other vulnerable populations*".

The key challenge is to identify the role of nutrition information (anthropometry, consumption, health) in addressing the five key questions to be answered in a **WFP**-**VAM** study:

1. Who are the food insecure?
2. How many are they?
3. Where do they live?
4. Why are they food insecure?
5. Does food aid have a role to play?

What these guidelines ***can*** do:

- Define and describe malnutrition and measures of nutritional status (***what***).
- Explain ***why*** this information is important for VAM work in meeting the WFP Strategic Priorities and the Millennium Development Goals.
- Complement the WFP Food and Nutrition Handbook and the guidance materials being produced by the unit.
- Provide specific guidance on the strengths and limitations of using anthropometric data from secondary sources to answer the five VAM questions.
- Create an understanding of the linkages between individual nutritional status and the nutritional status of populations from which they come.
- Explain the rationale behind using household consumption data (food frequency) to measure relative household food security.
- Provide examples of tools and approaches for collecting and analyzing consumption and anthropometric data (***how***) – primarily for VAM food security and vulnerability studies, rather than to provide precise national or sub-national estimates.

What these guidelines ***cannot*** do:

- Provide prescriptive tools and checklists on ***how*** to conduct anthropometric surveys in the absence of training.
- Teach the reader how to analyze household food consumption data with statistical software.
- Replace or contradict the existing guidance materials produced by the Nutrition Unit in WFP HQ.
- Be used as a stand alone guide for other nutrition-related studies or activities.
- Create expertise in nutritional data collection and analysis.
- Provide specific guidance on how to '**do**' a nutrition survey.

Section I – Concepts and definitions

In this section, the basic concepts and definitions of nutrition, specifically protein energy malnutrition (macronutrient malnutrition) and micronutrient malnutrition will be presented. The causal model of malnutrition is presented along with descriptions of how individual nutritional status is measured (e.g. indicators) and how data from population-based surveys can be interpreted.

1.1 - Defining malnutrition in relation to food security

Malnutrition is a disorder, condition, or state of being poorly nourished. The term covers a broad range of clinical conditions in both children and adults, including both over- and under- nutrition. In the context of developing countries where WFP/VAM works, problems of under-nutrition are the greatest concern and are the primary focus of these guidelines. It should be noted, however, that urbanization and changes in eating patterns have been linked to an increasing prevalence of over-nutrition[1].

Nutritional status is both a fundamental component and outcome of **food security**. Although treating nutrition as a cause or outcome depends on the perspective of the analysis (e.g. nutritional analysis or food security analysis), this relationship suggests that a comprehensive analysis of either requires an integrated analysis of nutrition and food security. Furthermore, the inclusion of nutrition in vulnerability and food security analyses contributes to the achievement of WFP's strategic priority number three: '*Support the improved nutrition and health status of children, mothers and other vulnerable populations*.'

1.1.2 - Nutrition as a fundamental component of food security

Many food security analyses focus solely on food **availability** (production, imports). Other analyses incorporate food **access** (market access, purchasing power) in recognition that availability does not equate with a household's ability to acquire food. However, a comprehensive analysis of food security at the community, household, or individual level demands that a third and critical component of food security also be included: **utilization**[2]. A more thorough integration of nutrition is required to effectively incorporate this third aspect of food security into VAM analyses and answer the five critical questions outlined in the introduction to these guidelines.

> '***Food security*** *exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.'*
> *1996 World Food Security Summit*

1.1.2 - Food insecurity as a cause of malnutrition

In addition to nutrition being a critical component of food security (e.g. utilization), inadequate dietary intake linked to household food insecurity is also a cause of malnutrition; a household's ability to access foods of appropriate quality and quantity, either through household production or purchases, to meet dietary needs has a direct relationship with individual consumption and, therefore, nutritional status. Although the range of factors that cause malnutrition goes beyond food insecurity and its affect on dietary intake (additional causes such as disease, care, and health environment are discussed in detail in these guidelines), a comprehensive nutritional analysis requires that an analysis of food insecurity be explored as a potential underlying cause.

1.2 - Types of malnutrition

There are two main types of malnutrition to be considered in VAM work: macronutrient malnutrition and micronutrient malnutrition.

[1] In recent years, over-nutrition as a form of malnutrition has become notably more prevalent in Northern and Southern Africa, Eastern Asia, Central America and South America.
[2] See Household Food Security Profiles guidelines for a detailed discussion of food security.

1.2.1 - Macronutrient Malnutrition

Macronutrient malnutrition is characterized by acute or chronic deficiencies of protein and energy (carbohydrates and fat) and is also called protein-energy or protein-calorie malnutrition (PEM/PCM). The groups most vulnerable to macronutrient malnutrition are pregnant and lactating women, children under five years of age (pre-school children), and women of reproductive age (15-49 years).

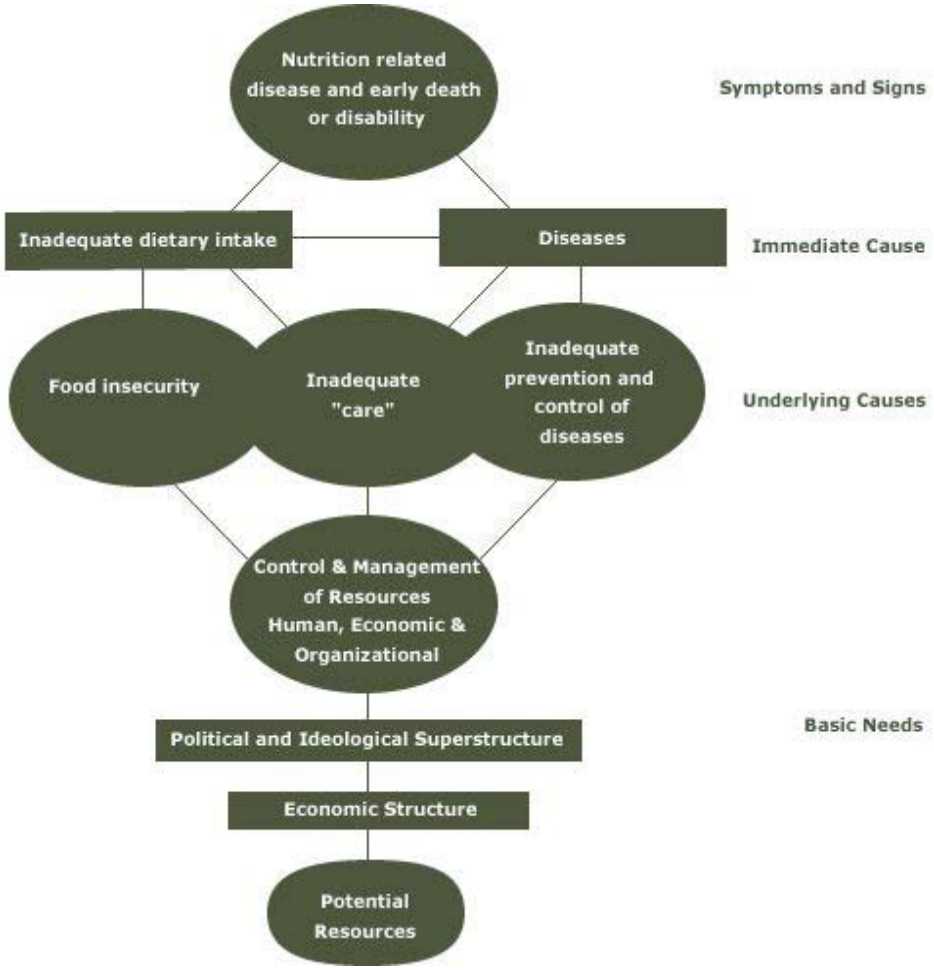
1.2.2 - Micronutrient Malnutrition

Micronutrient malnutrition is characterized by deficiencies in key vitamins and minerals. Micronutrient deficiencies are widespread in developing countries and affect all age groups. The micronutrient deficiencies of greatest public health concern are those of **iron**, **iodine**, and **vitamin A**.

1.3 - Causes of malnutrition (conceptual framework)

The conceptual model best suited for VAM's work in understanding the causes of malnutrition and their relation to household food insecurity is illustrated in Figure 1. As illustrated in the model, malnutrition is more than simply a lack of food. Malnutrition results from inadequate food intake and disease. However, as illustrated in the model, these immediate causes are themselves the result of a set of **underlying causes**: food insecurity (food), inadequate care (care), and inadequate prevention and control of disease. As a result, understanding the causes of negative nutritional outcomes in an individual or population requires that this range of potentially causal factors and the interaction between them be examined.

Figure 1 - Conceptual Model of the Causes of Malnutrition[3]



[3] IFAD (adapted from UNICEF) (http://www.ifad.org/hfs/approach/hfs/nutrition/nut_2.htm)

1.3.1 - Health environment (inadequate prevention and control of diseases)[4]

An individual or household's degree of access and utilization of good quality health services, safe water supplies, adequate sanitation and good housing are preconditions for adequate nutrition.

- **Good quality health services** - Health and nutrition are closely linked in a 'malnutrition-infection cycle': diseases contribute to malnutrition and malnutrition makes an individual more susceptible to disease. The most common afflictions suffered by children that contribute to malnutrition are: diarrhoea, acute respiratory infections, measles, and malaria (fever). Vitamin A supplementation and measles immunizations provide good proxy indicators of the health services environment.
- **Safe water supplies** – Clean water is essential for maintaining health and achieving adequate nutritional status. Diarrhoea from unsafe water sources and water borne diseases are common problems in developing countries that are strongly association with negative nutritional outcomes.
- **Adequate sanitation** - Availability of adequate sanitation services are essential in maintaining a healthy environment. Disposal of faeces and hygiene practices have a strong influence on nutritional outcomes.
- **Adequate housing** – Adequate shelter is one of the basic human needs. When lacking or inadequate, multiple aspects of life are affected, including nutritional status.

1.3.2 - Household food security and consumption (food insecurity)

Consumption-related malnutrition is directly linked to inadequate household food security. The ability to access adequate food to meet dietary needs through either household production or purchases can have a direct effect on individual nutritional status. On a short term basis inadequate food consumption may result in acute malnutrition as measured by wasting. Longer periods of inadequate food consumption may result in chronic malnutrition as measured by stunting. An understanding of both the quantity and the quality of diet in terms of macro and micronutrients is important for analyzing the relationship between food security, as measured by consumption, and malnutrition.

Measures of dietary diversity are relatively simple to collect and research shows them to be associated with both nutrient adequacy and nutritional status. In addition, dietary diversity at the household level tends to increase with income and wealth. A recent study that analysed data from eleven Demographic and Health Studies data sets found that dietary diversity was significantly associated with child linear growth measures (height-for-age z-scores) in all but one of the countries in the study[6].

Caloric values are quantitative measures of food determined by their macronutrient composition. The international average daily caloric intake standard used by WFP is 2,100 kcal[7] and provides a standard measure against which deficiencies in caloric intake can be gauged. Qualitative measures of dietary quality that assess the vitamin and mineral content of food consumed in relations to international standards are needed to fully analyze food consumption and its relationship to negative nutritional outcomes. It should be noted that for both macro and micro nutrients, recommended requirements at the individual level vary by age and sex (Table 1).

Table 1 - Energy Requirements[5]

Age (years)	Male (kcal/day)	Female (kcal/day)
0-4	1,320	1,250
5-9	1,980	1,730
10-14	2,370	2,040
15-19	2,700	2,120
20-59	2,460	1,990
60+	2,010	1,780
Pregnant	-	285 (extra)
Lactating	-	500 (extra)
Whole Population	***2,250***	***2,010***

Accordingly, recommendations for a defined population should reflect the demographic structure of that population. Furthermore, other factors such as pregnancy and lactation, temperature, and level physical activity affect macro and micro nutrient requirements.

[4] See Section 1.9 for a discussion of key health environment indicators
[5] WHO Technical Report Series no. 724
[6] Arimond and Ruel, 2004.
[7] WFP Food and Nutrition Handbook, p.65

1.3.3 - Care environment (inadequate care)[8]

Malnutrition can occur even when access to food and healthcare is sufficient and the environment is reasonably healthy. The social context and care environment within the household and the community also directly influence nutrition. Factors influencing nutrition status are:

- breastfeeding practices - exclusive breastfeeding up to 6 months of age
- weaning practices – timely introduction of nutritious weaning foods
- maternal hygiene behaviours – hand-washing, bathing, etc.
- relationships between morbidity and water and sanitation
- pregnancies and antenatal care – birth spacing, tetanus toxoid injections, vitamin A supplementation
- HIV and AIDS

HIV and AIDS
The HIV and AIDS epidemic has had a devastating impact on health, nutrition, food security and overall socioeconomic development in countries that have been significantly affected by the disease. Moreover, the epidemic is greatest in populations where malnutrition was already a problem at the *population* level. At the *individual* level, it is important that attention is focused on the interaction between HIV/AIDS and care practices, nutrition, and food security due to increased incidence of secondary infections among affected individuals and decreases in quality of care given to children and the household's ability to produce food or income when productive members are affected.

1.4 - Measuring macronutrient malnutrition

A number of well-established indicators exist for measuring different types of macronutrient malnutrition; indicators of chronic malnutrition that reflect past growth failure and indicators of acute malnutrition that reflect current macro-nutrient nutritional well-being.

1.4.1 - Indicators for measuring macronutrient malnutrition among children[9]

For children, there are four main indicators of macronutrient malnutrition:

- **Stunting** – (low height-for-age) is 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. Stunting is an indicator of past growth failure, does not measure short-term changes in nutritional status and is associated with a number of long-term factors including chronic insufficient protein and energy intake, certain micronutrient deficiencies, frequent infection, sustained inappropriate feeding practices, and poverty.

- **Wasting** (low weight-for-height) is a measure of acute malnutrition characterized by considerable weight-loss or failure to gain weight and resulting in a child's weight being substantially below the weight 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 wasting does not incorporate child age, the difficulties encountered in contexts where exact age is difficult to determine do not affect this indicator.

- **Underweight** – (low weight-for-age) is a composite measure 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 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.

- **Mid-Upper Arm Circumference (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

[8] See Section 1.9 for a discussion of key care environment indicators
[9] Children 0 to 59 months of age

provides a useful tool for *screening* cases of acute malnutrition among children 12-59 months, particular in emergencies. In some cases MUAC-for-age offers a more refined version of this indicator of acute malnutrition.

1.4.2 - Indicators for measuring macronutrient malnutrition among adults

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

- **Chronic energy deficiency (CED)** - is a measure of underweight for non-pregnant adults determined by using the **body-mass index (BMI)**[10]. An adult (18 or older) with a BMI below 18.5 kg/m^2 is considered to be malnourished. 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.

- **Mid-Upper Arm Circumference (MUAC)**: MUAC (see description in Section 1.4.1) is also recommended for assessing acute adult malnutrition.

1.5 - Collecting, analyzing and using indicators of macronutrient malnutrition

Collecting the data necessary to calculate the indicators described in Section 1.4 requires collecting data on weight, height or length, gender and age[11] of a sub-set selected from the population of interest (e.g. a sample[12]). These measurement techniques are known collectively as **anthropometry**. Once this data has been collected, the results are then compared to a standard reference of statistical[13] norms based on data classified by sex and age (in months) which allows for international standardization and comparison of nutritional indices.

The accepted reference standard was developed by the United States National Center of Health and Statistics (NCHS, 1977) and the Center for Disease Control (CDC) based on data collected from a population of healthy children[14]. The WHO adopted the reference curves of the National Center for Health Statistics (NCHS) for international use based on the evidence that the growth patterns of well-fed, healthy children under 5 years of age from diverse ethnic backgrounds are similar[15] and consequently hold valid for children from all races and ethnicities. These reference standards are utilized by agencies involved with nutritional assessments and analysis, including WFP. By the end of 2005, a new set of international growth curves are expected to be produced by WHO; it is likely that WFP and all international agencies will adapt those curves as the reference standard.

The two main methods for comparing a child's measurements with the reference values are by calculating either their 'percentage of the median' or by calculating their standard deviation from expected values (z-scores) for each of the most commonly used macro-nutrient malnutrition indicators: weight-for-height, height-for-age, and weight-for-age.

- The *percentage of the median* is calculated primarily for determine whether an ***individual*** child should be admitted to supplementary feeding programs and is not normally used in VAM studies. A cut-point of 80% of median corresponds approximately to -2.00 standard deviations. If more information is desired please refer to the WFP Food and Nutrition Handbook.

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[10] Calculated by dividing weight in kilograms by the square of height in meters

[11] Numerous guidelines describing how to collect anthropometric data already exist. See References and Guides provided at the end of these guidelines for appropriate sources.

[12] See Sampling Guidelines for a detailed discussion of sampling techniques.

[13] NCHS: National Centre for Health Statistics (1977) NCHS growth curves for children birth-18 years. United States. Vital Health Statistics

[14] The NCHS data was established using two different child populations- 0-36 months, lying recumbent and 2-18 years, measured standing. Length measurement is always greater than height measurement for children. When interpreting data for children around 24 months it should be noted that wasting and stunting rates may peak as a result or the overlapping data sets.

[15] Habicht JP, Martorell R, Yarbrough C, Malina RM, Klein RE. Height and weight standards for preschool children: How relevant are ethnic differences in growth potential? Lancet 1974;i:611-5

- *Standard deviation scores (z-scores)* are a statistical measure of the distance between the child's anthropometric index value and the expected value of the reference population. Ninety-five percent of the reference population has anthropometric z-scores that fall between -2.00 and +2.00, the normal range of adequately nourished children. If a child's z-score falls outside of this normal range they are considered malnourished.

Figure 2 – Normal Distribution of malnutrition among standard reference population

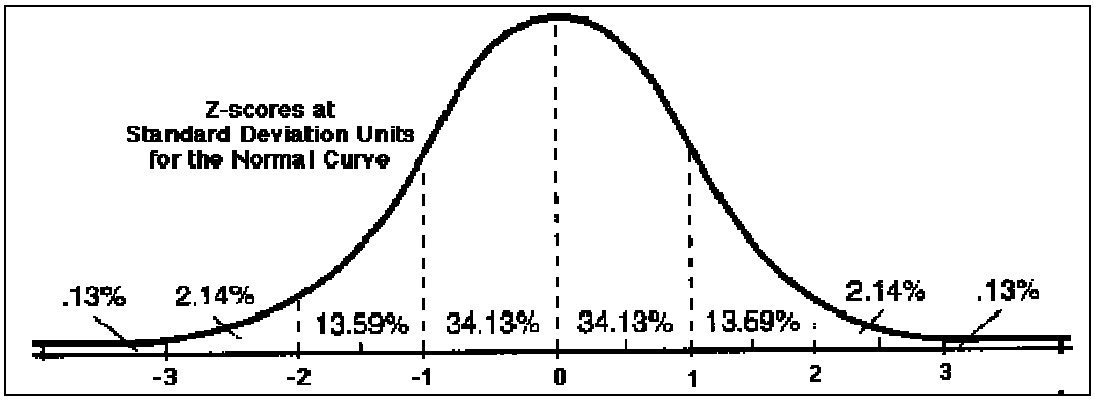


Figure 2 illustrates the normal distribution of malnutrition for the standard reference population by z-score. It should be noted that within the standard reference population the expected prevalence of malnutrition is not zero; approximately 2% of the standard healthy population will be moderately malnourished and 0.5% severely malnourished. This graphical representation of the nutritional status of a population can be very useful when specific population based results are graphed against this normal curve.

Further classification of child malnutrition using z-scores has been established by the WHO with internationally agreed upon cut-off points (Table 2). Population based nutrition information compared with the normal population distribution provides an understanding of overall nutrition status of the **population**, or similarly can be used to determine the nutritional status of an **individual**.

Classification of malnutrition in individuals[16]

	Moderate Malnutrition	**Severe Malnutrition**
Weight-for-height, weight-for-age and height-for-age	-2.00 to -3.00 z-scores	< -3.00 z-score
Mid-Upper Arm Circumference (MUAC) 12-59 months	12.0 to 12.5 cm	11.5 to 12.0 cm
Body Mass Indicator (BMI) adult	16.0 to 17.0 kg/m^2	<16.0 kg/m^2

Terms often used to describe to malnutrition in ***individuals*** are:

- *Kwashiorkor* is a form of malnutrition caused by inadequate protein intake in the presence of fair to good energy (total calories) intake and is characterized by the presence of bilateral pitting oedema[17]. The child may appear adequately nourished due to excess fluid and presents a round moon face. Kwashiorkor is automatically classified below -3 z-scores weight-for-height.
- *Marasmus* is severe weight loss caused by loss of muscular tissues and sub-cutaneous fat. This gives the child an old man face and gathering of excess skin around the buttocks. Marasmus is classified below -3 z-scores weight-for-height.

[16] WFP Food and Nutrition Handbook
[17] Oedema (sub-dermal fluid retention) is nutrition related if it is on both legs (bilateral) and if thumb pressure leaves an indent in the flesh.

Calculating z-scores and classifying children

Epi-Info software is a series of micro-computer programs produced by the CDC and WHO. One of the programs is called Epi-Nut which can be used to calculate anthropometric indices from data sets or directly from the keyboard. The following is an example using the four measures:

Child	Age	Sex	Weight	Height	whz	waz	haz
1	17	M	9.7	83.4	-2.12	-1.37	0.66
2	47	F	12.3	90.1	-0.57	-2.09	-2.72

Interpretation:

Child 1 – This boy has low weight-for-length but the other indices are in the normal range. Therefore he is classified as being ***wasted***.

Child 2 – This girl has low weight-for-age and height-for-age but normal weight-for-height. She is both ***underweight*** and ***stunted***.

Terms often used to refer to acute malnutrition prevalence in ***populations*** are:

- *GAM* (Global Acute Malnutrition) is a total of all children with moderate or severe wasting and/or oedema. It encompasses all children below -2 z-scores weight-for-height.
- *SAM* (Severe Acute Malnutrition) is simply an acronym for all children who are severely wasted. It encompasses children below -3 z-scores weight-for-height.

1.6 – Consequences of macronutrient malnutrition

According to the 4th Report on the World Nutrition Situation (ACC/SCN), there are nutrition challenges throughout the life cycle, starting at birth and carrying on into adulthood and old age, especially for girls and women.

- **Low-birth weight infants** (< 2,500 grams) have suffered from intrauterine growth retardation (IUGR) as foetuses and are at a far greater risk of dying in the neonatal period or infancy. If they survive, they usually have inadequate catch-up growth and may suffer from impaired mental development. A low birth weight infant who survives infancy is thus more likely to be underweight or stunted early in life.
- **Early childhood under-nutrition** has serious consequences – underweight children are likely to have more severe illnesses such as diarrhoea and pneumonia while there is a significant exponential relationship between severity of underweight and likelihood of death.
- The nutrition and health of **school-age children** in developing countries has only recently been recognized as an important issue. Before, it was assumed that if a child survived the most critical periods of infancy and early childhood, he/she was no longer vulnerable. Research shows that these children are affected by the same infectious diseases as younger children and that malnutrition in this group negatively affects school attendance, performance and learning.
- A second period of rapid growth occurs in **adolescence** which offers a limited opportunity for catch-up growth in undernourished children. However, even if some growth is regained it is likely that the child will still be suffering from cognitive development and behaviour problems. A stunted girl is very likely to become a stunted adolescent and later a stunted woman.
- A **stunted and/or underweight woman** will already suffer directly in terms of her health and productivity and is also likely her children will be born with low birth weight, continuing the cycle.

1.7 – Uses of anthropometric data

The following are some uses for anthropometric data:

- Identification of individuals or populations at risk
    - Indicator of present malnutrition (wasting) as a predictor of an increased risk of mortality in the future.
- Selection of individuals or populations for an intervention
    - Low weight for age children and low BMI adults (or low MUAC) to screen for entry into feeding programmes.
    - Stunting in young children to target development programmes.
- Evaluation of the effects of changing nutritional, health, or socioeconomic influences, including interventions.

- Changes in wasting as an indicator of short-term response in a wasted child being treated for malnutrition
- Decrease of stunting at the population level as a long-term indicator that social development is benefiting the poor as well as the affluent.

1.8 - Measuring and analyzing micronutrient malnutrition

As mentioned previously in these guidelines, the three most common and preventable micronutrient deficiencies are those of iodine, iron and vitamin A. Micronutrient malnutrition is more difficult to measure and diagnoses than macronutrient malnutrition and relies primarily on the presence of clinical symptoms. However, biological measures are more accurate and advances in technology allow for more field-based diagnostics to take place. The table below describes each of these micronutrient deficiencies, its symptoms and common proxy indicators used to determine the micronutrient status of populations.

Micro-nutrient	Deficiency disease	Symptoms	Food sources	Proxy indicators
Vitamin A	Xerophthalmia	Night blindness, Bitot's spots	Red, orange & yellow fruits & vegetables, pulses, green-leafy plants, liver, fish oil.	Vitamin A supplementation for children and lactating women
Iron	Anaemia	Clinical signs of pallor, tiredness, headaches and/or haemoglobin test.	Meat, liver, green leafy vegetables	Iron supplementation for pregnant women, prevalence of malaria
Iodine	Goitre	Swelling of thyroid gland in the neck (both visible and palpable).	Iodized salt, seafood	Iodate salt testing, proximity to salty water body, and salinity of soil
Vitamin C	Scurvy	Painful joints, swollen and bleeding gums, slow healing of wounds.	Citrus fruits, green leafy vegetables	Prolonged absence of fresh foods

1.8.1 - Iodine and iodine deficiency[18]

Iodine deficiency is the single most common cause of preventable mental retardation and brain damage in the world. Globally, 2.2 billion people (38% of the world's population) live in areas with iodine deficiency and are at risk of its complications.

- Iodine is a chemical element (as are oxygen, hydrogen, and iron). It is present in fairly constant amounts in seawater but its distribution over land and fresh water is uneven. Deficiency is especially associated with high new mountains (e.g., Himalayas, Andes, Alps) and areas of frequent flooding, but many other areas are also deficient (e.g., Central Africa, Central Asia, much of Europe).
- Iodine is an essential part of the chemical structure of thyroid hormones. The thyroid is a butterfly-shaped gland in the front part of the neck. The thyroid hormones act in target organs by influencing many different chemical reactions, usually involving manufacture of key proteins. The body must have proper levels of thyroid hormone to work well.
- Seafood is usually a good source of iodine because the ocean contains considerable iodine. Freshwater fish reflect the iodine content of the water where they swim, which may be deficient. Other foods vary tremendously in iodine content, depending on their source and what may have been added. Plants grown in iodine-deficient soil do not have much iodine, nor do meats or other products from animals fed on iodine-deficient plants.
- Maternal iodine deficiency causes miscarriages, other pregnancy complications, and infertility. Thyroid hormones, and therefore iodine, are essential for normal development of the brain. If the foetus or newborn is not exposed to enough thyroid hormone, it may have permanent mental retardation, even if it survives. Low birth weights and decreased child survival also result from iodine deficiency. Cretinism is a very severe degree of this brain damage; it includes permanent dense mental retardation, and varying degrees of additional developmental defects.

[18] Source: International Council for Iodine Deficiency Disorders – ICCIDD

- The most visible consequence of iodine deficiency is goitre, which means "an enlarged thyroid." The process begins as an adaptation in which the thyroid is more active in its attempts to make enough thyroid hormone for the body's needs, despite the limited supply of raw material (iodine).

Goitre size & classification

- Grade 0 – not palpable or visible.
- Grade 1 – palpable but not visible when the neck is in a normal position.
- Grade 2 – a swelling in the neck that is clearly visible when the neck is in a normal position.

- In addition to these effects on the individual, iodine deficiency has adverse consequences for the community. The mental retardation can cover a wide range, from mild blunting of intellect to cretinism, and a large part of the population may have some intellectual impairment. Individuals in these communities have lower educability and lower economic productivity, and the output of the whole community suffers.
- **Median urinary iodine** and the **prevalence of goitre** are the most important indicators for assessing IDD prevalence and for understanding the severity of IDD as a public health problem. School-age children are the most appropriate target group for IDD surveillance. Urinary iodine is a measure of very recent iodine intake. Goitre can be determined clinically by inspection and palpatation and is graded according to size. Palpatation becomes les reliable when average goitre size decreases in a population. The table above shows the cut-points to determine if IDD is a public health problem in the population. Salt testing is commonly done in household surveys to determine whether the salt for consumption has an iodine content of at least 15 parts per million (ppm). **Salt testing kits** and instructions are often available from **UNICEF**.

Public health problem	Median urinary iodine level	Total goitre rate (TGR)[19]
No problem	100-200 µg/L	0.0 – 4.9%
Mild	50-99 µg/L	5.0 – 19.9%
Moderate	20-49 µg/L	20.0 – 29.9%
Severe	< 20 µg/L	30% or more

1.8.2 - Vitamin A and vitamin A deficiency (VAD)[20]

Vitamin A is an essential micronutrient for the normal functioning of the visual system, growth and development, maintenance of epithelial cellular integrity, immune function and reproduction. Vitamin A is fat soluble and is stored in the body when intake exceeds physiological need – mostly in the liver.

- Vitamin A is found in dark green and yellow vegetables and yellow fruits, such as broccoli spinach, turnip greens, carrots, squash, sweet potatoes, pumpkin, cantaloupe, and apricots, and in animal sources such as liver, milk, butter, cheese, and whole eggs.

Vitamin A deficiency

- Between 100 and 140 million children are deficient in vitamin A.
- An estimated 250 000 to 500 000 vitamin A-deficient children become blind every year, half of them dying within 12 months of losing their sight.
- Nearly 600 000 women die from childbirth-related causes each year, the vast majority of them from complications which could be reduced through better nutrition, including provision of vitamin A.

- Vitamin A deficiency occurs when body stores are depleted to the extent that health problems occur. Initially, the integrity of the epithelial barriers and the immune system become compromised. This is followed by impairment of the visual system.
- Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and raises the risk of disease and death from severe infections. In pregnant women VAD causes night blindness and may increase the risk of maternal mortality.
- Vitamin A deficiency is a public health problem in 118 countries, especially in Africa and South-East Asia, mostly affecting young children and pregnant women in low-income countries.

[19] In school children 6-12 years = (# Grade 1 + # Grade 2)/total children examined
[20] Source: W.H.O. (http://www.who.int/nut/vad.htm)

- The table below shows the cut-offs for biological indicators of sub-clinical vitamin A deficiency to determine a public health problem. In addition, a prevalence of 5% or more of night-blindness in pregnant women indicates a problem of public health significance.

Public health problem	Children 6-71 months of age	
	Night-blindness	Serum retinol
Mild	< 0 - < 1%	> 2 – 10%
Moderate	≥ 1% - < 5%	> 10% - < 20%
Severe	≥ 5%	≥ 20%

- For children, lack of vitamin A causes severe visual impairment and blindness, and significantly increases the risk of severe illness, and even death, from such common childhood infections as diarrhoeal disease and measles.
- For pregnant women in high-risk areas, vitamin A deficiency occurs especially during the last trimester when the body's demand in both the unborn child and the mother is highest. The mother's deficiency is demonstrated by the high prevalence of night blindness during this period. VAD may also be associated with elevated mother-to-child HIV transmission.
- Demographic and ecological risk factors for VAD in a population include:
    - Infant mortality rate > 75/1000 live births; under-5 year MR > 100/1000 live births;
    - Full immunization coverage or, particularly measles immunization coverage, in < 50% of children at 12-23 months of age;
    - < 50% prevalence of breast-feeding in 6-month old infants;
    - two-week period prevalence of diarrhoea ≥ 20%
    - measles case-fatality rate ≥ 1%
    - no formal schooling for ≥ 50% of women 15-49 years of age;
    - < 50% of households with a safe water source.
- There are three main ways to deal with vitamin A deficiency in a population: supplementation, fortification and dietary modification. In most developing countries there are national campaigns to provide high dose supplements to young children linked to the polio vaccination through National Immunization Days (NIDS). However, NIDS is only conducted once a year whereas vitamin A deficient children need supplements at least twice a year.
- Food fortification is the preferred long-term strategy (as seen with iodized salt) but this is still being perfected.
- Food-based approaches are more difficult to implement but with some progress made on modified food selection, improved availability of vitamin A rich foods and some genetic modification of staple foods. Home gardening promotion, despite the fact that the levels of pro-vitamin A in dark green leafy vegetables are much lower than previously thought, has other benefits such as women's income generation.
- Promoting, protection and supporting breastfeeding are essential components of vitamin A control programmes for young children in addition to infectious disease control through immunization as well as hygiene and sanitation interventions.

1.8.3 - Iron and iron deficiency anaemia (IDA)[21]

Iron is essential for the production of haemoglobin which has the primary function of transporting oxygen from the lungs to body tissues. Iron balance is determined by the body's iron stores, iron absorption, and iron loss. About two-thirds of body iron is functional iron, mostly haemoglobin within circulating red blood cells which the remaining is storage iron (ferritin and haemosiderin) which can be mobilized when needed.

Although iron is found in a variety of different foods and supplements, its availability to the body varies significantly. In general, iron is not readily absorbed by the body. Availability is partially determined by whether the iron is found in the form of ***heme*** or ***non-heme*** iron. **Heme** iron is found only in meat, fish and poultry and is absorbed much more easily than **non-heme** iron, which is found primarily in fruits, vegetables, dried beans, nuts and grain products.

[21] Source: W.H.O. (http://www.who.int/nut/ida.htm)

The following factors will increase the iron absorption from non-heme foods:

- A good source of vitamin C (ascorbic acid) - i.e., oranges, grapefruits, tomatoes, broccoli, and strawberries, eaten with a non-heme food
- A heme and non-heme food eaten together
- A non-heme food cooked in an iron pot, such as a cast iron skillet.

The following factors will decrease non-heme iron absorption:

- Large amounts of tea or coffee consumed with a meal (the polyphenols bind the iron).
- Excess consumption of high fiber foods or bran supplements (the phytates in such foods inhibit absorption).
- High intake of calcium.

- Iron deficiency is the most common nutritional disorder in the world. As many as 4-5 billion people or 66-80% of the world's population, may be iron deficient; 2 billion people – over 30% of the world's population – are anaemic, mainly due to iron deficiency, and in developing countries, frequently exacerbated by malaria and worm infections.
- Iron deficiency anaemia is the most severe degree of iron deficiency, the result of depletion of iron stores (reduced serum ferritin) coupled with insufficient iron absorption leading to impaired haemoglobin synthesis.
- In developing countries other factors besides iron deficiency can lead to anaemia. They include: malaria and other parasitic infections, current infectious disease plus other pathologies or nutrient inadequacies that can limit haemoglobin formation.

Iron deficiency

- Iron deficiency is the main cause of anaemia; both affect all age groups.
- Nine out of ten anaemia sufferers live in developing countries; on average, every second pregnant woman and four out of ten preschool children are anaemic.
- In many developing countries, iron deficiency anaemia is aggravated by worm infections, which cause blood loss to some 2 billion people worldwide; and malaria, which affects 300-500 million people. In endemic areas, malaria may be the primary cause of half of all severe anaemia cases.
- For children, health consequences include premature birth, low birth weight, infections and elevated risk of death. Later physical and cognitive development are impaired, resulting in lowered school performance. For pregnant women, anaemia contributes to 20% of all maternal deaths.

- Iron deficiency and anaemia reduce the work capacity of individuals and entire populations, bringing serious economic consequences and obstacles to national development. Conversely, treatment can raise national productivity levels by 20 percent. Overall, it is the most vulnerable, the poorest and the least educated who are most affected by iron deficiency, and it is they who would benefit the most by its reduction.
- To estimate iron deficiency at the global, regional, or national level, the prevalence of anaemia is used as a proxy indicator. The level of haemoglobin concentration in the blood is used as an indicator to estimate the prevalence of anaemia.

Age group	g/dL
6 to 59 months	11.0
5 to 11 years	11.5
12 to 14 years	12.0
Non-pregnant women	12.0
Pregnant women	11.0
Adult males	13.0

- Iron deficiency and anaemia are usually dealt with together using a multidisciplinary approach tailored to specific circumstances. The comprehensive intervention features:
  - **Increased iron intake**. Iron supplements, iron-rich diets, increasing iron absorption and fortification.
  - **Infection control**. Public health measures to control hookworm infections, malaria and schistosomiasis.
  - **Improved nutritional status**. Control of major nutrient deficiencies, diet diversification and infection prevention.

1.9 - Health environment and care practices: Indicators

As previously discussed, the health environment and care practices are closely linked with nutritional outcomes. Understanding the prevalence of the primary public health illnesses is important for assessing vulnerability, as well as for discerning the underlying causes of malnutrition.

1.9.1 - Disease prevalence

Often there is a correlation between illness and malnutrition, especially among children. A standard recall period of **two weeks** is used in determining the prevalence of diarrhoea, fever, and acute respiratory infections (coughing with faster than normal breathing).

1.9.2 - Treatment of illness

Home treatment, such as increasing breast milk feeding or use of oral re-hydration solutions (ORS) when a young child has diarrhoea, are important health seeking behaviours which can be pre-determinants of health status. Equally important are the uses of professional medical treatment in a timely fashion to treat child illnesses.

1.9.3 - Immunization

Immunization is one of the most important and cost-effective interventions that health systems can provide and has saved over 20 million lives in the last two decades. Immunization coverage for the six major vaccine-preventable diseases – diphtheria, tetanus, pertussis (DPT), childhood tuberculosis (BCG), polio (OPV), and measles have risen significantly since the launching of the Expanded Programme on Immunization (EPI) in 1974; from less than 5% of the world's children immunization in the first year of life to around 76% by the end of 2003. Polio is on the verge of eradication while deaths from measles declined nearly two-thirds in the last decade. Immunization against tetanus saved hundreds of thousands of mothers and newborns. According to UNICEF:

World Fit for Children Goal (UNICEF)
Ensure full immunization of children under one year of age at 90 per cent nationally, with at least 80 per cent coverage in every district or equivalent administrative unit; reduce deaths due to measles by half by 2005; eliminate maternal and neonatal tetanus by 2005; and extend the benefits of new and improved vaccines and other preventive health interventions to children in all countries. (www.childinfo.org)

- **Neonatal tetanus** is the most common form of tetanus in developing countries, and it occurs as a result of unhygienic birth practices when tetanus bacteria enter the body through the umbilical stump following childbirth when the cord is cut. It strikes between the 3rd and the 28th day after birth, killing between 70-100% of infected infants.
- **Maternal tetanus** strikes women during pregnancy or within six weeks of the termination of pregnancy. It occurs between 2 and 21 days after initial contamination from tetanus spores through puncture wounds caused by unsafe or unclean deliveries and abortions.
- The goal is to immunize all women of child-bearing age with at least **three doses of tetanus toxoid** along with immunizing all pregnant women will provide immunity to all women and their infants.
- **Measles** is a highly contagious viral infection that weakens the immune system leaving children very susceptible to fatal complications from diarrhoea, pneumonia, and encephalitis, especially for children in developing countries without access to adequate health care services. Children that survive measles can have permanent disabilities, including brain damage, blindness and deafness.

To be fully immunized, a child should receive 3 doses of DPT, 1 BCG, 4 doses of polio vaccine and measles immunization before their first birthday. The table on the left shows the basic immunization schedule (which varies some by country) for infants as recommended by the World Health Organization's (WHO) Expanded Programme on Immunization (EPI).

Age	Vaccines	Scheme A[22]	Scheme B[23]
Birth	BCG, OPV 0	HB 1	
6 weeks	DPT 1, OPV 1	HB 2	HB 1
10 weeks	DPT 2 OPV 2		HB 2
14 weeks	DPT 3, OPV 3	HB 3	HB 3
9 months	Measles, yellow fever[24]		

[22] Scheme A is recommended in countries where perinatal transmission of hepatitis B virus is frequent (e.g. South-east Asia).
[23] Scheme B is recommended in countries where perinatal transmission of hepatitis B virus is less frequent (e.g. sub-Saharan Africa)
[24] In countries where yellow fever poses a risk

1.9.4 - Care practices, infant & child feeding

Care is defined as the behaviours and practices of caregivers (mothers, fathers, siblings, etc.) to provide food and health care in addition to stimulation and emotional support to ensure healthy growth and development. There are six main areas of care giving behaviours:

- Care for women
- Feeding/breastfeeding
- Psychosocial and cognitive stimulation
- Hygiene practices
- Home health practices
- Food preparation and storage

A 1997 WHO/IFPRI/University of Ghana study to examine the determinants of child malnutrition found that **good caring practices** for children 4-36 months old were beneficial for child nutritional status and partially compensated for the negative effects of poor maternal schooling and poverty and their application was not constrained by household food security and poverty.

Feeding practices are key determinants of infant and child health, growth, and susceptibility to illnesses. **Breastfeeding** (timing of initiation, frequency, exclusive breastfeeding, use of bottles, duration/continuation) and **complementary feeding** (types of food, frequency of feeding) practices should be analyzed for casual links with nutritional outcomes of interest.

WHO/UNAIDS/UNICEF infant feeding guidelines

"All HIV-infected mothers should receive counselling about the risks and benefits of various infant feeding options and specific guidance in selecting the option most suitable for their situation."

"When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breast feeding by HIV-positive mothers is recommended; otherwise, exclusive breastfeeding is recommended during the first months of life."

Research indicates that domestic hygiene practices such as disposal of children's faeces and **hand washing** at critical times – after defecation, before meal preparation, before eating are important for child health and nutrition.

Section II - Secondary data sources and their use in VAM context

This section describes the rationale and utility of using secondary data sources (e.g. pre-existing data) in VAM studies[1].

2.1 – Why use secondary data?

Primary data collection activities are expensive, time consuming and requires technical expertise that is not always readily available in a WFP country office or regional bureau. In addition, there are usually many surveys that have been conducted by NGOs or the Government which are good sources of health and nutrition data. In many cases, these existing data sources can provide answers to the first three key questions outlined in the introduction to these guidelines (Who? Where? How many?). On occasion, analyses of a secondary data sources may answer questions related to the causes of food insecurity (question 4). However, because secondary data comes from previous surveys aimed at answering a related, but different set of questions, secondary data alone rarely provides the information needed to understand the potential role of food aid (question 5).

> ***Precision vs. prioritization***
> Discussions will arise with nutritionists regarding the use of secondary anthropometric data for comparative analyses. Many nutrition surveys use 30 by 30 cluster sampling to achieve a very precise measure of malnutrition while for targeting purposes VAM is usually interested in differences in malnutrition between geographic areas or social groups (e.g. prioritization).

2.2 - Sources of secondary data

There are five main sources of secondary data that can be analysed to try and answer the five questions of a VAM study. These are:

- the National Population and Housing Census
- the Demographic and Health Survey (DHS)
- the Multiple Indicator Cluster Survey (MICS)
- the Living Standards Measurement Survey (LSMS)
- survey data previously collected by WFP partner agencies.

These data can be re-analysed to help answer the five questions of a WFP-VAM study or report outputs can be used, if appropriate. Secondary data can also be useful for triangulating and/or contextualizing primary data results from a different survey. Although the first four sources of secondary data are standardized and reliable, an assessment of survey data quality from partner agencies is required prior to its use. The Nutrition Services Unit in WFP is producing a set of guidelines that can be used to determine the quality of these surveys.

2.2.1 - National population and housing census

For any given country, the national population and housing census should be conducted approximately every 10 years but this is often not the case in many developing countries. When available, the data usually contains information on household composition, education levels, and basic socio-economic information. The national population and housing census data is especially useful for targeting groups by gender, age, disability, shelter, education, and migration status. In addition, current census data is required to prepare a sample frame for primary data collection activities.

2.2.2 - Demographic and Health Surveys (DHS)[2]

Demographic and Health Surveys (DHS) are nationally-representative household surveys with large sample sizes (usually between 5,000 and 30,000 households). DHS surveys provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition, with focus on women of reproductive age (15-49 years) and pre-school children (0-59 months). Typically, DHS surveys are conducted every 5 years, to allow comparisons over time. Use of a standardized core questionnaire

[1] Data collected in the field during a VAM survey are called primary data (see Section III)
[2] www.measuredhs.com

allows for comparisons across different countries while special modules can also be added to questionnaires in order to meet host-country data needs. The standard DHS survey consists of a household questionnaire and a women's questionnaire.

Strengths:

- Recognized as the most complete standardized field survey program for health, population and nutrition sectors
- Already widely used in Africa
- HIV/AIDS knowledge, behaviours and practices (plus HIV testing), domestic violence, situation of women, malaria, and verbal autopsy optional modules

Limitations:

- Does not measure food and livelihood security
- Sampling frame only includes women of reproductive age and their young children.
- Difficult to measure excess mortality due to disaster/emergency.

2.2.3 Multiple Indicator Cluster Surveys (MICS)[3]

Multiple Indicator Cluster Surveys (MICS) are part of an ongoing data gathering initiative by UNICEF and other international agencies. The mid-decade surveys were conducted for 1995 reporting and the end-decade for the year 2000. MICS uses household surveys specifically designed to help countries accurately assess progress for children in relation to the *World Summit for Children*[4]. Currently, many countries are planning the mid-decade survey to measure progress for 2005.

The sample is anywhere from 2,500 to 14,000 households, depending on the desired level of stratification of results (region, province, district) and has a focus on women aged 15-49 years and their children 0-5 years. Basic modules cover nutrition, health, water & sanitation and mortality.

Example of use of secondary data:

For the 2003 VAM survey report for Sierra Leone the malnutrition prevalence calculated using primary data sources were then compared to MICS and DHS results for Sierra Leone and as well as other countries in the region. This *within* country comparison substantiates WFP survey results and *between* countries comparison facilitates a larger contextualization of the situation.

Within country comparison of results from 2000 to 2003 (children 0-59 months)

Region	Number		Wasting		Underweight		Stunting	
	MICS	WFP	MICS	WFP	MICS	WFP	MICS	WFP
East	460	517	9.1%	4.5%	32.1%	22.4%	36.7%	40.4%
North	1004	876	10.7%	7.4%	29.0%	26.4%	36.3%	39.5%
South	279	746	8.2%	3.2%	23.7%	22.0%	39.3%	44.1%
Total	**1743**	**2282**	**9.9%**	**5.3%**	**27.2%**	**23.3%**	**33.8%**	**40.5%**

Between countries comparisons of child nutritional outcomes (children 0-59 months)

	Source/year	At least moderate (< -2 SD)			Severe (< -3 SD)	
		% wasted	% stunted	% under	% under	% stunted
Côte d'Ivoire*	DHS 1998-99	8.5%	28.6%	25.1%	6.0%	11.5%
Gambia	MICS 2000	8.6%	18.7%	17.0%	3.5%	5.9%
Guinea	DHS 1999	9.1%	26.1%	23.2%	5.1%	10.1%
Guinea Bissau	MICS 2000	10.1%	28.0%	23.1%	5.2%	10.2%
Liberia	**NO INFORMATION**					
Senegal	MICS 2000	8.3%	19.0%	18.4%	4.1%	6.0%
Sierra Leone*	MICS 2000	9.6%	36.0%	28.8%	9.5%	17.7%
Sierra Leone*	WFP 2003	5.3%	40.5%	23.3%	3.4%	9.9%

**Rural households only*

Strengths:

- Proven reasonable quality – widely used in all countries
- Contains optional modules for HIV/AIDS and child disability
- Relatively inexpensive – can be repeated on a regular basis for monitoring

[3] www.childinfo.org
[4] http://www.unicef.org/wsc/

Limitations:

- Does not measure food and livelihood security
- Mortality estimates not as reliable as DHS
- Little external assistance provided, thus variable quality of data

2.2.4 - Living Standards Measurements Study (LSMS)[5]

The main objective of the World Bank sponsored LSMS surveys is to collect household data that can be used to assess household welfare, to understand household behaviour, and to evaluate the effect of various government policies on the living conditions of the population. The sample usually consists of between 1,600 and 3,200 households. Accordingly, LSMS surveys collect data on many dimensions of household well-being, including consumption, income, savings, employment, health, education, fertility, nutrition, housing and migration. Three different kinds of questionnaires are normally used: the household questionnaire, which collects detailed information on the household members; the community characteristics questionnaire, in which key community leaders and groups are asked about community infrastructure; and the price questionnaire, in which market vendors are asked about prices.

Strengths:

- Excellent coverage for food and livelihood security issues
- Collects detailed information on demography and migration
- Often includes anthropometry for all household members
- More representative of general population than either DHS or MICS

Limitations:

- Not widely used in Africa
- Processing and analysis take a long time so it can be easily outdated
- They are expensive

Table 9 – Comparison of DHS, LSMS, MICS

	DHS+	LSMS	MICS
Demography			
Female Head	+++	+++	++
Mortality	+++		+++
Orphans	+		++
Food and Livelihood Security			
Agriculture production		+++	
Asset ownership	++	+++	+
Coping strategies		++	
Debt		+++	
Food expenditure		+++	
Income diversity		+++	
Land tenure/rights		++	
General Information			
Education	++	+++	+++
Health seeking behaviour	+++	++	+++
Health utilization	++	+++	++
Housing/Shelter	+++	+++	+++
Immunization	+++		+++
Nutritional status	+++	+++	+++
Water/Sanitation	+++	+++	+++

+++ = Good *++ = Some* *+ = Limited*

2.2.5 - Partner Agencies

Partner agencies – mostly NGOs and UNICEF, along with the national Ministries of Health - will often conduct nutritional surveys. These surveys can provide valuable information that can be used for targeting or monitoring but usually their coverage is limited, which can be both good and bad for VAM purposes. Things to consider before using data from these surveys include:

- Purpose: project planning, monitoring, surveillance or emergency appeals.
- Coverage: related to purpose, coverage is important to understanding the population which the data represent.
- Sampling: Today, most nutrition surveys use 30 by 30 cluster sampling methods, weighing and measuring 900 children per administrative unit (camp, district, or province) or cluster of units.
- Additional information: The best surveys will also include information on health, consumption, demography and other indicators of household food security. The worst will only collect age, weight, height and gender.

2.3 - Issues in the analysis of secondary data

There are several issues to consider when analysing data from secondary sources. The most important issues, as already mentioned, are sampling and representation. Another

[5] www.worldbank.org/lsms

issue which is very important to understand when analysing child anthropometric data is the influence of age on nutritional outcomes – children are more likely to be wasted between the ages of 6-24 months, while stunting is more common in older children.

2.3.1 Sampling

The DHS survey will normally be sampled to present findings at sub-national levels, disaggregated by urban or rural status. The best way to know at which levels the data can be used is to read through the report to see how the nutritional outcomes are presented. Care should be taken when analysing the data at lower levels and should be done only for targeting purposes. A rule of thumb is to make sure there are at least 300 children[6] per unit of dis-aggregation. For example, the 2002 Eritrea DHS survey was sampled to present nutritional outcomes at national level. However, the prevalence of malnutrition is presented by *Zoba* (region) with sample sizes ranging from 156 children in the sparsely populated *Southern Red Sea*, to 1,738 children in *Debub Zoba* (table 10). For targeting analysis, it is best to treat the six *Zobas* separately in terms of dis-aggregation although it would be beneficial to have a better understanding of the sampling method and to consider possibilities to analyse the data at sub-*Zoba* levels, especially for the more populous *Zobas*.

Zoba	# children
Southern Red Sea	156
Maekel	984
Northern Red Sea	752
Anseba	873
Gash Barka	963
Debub	1,738

Another example is the 2001 Nicaragua DHS where more than 6,000 children were weighed and measured and the results were presented at *Departamento* level. In all there are 17 *Departamentos* and the sample size ranged from a low of 115 children in *Granada* to 1,348 children in *Managua*. The sample scheme appears to have been designed to have around half the sample from rural areas and the other half from urban. This is an issue that also should be explored and understood clearly when using data from DHS or MICS surveys as WFP country programmes typically focus their work in rural areas. Therefore it is better to re-analyse data sampled from rural areas only, unless WFP is planning to implement programs in urban areas.

2.3.2 - Types of variables

There are two main types of variables to work with in quantitative data analysis: continuous variables and categorical variables.

- **Continuous** variables are those such as age, body-mass index, percentage expenditure for food – any variables that do not have fixed intervals or levels.

- **Categorical** variables are those that have specific levels or categories that are usually coded and labelled such as: type of crop (1 = wheat, 2 = rice, 3 = maize, 4 = sorghum, 5 = millet) or even age if existing data is only available by age-group (for example: 0 – 5, 6 – 10, 11 – 15, 15 – 20, 20 – 65, 65+)

Using SPSS software for analysis, a continuous variable can be **re-coded** into a categorical variable for clearer analysis. A good example is children's age as nutrition data are usually collected from children aged 0 to 59 months. The standard way to analyse child-level data is by age groups: 0-5 months, 6-11 months, 12-17 months[7], 18-23 months, 24-35 months, 36-47 months and 48-59 months. When recoding, they would be given a label such as 0-5 months = 1, 6-11 months = 2 and so on.

When analyzing variables together, the techniques used depend on the types of variables being compared. When comparing **two categorical variables**, one should use a cross tabulation (cross-tabs). If one of the categorical variables is a yes/no bi-variate (meaning only 2 levels) that is coded 0 for 'no' and 1 for 'yes' one can use means comparisons. For easier interpretation of results it is best to have the bivariate (two level) variable as the 'dependent' variable and the other categorical variable (which may have 2 or more levels) as the 'independent'. Please note that the use of a *chi-square* test is only appropriate when comparing two bi-variate variables.

[6] This does not apply to nutrition surveys or for RBM baseline purposes.
[7] Sometimes ages are grouped as 12-23 months

When comparing a **continuous** and **categorical variable** one would normally use means comparisons (see above). For example, one could compare '% total expenditure for food', by 'main income activity', by selecting the main income activity as the 'independent' and '% expenditure for food' as the 'dependent' variable.

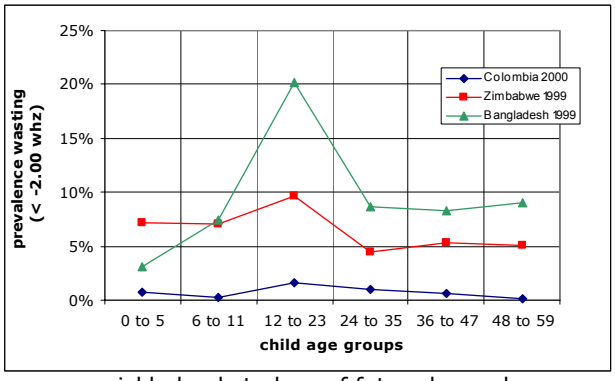
When comparing **two continuous variables**, one should re-code one of them into a categorical variable. A good example is when investigating the relationship between child weight-for-age z-score (whz) and age. It would be best to recode the children's age into age groups first. Then use a means comparison with age group as the 'independent' variable and whz as the 'dependent' variable.

2.4 - Examples of secondary data interpretation and presentation

The following section provides examples of the use of DHS data and National household survey data for various purposes; comparative situation analysis, targeting and advocacy. Along with each example linkages to programming are provided.

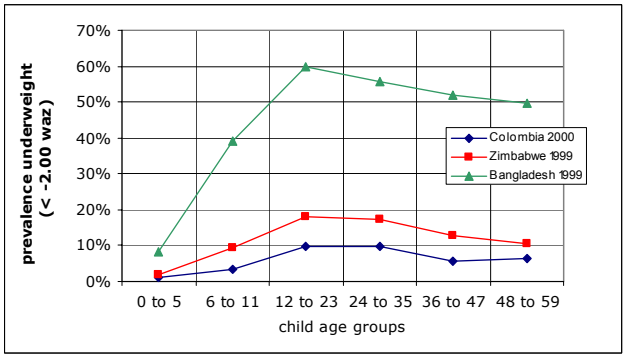
2.4.1 - Malnutrition and child age and country-country comparison

The graph on the right provides an illustration of acute malnutrition by age group in three different countries. First, the graph visually presents trends in child wasting by age; in all three countries the prevalence of **wasting** is highest in the 12-23 months age group. This can be explained by:



- Weaning (between 6-24mths) often leads to increased vulnerability to illness and malnutrition.
- Increased mobility of young children leads to increased exposure to germs/illness.
- Low intake of nutrients in the early years quickly leads to loss of fat and muscle.

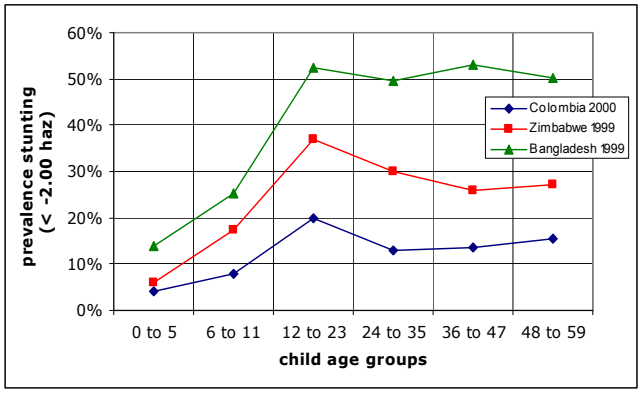
Another issue that is illustrated in the graph is that the prevalence of wasting in all three populations tends to level out after 2 years of age. However, notice that in Zimbabwe, the prevalence of wasting in the 2-5 years groups is lower than in the youngest groups while in Bangladesh it is higher in the older children. The very low prevalence in Colombia makes it difficult to interpret the findings. Statistically, the expected prevalence of wasting in a healthy population would be 2.5% (e.g. the percentage of the area under a normal curve that is less than two standard deviations below the mean).



The trends in **underweight** by age are illustrated in the graph on the left. The prevalence of underweight in children is usually higher than wasting in a population. In all countries, the prevalence of underweight starts low and increases exponentially with age, to the 2-3 year age groups and then declines slightly in the 4-5 year age groups. Underweight is a good composite indicator when a population is suffering from both acute and chronic food insecurity.

Stunting prevalence also shows particular trends by age group, starting low and also increasing exponentially with age and peaking at the 12-23 month age group. There is usually a drop at 24-35 months, followed again by an increase. Part of this trend is due to

the use of different international reference data (NCHS and WHO) for calculating z-scores for these age groups. It is important to remember that stunting is the result of prolonged reduced nutrient intake and/or illness where the body first compensates in loss of fat and muscle mass, followed by reduced linear growth which is manifested in low length or height for age (stunting).

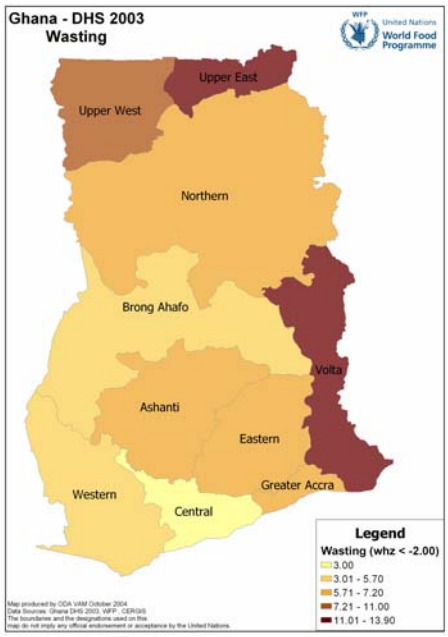


Programming implications and applications

- These graphs illustrate that the nutritional problems are highest in Bangladesh and lowest in Colombia and depict somewhat typical trends in these respective regions. For Africa, despite some regional trends, the problems are truly country specific, being influenced by food access, maternal education levels, conflict, poverty and HIV/AIDS.
- It is not appropriate to compare the nutritional problems in a country like Colombia with those of Bangladesh, which has among the highest levels of malnutrition in the world because every country has it's 'normal' levels of malnutrition against which all other internal nutrition survey results should be compared. However, comparisons can and should be made with bordering countries or others in the region (see above box on Sierra Leone).
- In general, WFP programmes to address wasting or underweight may not be appropriate in countries like Colombia, unless targeted to specific populations. Programs designed to address macronutrient malnutrition in young children should be targeted to children between 6 and 24 months and should use indicators such as wasting or underweight to measure progress.

2.4.2 - DHS data in Ghana

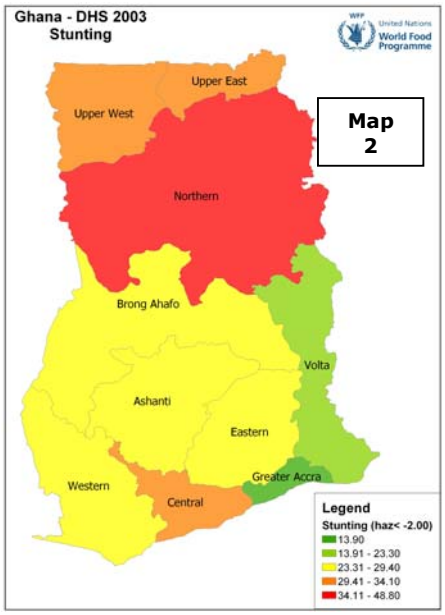
For the Ghana VAM survey, DHS data were used in the secondary data analysis phase to determine which regions in the country appeared to be worse off in terms of child nutritional status. For this the data were simply mapped and analysed. The rationale was that nutritional status is the best composite indicator of food security utilization.



- The map to the left shows the prevalence of acute malnutrition (wasting) by region as determined by the 2003 Demographic and Health Survey.
- The regions with the highest prevalence of wasting are *Upper East* and *Volta*, followed by *Upper West*.
- *Northern*, *Ashanti*, *Eastern* and *Greater Accra* are all in the same group while children in *Central* region have the lowest prevalence of acute malnutrition in the country.

Thematic mapping:
It is recommended that when mapping data by administrative region, the 'natural breaks' should be used rather than 'equal intervals'. Before deciding the number of classes, look at the distribution of the data. Usually 4 or 5 classes are selected.

The prevalence of chronic malnutrition ranges from about 15% to nearly 50% within the country, as illustrated in the map to the right (map 2).

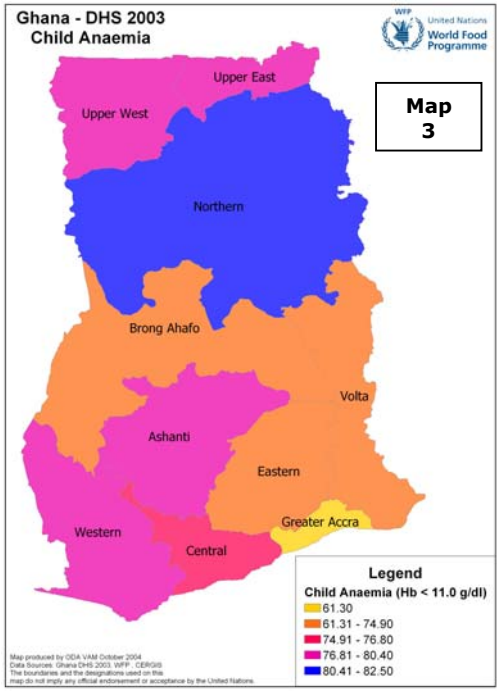


- The highest prevalence is found in *Northern* region followed by the *Upper East*, *Upper West* and *Central* regions.
- The lowest prevalence was found in *Greater Accra*, followed by *Volta* region.

The prevalence of maternal malnutrition was also analysed and the regional rates range from more than 20% in *Upper East* to less than 3% in *Greater Accra*. High prevalence of maternal malnutrition is also found in *Upper West, Northern* and *Western* regions.

Micronutrient malnutrition is equally widespread in the regions given the levels of anaemia, goitre and night blindness that exist in communities. The map on the left (map 3) shows the prevalence of anaemia in young children. Although levels of anaemia are high in all regions, Northern region has the highest prevalence of child anaemia followed by Upper West, Upper East, Western and Ashanti regions.

The prevalence of maternal anaemia is highest in Upper East region (about 50%), followed by Upper West and Northern. The lowest levels are in Central, Western and Brong Ahafo regions, followed by Ashanti and Greater Accra.



In summary, the availability of food through local production in the north of Ghana is limited, poverty is higher than anyplace else in the country, reducing purchasing power and limiting access. In addition, nearly every outcome measure of nutritional status from the 2003 DHS survey indicates high levels of both acute and chronic malnutrition plus very high levels of child and maternal anaemia in the three northern regions.

Programming implications and applications

- These findings supported the decision to conduct a household survey in the three northern regions of Ghana to better understand the causes of food insecurity and to determine a role for food aid.
- These data also highlighted a problem with micro-nutrient malnutrition in the three northern regions (namely anaemia) which could be used to advocate for programmes to address anaemia, including WFP-supported MCH programmes and the use of fortified blended foods in school feeding.

2.4.3 - National Nutrition Surveillance System (NNSS) in Eritrea

In late 2003, the Ministry of Health in Eritrea, along with support from UN and NGOs, conducted their first round of the NNSS. This system collects data twice a year from all six regions, using a modified cluster sampling method that allows both national and regional estimates as well as analysis at sub-region cluster level. In 2005, Eritrea was suffering

through the sixth consecutive year of drought, which was complicated by problems with border conflicts and general poverty.

WFP VAM was in the process of preparing a new PRRO and needed to use secondary data to determine geographic allocation to the various regions and sub-regions. The previous PRRO used a combination of global acute malnutrition (wasting and/or oedema) and the Coping Strategies Index (CSI). Information from both was being collected by the NNSS at the time. For the 2005 PRRO preparation, the May-July 2004 round of NNSS data were re-analysed to determine which indicators, if any, would be useful in a quick VAM analysis to answer the five questions.

In rural Eritrea, nearly 90% of the population is receiving food aid with WFP supporting about 1.3 million beneficiaries in three regions. Analysis of the data showed no relation between nutritional outcomes and the CSI – actually there was an inverse relationship where those households receiving food aid had a significantly lower coping strategies index but higher prevalence of maternal malnutrition. The good news is that this indicates that perhaps food aid is beneficial in reducing the use of coping strategies as well as that food aid is being targeted to the households in greatest need. However, it also showed that the CSI would no longer be useful for determining the number of beneficiaries per geographic area.

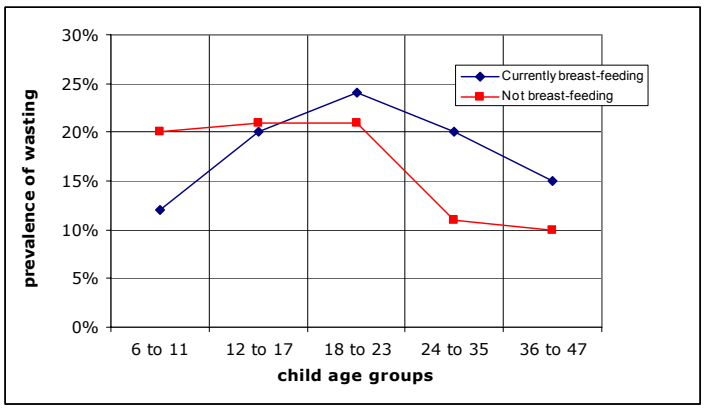
The current situation showed a chronic food insecurity problem, exacerbated by border conflicts and a high dependence on food aid. Global acute malnutrition is a better indicator when analysing an acute situation. The NNSS data showed wasting to be nearly 20% in two regions, but 7% in a third. Stunting was between 42 and 46 percent in the three WFP regions. However, underweight prevalence was above 50% in two regions and 38% in the third (as high as 58% in some sub-regional clusters). In situations where there is both chronic and acute food insecurity, it made sense to use underweight prevalence as an indicator of household food security.

When investigating the basic causes of malnutrition in children, it can be assumed that **household food insecurity** is a problem considering that most of the households are engaged in agricultural production, but with many female headed households also relying in meagre remittances from their husbands who have been conscripted to the military. Traditionally, women are not allowed to engage in agricultural production so this causes many problems in terms of household food access. In fact the survey showed that 86% of the households rely on food aid as a livelihood activity, followed by agricultural production (81%), remittances (33%), livestock (27%) and wage labour (11%). Women were more likely to be malnourished in households relying on livestock for income but less likely than households relying in remittance income.

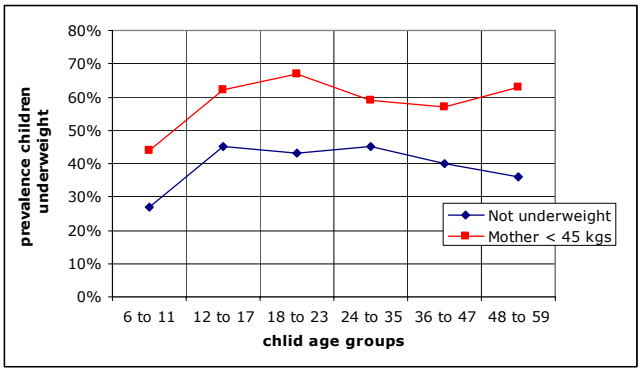
Health and **water** were also investigated to determine their impact on child malnutrition. There was no relationship between access to adequate safe drinking water and child malnutrition. However, there was a significant relationship between diarrhoea and wasting, as expected. In addition, there were significant relationships between acute respiratory infection and wasting and underweight. Children with recent fever were significantly more likely ($p < 0.001$) to be wasted and/or underweight. Families of well-nourished children were no more likely to seek professional treatment when the children were ill.

The final group of basic causes of malnutrition are **care** and **caring practices** and are the most difficult to measure in household surveys. The NNSS collected information on breastfeeding practices but not immunization as it was felt that most children had been properly immunized. Another factor determining care of children is the nutritional status of mothers.

Analysis of **wasting prevalence** by age group and current **breastfeeding** status shows that breastfeeding has a positive effect on child nutritional status in the 6 to 11 month age group. The graph on the left shows that prolonged breastfeeding has detrimental effects on child nutrition. This is most likely because mothers are not providing timely and appropriate complementary or weaning foods. These findings were verified by local experts – mothers are lacking both the knowledge and resources to provide age-appropriate nutrition to their children. The findings were similar for underweight, except that children in the 6-11 month age groups who were not breastfed (n = 45) were not more likely to be underweight.



Lastly, **maternal nutritional status** was analysed with child nutritional status. In situations such as in rural Eritrea, where maternal malnutrition ranges between 26 and 59 percent for sub-regions, it is a very sensitive indicator of household food security. For all regions, there were statistically significant correlations between maternal BMI and weight-for-height z-score and weight-for-age z-score. However, the relationship was not significant between BMI and height-for-age z-score. Comparative analysis showed that for all age groups, children with malnourished mothers are significantly more likely to be malnourished than those with well-nourished mothers. Measures of maternal malnutrition used were low BMI and maternal underweight (< 45 kgs). The graph on the right shows the prevalence of underweight by age group by nutritional status of the mother. At every age, children are significantly more likely to be underweight if their mothers are underweight.



Programming implications and applications

- The prevalence of underweight children and prevalence of malnourished mothers were used to estimate the numbers of people in need of general food rations by sub-region for the new PRRO.
- Analyses of the data show that the use of CSI for targeting and monitoring was not appropriate in the current context.
- Given the extremely high prevalence of wasting and underweight in young children, coupled with extremely high prevalence of maternal malnutrition, it was important to consider these indicators as appropriate for a targeting exercise.

Section III - Primary data collection & analysis

This section describes the rationale and utility of collecting primary data (e.g. data collecting at the community, household, or individual level specifically for the purposes of a VAM study).

3.1 – Why collect primary data?

There are many secondary sources of anthropometric and nutrition data which can be used to gain a relatively good understanding of national and sub-national food security status, particularly in terms of utilization. However, these surveys rarely, if ever, simultaneously collect information on food access and almost never have information on food availability. Conversely, most household food security surveys focus only on food access and availability and ignore issues related to nutrition (e.g. the utilization element of food security).

In order to fully understand the relationship between household food security and malnutrition, health and nutrition data must also be collected from individuals within the surveyed household and the databases must be linked for analysis. Although these primary data collection activities are expensive and time consuming, they are necessary in order to answer the final questions in a VAM study: Why are they food insecure and what role can food aid play in addressing their food insecurity?

3.2 - Types of primary data collection activities

Nutrition surveys are commonly conducted in the field but rarely do these surveys also contain a household food security component. Mostly they are focused on collecting individual anthropometric measurements on children 6-59 months of age, using a 30 by 30 cluster sampling methodology in order to obtain a very precise estimate of malnutrition for the sample population. As already mentioned in these guidelines, this information is not so useful for WFP programming purposes in terms of providing information on geographic or social targeting. However, in some instances WFP-VAM can work with the agencies conducting nutrition surveys by adding some modules about household food security to the nutrition questionnaire.

Nutrition surveys with a food security component follow the recommendations of WFP Nutrition Services as well as those conducted by WFP partner NGOs such as Action Against Hunger (AAH/ACF), CARE or World Vision. Their focus is on obtaining a precise estimate of malnutrition (usually wasting) in a well-defined population. Most often they collect information on household demography and some on household food security in addition to health and nutrition information. The results of these surveys are more difficult to use in understanding household food security and answering the five questions of a WFP Vulnerability Analysis. However, the information can be used to supplement analysis of secondary data.

Data base linkages

It is important to design a system to create unique household IDs during data entry – most often linked to administrative divisions. For example, in Azerbaijan, there were 7 different economic zones in the sample. For each, a number of communities were sampled from the various districts in each zone. In each community, there were 12 household interviews conducted. A unique ID was created for each household by combining the codes (we used established district and community IDs from the census data) for each level. For example:

EZ Kur = 4; District Sabirabad = 34; Community Muradbayli = 2; Household # = 6. The unique HH ID is 4340206. There were 2 children 6-59 months in the household. The youngest is coded 4340206.1 and the next is 4340206.2.

The preferred way of linking nutrition and household food security is by including health and nutrition modules in a household food security and vulnerability survey questionnaire. Most of the questions in these modules are taken from the DHS or MICS survey questionnaires and modified to meet the country context, in order to standardize the information collected and the subsequent analysis as well as to avoid 're-inventing the wheel'.

3.3 - Instruments, analysis and reporting

Over the past few years, WFP-VAM in HQ has been refining data collection instruments that incorporate modules on health and nutrition for both women of reproductive age and pre-school children in the household survey. This section will provide both examples of health and nutrition modules as well as summaries of the analytical issues involved and examples of ways to present the findings.

3.3.1 - Women's health and nutrition modules

The following is an example of the women's health and nutrition module used in Azerbaijan where there is more of a problem with micronutrient malnutrition, especially iodine/goitre. Only a woman between ages 15-49 (reproductive age) should be interviewed for this section. If there is more than one, interviewing the woman who has children aged 6-59 months is preferred.

Mother's name_____

10.1 – How old were you on your last birthday? **|__|__|**
(Note: must be between 15 and 49 years old)

10.2a – Are you currently pregnant or breastfeeding? *(circle one)*

1 = pregnant **2** = breastfeeding **3** = neither **4** = both **5** = don't know

10.2b – If pregnant, when is the baby due? *(calculate months pregnant)* **|__|**

10.2c – If pregnant, did you receive iron-folate tablets from the health center?

YES……1 NO……2

10.2d – If so, how many tablets have you taken in the past 7 days? **|__|**

10.3a – How many times have you been pregnant? **|__|__|**

10.3b – Have you ever suffered a miscarriage or stillbirth?

YES……1 NO……2

10.3c – How many miscarriages or stillbirths have you had? **|__|__|**

10.3d – How many living children have you given birth to? **|__|__|**

10.3e – How many of those children have died? **|__|__|**

10.4 – How old were you with your first live birth? **|__|__|**

10.5 – After the birth of your last child, did you receive a vitamin A capsule?

YES……1 NO……2

10.6 – In the past 2 weeks have you been ill with:

10.6a – Diarrhoea? YES……1 NO……2

10.6b – Fever? YES……1 NO……2

10.7 – After visiting the toilet, what do you use to wash your hands?

1 = water only **2** = ash & water **3** = washing soap & water **4** = nothing

10.8a – Does anyone in your family have goiter?

YES……1 NO……2 *(skip to 10.9)*

10.8b – If "yes", then did he/she receive medical treatment?

YES……1 NO……2

10.9 – Salt Testing for Iodine

Ask the woman for a teaspoon of salt. Test salt for iodine and record result below.

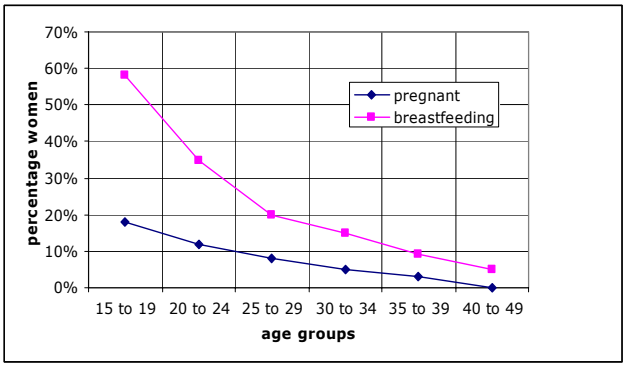
Yes, iodine present……1
No, no iodine……2
Not tested/no salt……3

3.3.2 - Analysis and reporting

For the Azerbaijan household survey the woman's weight in kilograms and height in centimetres were measured so the body mass index could be calculated. Also, for this particular survey, the NGO partners were interested in anaemia so haemoglobin was also tested in the field using a finger stick. The responses to the women's module were entered in the household level database. With these simple sets of questions, the following analysis was conducted:

- **Age groups**

For the women, it is important to create an age group variable so findings can be disaggregated by age in the analysis. This issue is especially important for pregnancy and breastfeeding status and body mass index. Younger women are more likely to be pregnant and breastfeeding as indicated in the graph below. The age groups presented are those commonly used in this type of analysis.



"At the time of the survey (Sept-Oct 2004), 7% of the women interviewed were pregnant with about 45% in their first trimester, one-third in the second trimester and the rest in the third. Nearly 20% of the women aged 15-19 were pregnant at the time of the survey, although there were only 77 women of that age in the sample. The likelihood of being pregnant decreased with age as seen in the graph. A total of 20% of the mothers were breastfeeding at the time of the survey. Nearly 60% of the women aged 15-19 years were breastfeeding at the time of the survey as indicated in the chart above. This percentage decreased with age as well."

- **Pregnancy history and number of children**

This information is useful especially when there is a possibility of recommending WFP-supported maternal-child health programmes. In addition, the information on receiving iron supplements is important in determining access and utilization of ante-natal care programmes as well as the need to improve supplementation programmes and/or compliance. Information on miscarriages and child deaths should not be used to calculate a mortality rate but rather to indicate there may be a problem, especially if the percentage is high amongst younger women. In Azerbaijan, the partner NGO was concerned about the possible influence of iodine deficiency on pregnancy outcomes in the women.

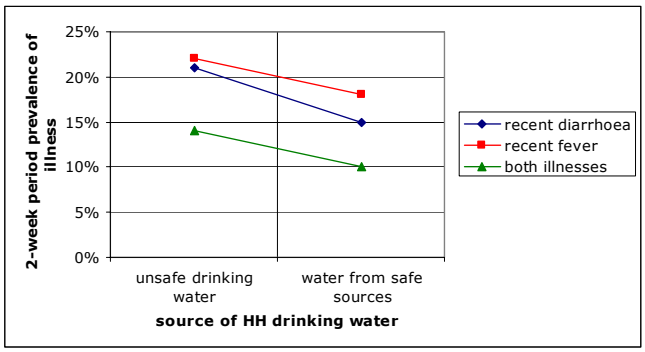
"In total, the women reported a median number of 3 pregnancies and 2 living children. Fifteen percent reported a miscarriage or stillbirth, ranging from 7% in women 15-19 years of age, and increasing to 12% for women 20-24 years and peaking at 18% in the 30-34 year age group. For every age group, the average number of miscarriages or stillbirths was one. Overall, 23% of the women in the sample reported the death of a child, ranging from 9% in the 15-19 age group, increasing to 26% for women aged 30-34 years, 32% in 35-39 years and up to 43% in the 40-49 years age group."

- **Current health and hygiene of women**

The recent illness of women is important to investigate, especially when relating it to nutritional status. In addition, it is useful to compare the incidence of diarrhoea by use of drinking water from improved sources and also with hand washing practices. Prevalence of recent fever can also serve as a general proxy for malaria, where it is endemic.

"The women in the sample were asked if they had experienced an episode of diarrhoea or fever in the two weeks prior to the survey. Overall, 19% of the women had at least one episode of diarrhoea. Recent fever (non-specific) was reported by 21% of the women in the sample. However, there are no significant correlations between illness, age and body-mass index."

"The survey instrument collected information on the household's main source of drinking water during the year as well as type of toilet facility the household used. The definitions of water from safe sources and good sanitation are taken directly from UNICEF definitions. When the entire sample was analysed, it was clear that women using drinking water from safe sources were significantly ($p < 0.001$) less likely to have experienced diarrhoea in the past 2 weeks (15%) when compared to those using water from other sources (21%). The 2-week period prevalence of fever ($p < 0.01$) and both illnesses ($p < 0.001$) were also significantly lower in women from households using safe sources of drinking water."



- **Weighing, measuring and body mass index**

Care should be taken when calculating body-mass index as it is important to only include non-pregnant women. During training the teams will be asked to only weigh non-pregnant women but sometimes they forget. Height can be measured on all women as it is not affected by pregnancy status and can be used to determine levels of stunting in adult women.

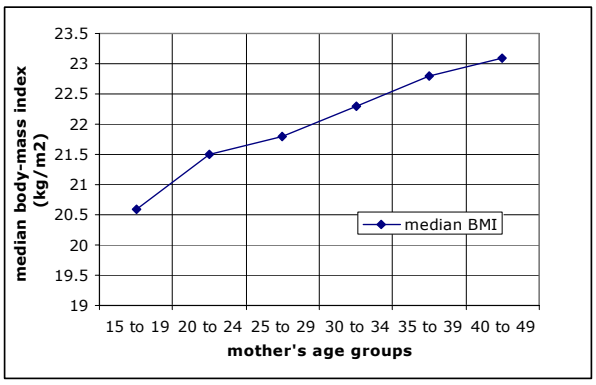
The best equipment for weighing adults is the UNICEF mother-child electronic scale (see Annex). The weight should be recorded to the nearest 0.1 kilogram.

The BMI can be calculated in SPSS using the 'compute' function where the weight (in kilograms) is divided by the height in **meters** squared. This creates a new variable in the data set which will be used for the analysis.

Measuring adults

- Have the woman stand against a straight flat surface with feet flat (no shoes!), chin up, and shoulders against the wall.
- Make sure the trunk and pelvis are properly aligned with the flat surface.
- Mark the height and use tape measure to read the measurement to the nearest 0.1 centimetre
- Record the numerical value.

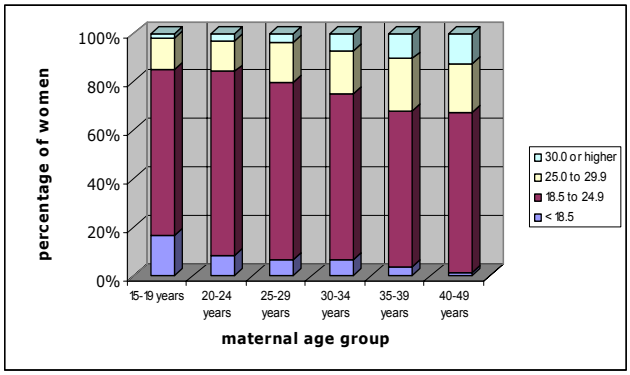
*"The body-mass index was calculated for 2320 non-pregnant women in the sample during the analysis and it was found that the mean BMI was 22.9 kg/m^2 (+/- 0.2). According to international standards, if a person has a BMI less than 18.5 kg/m^2, he/she is considered underweight or **malnourished**. An individual is **'normal'** if the BMI is between 18.5 and 24.9 kg/m^2, while a BMI between 25.0 and 29.9 kg/m^2 indicates a person is **overweight**. A person is considered to be **obese** if the BMI is 30.0 kg/m^2 or more."*



"The chart on the left shows the median BMI for women by age group, and indicates an increase in BMI with age. The greatest increase in BMI is between the 15-19 years age group and the 20-24 years group, mostly because girls less than 18 years of age are not usually 'fully matured' and thus are still growing. For the sample, the prevalence of malnutrition in non-pregnant women aged 15-49 years was 6.4 percent (95% CI – 5.4, 7.4)."

"Around 70% of the women in the sample were of 'normal' body-mass index at the time of the survey, while nearly 17% were considered 'overweight'. However, 6% of the women were classified as being 'obese' – nearly as many as were malnourished."

"When considering nutritional status or classification by maternal age group, as already noted the highest prevalence of malnutrition among non-pregnant women of reproductive age is in the youngest age group and decreases with increasing age group. Conversely, the prevalence of overweight and obesity increases with age group where more than one-third of the women over 35 years of age are overweight or obese. These findings are illustrated in the graph on the right. There are virtually no undernourished women in the 40-49 years age group (blue)."



- **Micronutrient malnutrition**

The survey was also designed to investigate three main types of micronutrient malnutrition at the individual and household levels – deficiencies of vitamin A, iodine and iron. The example questions provided in the maternal health section are usually complemented by questions from the child health and nutrition section, especially for antenatal care (including tetanus toxoid) as well as the questions below which are used to determine the incidence of night blindness during pregnancy.

12.6	When you were pregnant with this child, did you have difficulty with your vision during the daylight?	Yes.....1 No.....2 Don't know.....9
12.7	During this pregnancy did you ever suffer from night-blindness (local used term) where you had difficulty seeing at dusk?	Yes.....1 No.....2 Don't know.....9

The mothers of children under five in the survey were asked if they had experienced night blindness (difficulty seeing at dusk) during their most recent pregnancy. However, to distinguish **night blindness** from general poor vision, they were also asked if they had difficulties seeing during the day. Those who only had difficulties seeing at dusk were considered vitamin A deficient. For **vitamin A supplementation**, the women were asked if they had received a high dose capsule of vitamin A after their most recent delivery. These capsules are not only given to boost levels of vitamin A in the mother but also to ensure that she passes on the benefits of vitamin A to her newborn child through her breast milk while the child's immune system is developing.

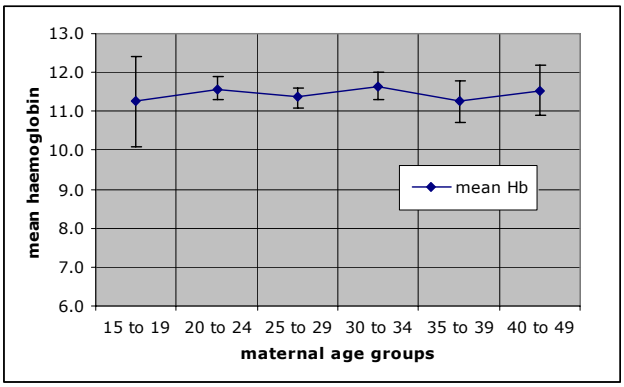
*"From the sample, 2.2% (95% CI: 1.6, 2.8) had suffered **night blindness**. The International Vitamin A Consultative Group (IVACG) recommends that a maternal night blindness prevalence of $\geq$ 5% as a cut-off at which vitamin A deficiency may be considered to be a problem of public health significance within the community."*

Clinical levels of **iodine deficiency disorder** (IDD) are known to cause goitre, cretinism, spontaneous abortion, premature birth, infertility and increased child mortality. As iodine is not stored in the body, small amounts are needed on a regular basis. Fortification of salt with iodine is the most common method to prevent iodine deficiency.

"Nearly one-quarter of the women reported that a member of the household had goitre and of the households with affected members, 28% reported that the member had gone for treatment. Around two-thirds of the households in the survey had been using adequately iodized salt, as confirmed by salt testing during the survey."

There were no questions directly related to iron intake included in the survey. However, additional analysis of consumption data could provide some idea of iron and vitamin A intake. However, for iron it is important also to estimate intake of absorption enhancers and inhibitors before drawing any conclusions from household level data.

"For the Azerbaijan study the haemoglobin levels of 516 non-pregnant women were analysed and 56.8% (95% CI: 52.5, 61.1) were classified as being at least mildly anaemic (Hb < 12.0 g/dL). In all, 1.9% of the women were severely anaemic (< 7.0 g/dL), 6.2% were moderately anaemic (7.0-8.9 g/dL) and 48.6% were mildly anaemic (9.0-11.9 g/dL). There were only 49 pregnant women in the entire sample who were tested for anaemia and 57% (+/- 15%) were classified as being at least mildly anaemic (Hb < 11.0 g/dL)."



"The chart on the left shows the mean haemoglobin levels and the 95% confidence intervals for sampled women, by age group. The lowest means are found in the youngest and 35-39 year age groups. However, as the wide confidence intervals show, the sample size was very small for the 15-19 year age group (only 10 women). The best levels were found for women aged 30-34 years. They also had the lowest prevalence on anaemia in the sample (51%, +/- 9%)."

3.3.2 - Child health and nutrition module

The module most often used for child health and nutrition is modelled closely after the DHS questionnaire and is aimed at collecting information on up to three children 0-59 months of age from the same mother. The mother must be the one interviewed for the maternal health and nutrition section (aged 15-49 years). If a household has more than one woman of reproductive age and children 0-59 years of age from different mothers, only one mother and her pre-school children must be selected for interview, weighing and measuring. The sample questionnaire is included in Annex III of these guidelines.

Main sources of error in primary data collection

- Estimation of age
- Selection of household and/or child
- Anthropometric measurement errors

- **Age estimation**

In most countries where WFP-VAM conducts household surveys, there are no official birth records, especially in rural areas. In order to have accurate calculation of weight-for-age and height-for-age z-scores, it is important to have a good estimation of the exact age (in months) of the child. At best, the goal would be to have the month and year of birth. Source of this information could be road-to-health 'yellow' immunization and growth monitoring cards. However, these are often not available so age must be estimated using a local calendar of events (see Annex IV).

For example, a local calendar was developed by ACF-USA for use in a June 2004 Nutrition survey in Northern Uganda and applied in the following scenario:

- *Surveyor*: What year was the child born in?
- Mother: 2000
- *Surveyor*: What religious holiday was the child born close to?
- Mother: She was born closely after Ascension Day.
- *Surveyor*: Was she born before the outbreak of Ebola?
- Mother: Yes!
- *Surveyor*: That means your child was born in September 2000.

The local calendar (Annex IV) shows that the child was born in September 2000 and was 45 months old.

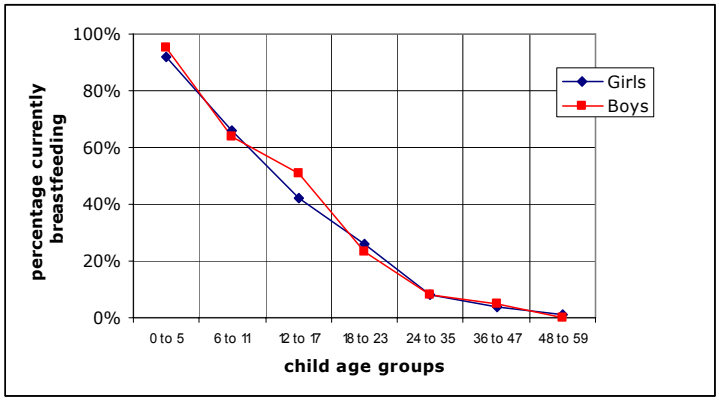
The questionnaire has a place for the estimated birth month and year as well as a place for the estimated age of the child. The actual age can be re-calculated in the analysis. It is a good idea to enlist in the help of UNICEF, NGOs or Government staff to assist in training enumerators in age estimation as well as interviewing for health and nutrition modules.

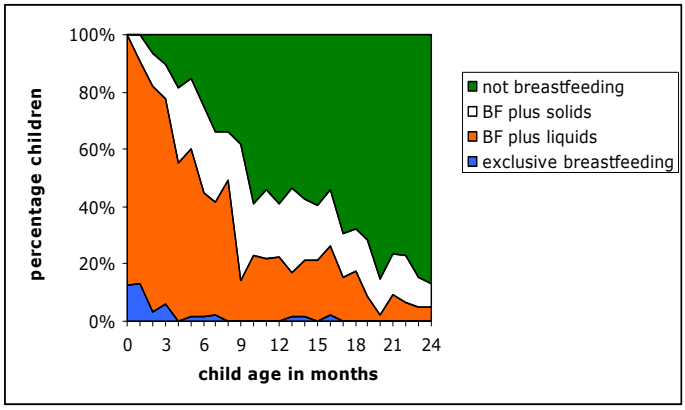
- **Feeding practices**

For each child in the survey sample, information is collected on breastfeeding initiation, duration and weaning practices. As noted in Section I it is important to consider feeding practices as part of the care component when determining the causes of malnutrition. The following are examples of how this information can be analysed and presented.

"In the Azerbaijan sample, over 90% of the children in the survey had been fed breast milk. Information was also collected on initiation of breastfeeding but it was not complete and thus is not included in the analysis."

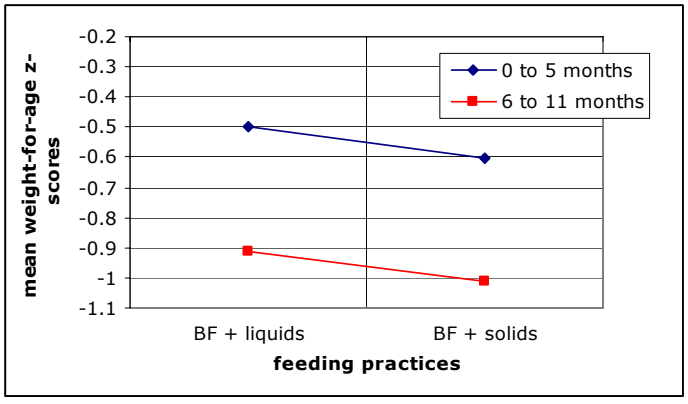
"The chart on the right shows the percentage of boys and girls who were still breastfeeding by the time of the survey, by age group. Nearly all children 0-5 months are breastfeeding. This percentage decreases gradually by age group with the steepest decrease coming after the 24 month age group – the most common age for weaning. Virtually no children over the age of 3 years were being breastfed. There are few differences by gender, except that slightly more boys than girls in the 12-17 months age group were being breastfed."

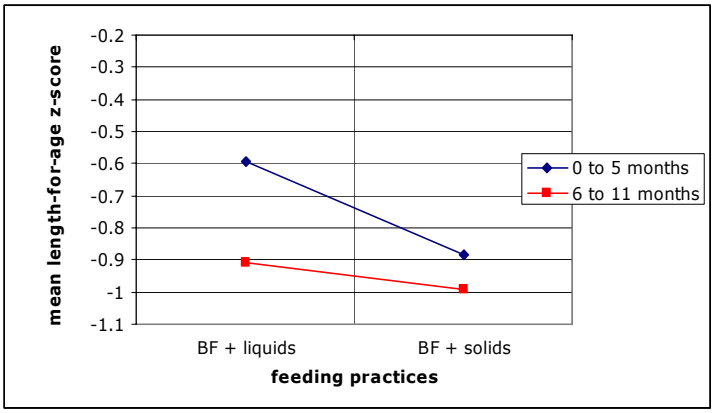




"The results of this survey show than only 2% of children < 24 months of age are being fed only breast milk (no water). Only 13% of the children one month or less are exclusively breastfed. Liquids are introduced to the diet almost immediately and solids are being introduced to more than one-quarter of the children by four months of age. By 10 months, nearly 60% of the children are no longer breastfed and by 2 years of age, nearly 90% of the children are not breastfeeding."

"The types of feeding practices have an effect on child growth, as indicated in the next two graphs. For the sample of children under 1 year, the mean weight-for-age z-score is lower for children having breast milk plus solids than those having breast milk plus other liquids. This is true for both 0-5 months and 6-11 months age groups although the curve is steeper for the younger children indicating that they are not getting the right type of nutrition for optimal growth."

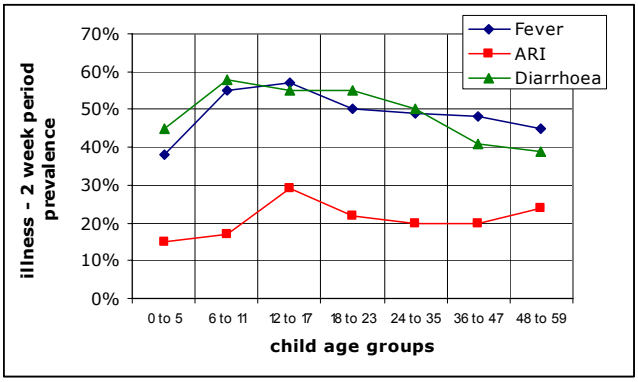




"The graph on the left presents the mean length-for-age of children less than one year by the type of feeding practices. For the children 0-5 months who are not exclusively breastfed, those being fed breast milk plus solids have a much worse z-score than those with breast milk plus other liquids. The relationship is not as strong in the children 6-11 months of age. Again, this illustrates the dangers of introducing solid or 'adult' foods too early for young children – the potential impact on linear growth."

- **Child illness**

During the survey, the mothers are asked if their children had experienced an episode of diarrhoea, coughing (if yes, with fast breathing), or fever in the past two weeks. In most health surveys, the 'two week period prevalence' of morbidity is reported. Coughing with fast breathing is a sign of acute respiratory infection (ARI), which is one of the major childhood illnesses in the developing world.



"Overall, 47% of the children had experienced an episode of diarrhoea, 40% had been coughing and 48% had a non-specific fever in the past two weeks. In the sample there was a 21% period prevalence of ARI in children less than five years of age. For those children suffering from diarrhoea, 34% had received treatment at a health facility."

"The prevalence of diarrhoea was highest in the 6-11 month age group and remains higher through the weaning period (24 months) before gradually reducing. The prevalence of fever and ARI was highest in the 12-17 month group. For all three illnesses, the prevalence was lowest in the youngest age group. The prevalence of each of the illnesses was slightly higher in boys than in girls."

Tests of significance can be performed with the data to investigate some relationships between illness and feeding practices or illness and nutritional outcomes in young children. The following are examples of such relationships that were discovered during the analysis of the Azerbaijan survey data.

"For the children less than 6 months of age the prevalence of ARI was 11% for those receiving breast milk plus other liquids, which was significantly lower ($p < 0.05$) than the 23% for children receiving breast milk and solids."

*"The presence of illness has an impact on child nutrition for the overall sample. Children with recent **fever** had significantly ($p < 0.01$) lower mean weight-for-height and weight-for-age z-scores than those without fever. As a result, they were also significantly ($p < 0.01$) more likely to be at least moderately wasted. Those with recent **diarrhoea** had significantly ($p < 0.05$) lower weight-for-height z-scores and were significantly ($p < 0.05$) more likely to be suffering from acute malnutrition. In general, children who had experienced **any illness** in the two weeks prior to the survey were significantly ($p < 0.01$) more likely to have lower weight-for-height z-scores and to be wasted. In addition, they*

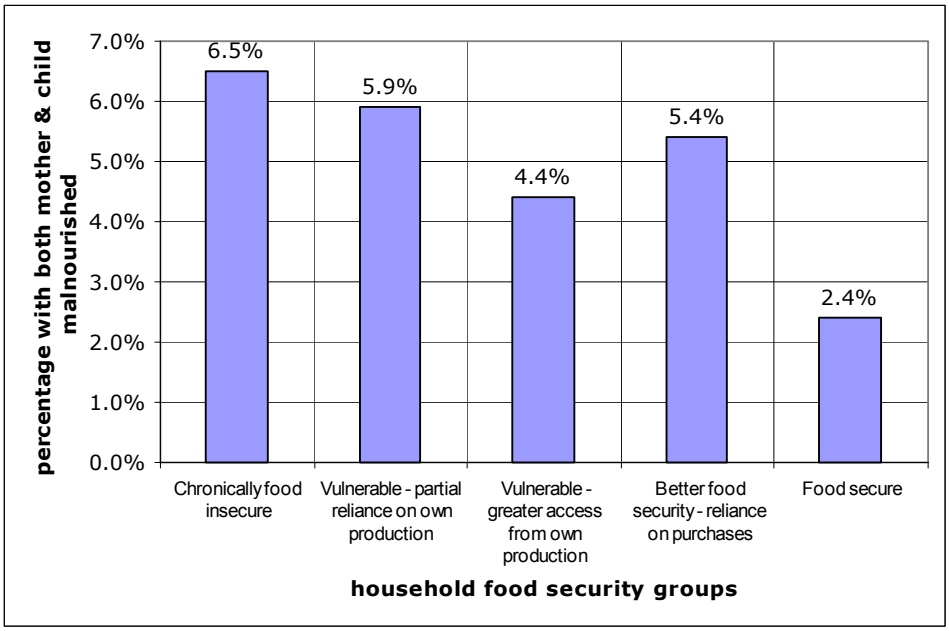
were also significantly ($p < 0.05$) more likely to have lower weight-for-age z-scores and to be underweight."

- **Nutrition and household food consumption typologies**

Additional analysis of the household survey data can be conducted to identify households where both the mother and a child (6-59 months) were malnourished in order to look at relationships between household food consumption typologies (see Guidelines on creating household food security profiles) and nutritional status. It is best to look at these malnourished mother-child pairs rather than just children since household food security is only one direct cause of child malnutrition.

For this analysis, a child is considered malnourished if he or she had been classified as either wasted, underweight or stunted. If a non-pregnant mother has a body-mass index of less than 18.5 kg/m^2, she was considered malnourished. The following example is from a VAM survey conducted in Sierra Leone in 2003. Five food security profiles were created from the data.

"The graph below shows the percentage of mother-child malnourished pairs in each of the food security profile groups. The highest prevalence was found in the chronically food insecure households which tend to have poor access, availability and utilisation. The food secure households had the lowest prevalence of maternal-child malnutrition. The slightly higher than expected prevalence in the better food secure households could be attributed in part to their poor utilisation of safe drinking water. Only 22% of the households are using water from safe sources, which is the lowest in the sample."



3.4 - Training for anthropometric data collection

Training for surveys that include both household interviews and anthropometry is critical for ensuring the quality of both activities as well as a for establishing a good understanding by enumerators and measuring teams of why both types of information are needed to understand the relationship between household food security and nutrition (see Section I). For more information, please refer to the new guidelines being produced by PDPN (Nutrition unit).

3.4.1 - Training agenda

It is essential that all field members receive the same training in order to ensure that all field members acquire the same skills necessary to collect high quality data. Training should include:

- Presentation of the objectives of the survey and explanation of the sampling method
- Description of what data will be collected, including:
    - Overview of anthropometric measurements
    - Achieve common understanding of health and nutrition questions included
    - Distribute a written guide to all surveyors with previously discussed information
- Demonstration of measuring techniques
- Standardization exercise[1]: all surveyors measure the same 5 children, measurements are collated and compared in order to determine outliers and reasons for inaccurate measurements. This is repeated until an acceptable level of variation exists between enumerators.
- Carrying out field-testing (in an areas not covered by the survey) in order to practice household selection, taking measurements, and completing questionnaires.
- Review of individual ability, relevance of questionnaire, working methods, and logistics

3.4.2 - Special equipment needs

The reliability of anthropometric indices depends on the precision and accuracy of the measurements involved. It is essential that care be taken to obtain accurate measurements by maintaining consistent measuring techniques and carefully reading and recording data. Values should only be rounded to the nearest 0.1 (i.e.: 1.44 rounds to 1.4; 1.46 becomes 1.5) and measurements must be recorded immediately and legibly.

The child's accurate age is required for sampling, deciding on whether the child is measured standing or reclining for height or length, and for converting height and weight into the standard indices. At the time of measurement, an age estimate is needed for decisions on eligibility whether the child is measured standing (24-59 months) or lying down (0-23 months).

Measuring boards for length/height can either be obtained from NGOs or UNICEF or can be constructed locally (see Annex IX). It should be lightweight, durable and have few moving parts and should measure up to 120 cm for children and be readable to 0.1 of a centimetre. Each field team should have their own board. Measuring tapes for adult height can be obtained locally. Instructions on how to measure children are found in Annexes V and VI.

In the past, hanging scales (Salter) were the preferred method of weighing; however with advances in technology VAM advocates the use of electronic scales when possible. UNICEF and others have found electronic scales to be durable and flexible, especially given the option of weighing the mother with the child (see table below). This technique is useful in situations where the child struggles and use of a sling or weighing pants with a hanging scale causes stress for the child. The mother can be weighed and then the mother is then weighed with the child. The difference between the two measures is the child's weight. An additional advantage is that the weight of the mother is also available for BMI calculations if needed. Each field team should have their own scale, whether it is hanging or

Salter Scale	
Pro's	***Con's***
• Many counterparts are already trained in use • Cheap and readily available • Durable	• Dial reading could introduce human error into results • Difficult to comfort struggling child to obtain accurate reading • With improper training skin diseases can be transmitted from one child through weighing pants
Electronic Scale	
Pro's	***Con's***
• Eliminates human error for precision of reading • Human contact of mother while weighing child facilitates accurate reading • Takes mother's weight as well – useful for BMI calculations	• Required training for agencies/people that use more traditional methods. • Expensive and not as easily available • Breaks more easily with excessive heat or mishandling.

[1] A standardization exercise is critical and should be conducted in every instance.

electronic. Details regarding purchase of scales can be found in Annex IX. However, when UNICEF is present in assessment area there is often an agreement to borrow scales for use by WFP.

3.5 - Data entry and analysis

Data entry is the first step to data analysis. Well trained personnel are essential for data entry – it doesn't matter how good the data quality is if it's entered incorrectly. A data entry program that is compatible with the computer software in which analysis will be run should be chosen. Training on the use the data entry program is very important as is supervision. Recent VAM survey data are entered in either Access or Epi-Info, as the nutritional indices can be calculated directly in Epi-Info.

3.5.1 - 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 as well as some of the analysis. It is one of the most widely used software packages for anthropometric analysis, and is most often used by VAM for nutrition analysis. A convenient aspect of EPI-Info is that data entry programs can be written and the software used for data entry. This eliminates the need to import data from another program such as Excel or SPSS. The DOS-based version (Epi-6) is widely used, even by the CDC as the Windows version still has some problems.

The software transform the age, gender, weight and height data of children into the indices and z-scores and the software flags outliers - usually the result of incorrect measurements, coding errors or incorrect ages. Another unique and useful feature of EPI-Info is that the indices are automatically added to the data sets and can be viewed alongside the data. Once the anthropometric indices have been calculated, they can be easily presented in simple tables using specified cut-offs and age categories consistent with normative standards. EPI-Info software and manual can be downloaded for free from www.cdc.gov/epiinfo.

3.5.2 - Nutri-survey

This windows-based software is available from www.nutrisurvey.de. This software program 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 program is to integrate all steps of a nutrition baseline survey into a single program. The program contains a standard Nutrition Baseline questionnaire which can be easily customized for the specific site, a function for printing out the questionnaire, a data entry unit which 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 programs.

3.5.3 - SPSS

For analysis of health and nutrition data in the context of household food security surveys, SPSS software is used most often. In fact, VAM-HQ is conducting data analysis, interpretation and presentation trainings using this programme. The main problem is the expense associated with purchasing copies for widespread office use.

Section IV - Dietary Diversity

This section provides a rationale for the use of dietary diversity as a measure of food consumption, as well as a description of how to measure and interpret dietary diversity.

4.1 - What is dietary diversity?

Nutritionists have long recognized dietary diversity as a key element of high-quality diets. Increasing the variety of foods is thought to ensure adequate intake of essential nutrients and thus promote good health. The predominant problem in developing countries is nutrient inadequacy; however, there are countries in transition undergoing rapid economic development and urbanization that are beginning to surpass nutrient adequacy. These specific populations are beginning to exhibit negative consequences of an excessive intake of certain nutrients, fats, refined sugars, and energy. For the purpose of VAM assessments in developing countries, dietary diversity is equated to nutrient adequacy since over-nutrition and excess of nutrients does not often occur in populations where WFP operates.

> Lack of dietary diversity is a serious problem among poor populations in the developing world, because their diets are predominantly based on starchy staples and often include little of no animal products and few fresh fruits or vegetables.

4.2 - Association between dietary diversity and child growth

Recent analysis (Ruel and Arimond. 2004) of 11 Demographic and Health Surveys (DHS) confirmed that dietary diversity is associated with child nutritional status, and that these associations remain when controlling for the effects of household wealth and welfare factors. This observation was made over a wide range of countries and populations with different eating patterns with solidly based implications.

Additionally analysis of the Ethiopia 2002 DHS data (Ruel et al. 2002) showed a strong statistical association between dietary diversity and children's linear growth; greater dietary diversity is shown to lead to better child growth.

A study in Mali also documents a strong association between dietary diversity and child linear growth. (Hatloy et al. 2000) In addition, a study in Kenya (Onyango, Koski, and Tucker 1998) found that dietary diversity was associated with child growth when using five nutritional indicators of height-for-age, weight-for-age, weight-for-height, triceps skinfold, and MUAC.

4.3 - Association between dietary diversity and socio-economic status

A multi-country analysis of data from 10 countries tested whether household dietary diversity was associated with socio-economic factors. (Hoddinott and Yohannes, 2002) Household income was a proxy indicator for socio-economic status and was measured by a consumption/expenditure instrument of food and non-food items. It was determined that an increase in dietary diversity was associated with an increase in consumption/ expenditure. Therefore, dietary diversity is positively linked with socio-economic status. However, when existing on a subsistence level, households focus primarily on acquiring additional calories. Once this constraint is met, further increases in income cause the household to move from the subsistence level increasing both caloric intake and food diversity.

Using data from Mali, Hatloy et al. also tested the association between dietary diversity and socio-economic status. In this study socio-economic status was measured by analysis of household asset ownership. The results show that dietary diversity increases with economic status.

4.4 - Dietary diversity as an indicator of food security

Hoddinott and Yohannes used data from 10 countries (India, the Philippines, Mozambique, Mexico, Bangladesh, Egypt, Mali, Malawi, Ghana, and Kenya) to assess the usefulness of dietary diversity as an indicator of the "access" dimension of food security (defined in relation to energy availability). The selected countries encompassed both poor and middle-income countries, rural and urban sectors, data collected in different seasons, and data on calorie intake using two different methods. Results determined that a 1 percent

increase in dietary diversity is associated with a 0.7 percent increase in total per capita caloric availability. Consequently dietary diversity and food security were positively related: an increase in dietary diversity indicates an increase in household food security.

These findings indicate that households with low levels of dietary diversity are likely to have low levels of consumption per person and low caloric availability. Dietary diversity is a simple indicator, which uses data that is easier and less costly in terms of time and money. It is also less intrusive and does not impose burdensome demands on time or recall of respondents. As such, dietary diversity can play a key role in identifying the food-insecure, assessing the severity of their food shortfall, characterizing the nature of their food insecurity, and monitoring changes in circumstances.

Methods to operationalize the use of dietary diversity as a food security indicator are still being developed and validated. Since these methods do not translate directly into targets for specific populations, one approach to setting targets would be to base them on the average dietary diversity of the richest 25% of households in the area surveyed. Alternatively, targets can be set based on the average dietary diversity of the top 25% of households with the greatest dietary diversity. Using either of these methods would ensure that the targeted level of dietary diversity is demonstrably achievable in the population.[1]

4.5 - Measuring household dietary diversity

Dietary diversity is often measured using a simple count of food groups over a reference period. The selection of food groupings should be driven by the specific purpose for which the dietary diversity indicator is to be used.

- If the diversity indicator is expected to reflect nutrient adequacy, the food groups should be selected on their nutrient contribution to nutrient adequacy.
- If diversity is to be used as an indicator of food security or socio-economic conditions, foods can be aggregated based on their relative economic value.

Recall periods to assess dietary diversity often vary across the literature. In relation to this there has been some research (Drewnowski 1997) to determine the effects of different recall periods. Results show that dietary diversity assessed over a single day underestimates the true variety of intake, while when assessed for over 10 days there is no significant change. Consequently, it is advised that the recall period ranges between 3 and 7 days. Furthermore, memory error is minimized if the recall period of kept at less than or equal to 7 days. For the purpose of cross comparison it is critical that one standard recall period is chosen and applied to VAM assessments. VAM currently uses a 7-day recall period and this should remain as the standard for estimating number of days an item was consumed – not the number of times.

For validity of results, a 7-day recall period is recommended.

4.5.1 - Threshold values

International cut-points defining high and low diversity tend to be meaningless – they must be defined in the country context, and their definition should consider local food systems and consumption patterns. In relation to vulnerability analysis, cut points can be selected based on the distribution of the diversity data for the sample of households being analyzed. For example, the range of diversity scores can be divided into quintiles where the lowest quintile (20%) can be considered the group with the lowest dietary diversity. This provides an approximation of a country- or sample-specific level of poor food consumption. There has been research conducted in South Africa, Mozambique and other countries where a country-specific quality of diet index has been developed.

4.5.2 Data collection tools

The following are some examples of modules which have been used to collect household food consumption information that is analysed using food frequency, dietary diversity and

[1] *Dietary diversity as a food security indicator*. Washington, D.C.: Food and Nutrition Technical Assistance, Academy for Educational Development.

source of main foods to create household food consumption profiles. These examples must be modified for use in other contexts.

Tajikistan household survey

	Food item	DAYS eaten in past week (0-7 days)	Sources of food (see codes below)	
8.3a	Wheat, bread			
8.3b	Maize, rice, barley			
8.3c	Macaroni / pasta products			
8.3d	Potatoes			
8.3e	Beans, lentils, chickpeas			
8.3f	Fish			
8.3g	Chicken, poultry			
8.3h	Beef			
8.3i	Mutton, lamb, goat			
8.3j	Vegetable oil, fats, butter			
8.3k	Eggs			
8.3l	Milk			
8.3m	Yoghurt, cheese			
8.3n	Vegetables (tomatoes, etc.)			
8.3o	Fruits (melon, plum, etc.)			
8.3p	Sweets, sugar			

Food source codes:
1 = Purchase
2 = Own production
3 = Traded goods or services
4 = Borrowed
5 = Received as gift
6 = Food aid

Darfur, Sudan household survey

	Food item	DAYS eaten in past week (0-7 days)	Sources of food (see codes below)	
8.3a	Sorghum			
8.3b	Millet			
8.3c	Other cereals *(wheat, maize)*			
8.3d	Groundnuts, legumes			
8.3e	Meat/Chicken, bush meat, etc			
8.3f	Cooking oil			
8.3g	Vegetables			
8.3h	Fruits			
8.3i	Milk, yoghurt, cheese, etc.			
8.3j	Eggs			
8.3k	Sugar			
8.3l	Wild foods *(including leaves)*			

Source codes:
1 = Own production/collection
2 = Purchase
3 = Traded goods or services
4 = Kinship/gift
5 = Borrowed
6 = Food aid
7 = other

Usually, the enumerator will first go down the list and ask the household which foods/food groups were eaten in the past week, making a tick by them on the form. Then the enumerator will go back and ask the number of days in the past week the foods were eaten. Finally, starting again at the top of the list, the enumerator will ask the main sources of those foods consumed in the past seven days.

Annex I – Nutrition and Health indicators

Indicator	Description
Wasting prevalence – moderate & severe	Percent of children 6-59 months of age who fall below minus 2 standard deviations from median weight-for-height of NCHS/WHO reference population
Wasting prevalence – severe	Percent of children 6-59 months of age who fall below minus 3 standard deviations from median weight-for-height of NCHS/WHO reference population
Stunting prevalence – moderate & severe	Percent of children 6-59 months of age who fall below minus 2 standard deviations from median height-for-age of NCHS/WHO reference population
Stunting prevalence – severe	Percent of children 6-59 months of age who fall below minus 2 standard deviations from median height-for-age of NCHS/WHO reference population
Underweight prevalence – moderate & severe	Percent of children 6-59 months of age who fall below minus 2 standard deviations from median weight-for-age of NCHS/WHO reference population
Underweight prevalence – severe	Percent of children 6-59 months of age who fall below minus 2 standard deviations from median weight-for-age of NCHS/WHO reference population
Low Body Mass Index	Percent of non-pregnant women (18-59 years)with a body mass index less than 18.5 kg/m^2
Contraceptive prevalence	Percent of non-pregnant women of reproductive age (15-49 years) in union who are using a modern contraceptive method.
Use of skilled antenatal care	Percent of women aged 15-49 years attended at least once during pregnancy by skilled health personnel (doctor, nurse or trained midwife).
Attendance at delivery	Percent of births attended by skilled health personnel (doctor, nurse or trained midwife).
Low birth weight	(1) Percent of live births weighing less than 2500 grams. (2) Percent of live births described by mother as 'smaller than normal' or 'very small'.
Prevalence of anaemia – pregnant women	Percent of pregnant women aged 15-49 years with blood haemoglobin levels below 11.0 g/dL.
Prevalence of anaemia – non-pregnant women	Percent of non-pregnant women aged 15-49 years with blood haemoglobin levels below 12.0 g/dL.
Anaemia – children	Percent of children 6-59 months of age with blood haemoglobin levels less than 11.0 g/dL.
Iodized salt consumption	Percent of households with adequately iodized salt (> 15 ppm).
Children supplemented with vitamin A in past year	Percent of children 6-59 months of age who have received a single high dose vitamin A supplement in the past 12 months.
Post-partum vitamin A supplementation in women	Percent of mothers who received a high dose vitamin A supplement before the infant was 8 weeks old.

Children with night blindness	Percent of children 24-72 months with night blindness, or difficulty seeing at dusk.
Night blindness in pregnant women	Percent of women without daytime vision problems who had difficulty seeing at dusk, during their most recent pregnancy.
Exclusive breastfeeding rate	Percent of infants less than 6 months (180 days) of age who are fed breast milk only (no other liquids or solids).
Timely complementary feeding rate	Percent of infants 6-9 months (180-299 days) of age who are receiving breast milk and complementary food.
Continued breast feeding rate1	Percent of children 12-15 months of age who are breastfed
Continued breast feeding rate2	Percent of children 20-23 months of age who are breastfed
Tuberculosis immunization coverage (BCG)	Percent of children 12-23 months who have received one dose of BCG vaccination (usually given at birth)
Polio immunization coverage	Percent of children 12-23 months of age who have received at least 3 doses of poliomyelitis vaccine (birth, 6 weeks, 10 weeks and 14 weeks).
DPT immunization coverage	Percent of children 12-23 months of age who have received 3 doses of DPT (diphtheria, pertussis & tetanus) vaccine (6 weeks, 10 weeks & 14 weeks).
Measles immunization coverage	Percent of children 12-23 months of age who have received a measles vaccination (9 months).
Full immunization coverage	Percent of children 12-23 months immunized against BCG, measles, and at least three doses of DPT and polio.
Neonatal tetanus vaccination coverage	Percent of mothers immunized against neonatal tetanus (tetanus toxoid vaccine) – at least 2 injections before last birth or during last birth and one prior.
Diarrhoea – two week period prevalence	Percent of children 0-59 months of age who had at least one episode of diarrhoea (simple or bloody) in the past two weeks.
Use of drinking water from improved sources	Percent of population/households who use any of the following types of water supply for drinking: (1) Household connection; (2) public standpipe; (3) borehole; (4) protected dug well; (5) protected spring; (6) rainwater collection
Use of sanitary means of excreta disposal	Percent of the population using improved sanitation facilities which are those more likely to ensure privacy and hygienic use. Improved sanitation facilities include: (1) connection to public sewer; (2) connection to a septic system; (3) pour-flush latrine; (4) simple pit latrine; (5) ventilated improved pit latrine
Literacy rate – women	The percent of women who completed sixth grade or can read all or part of a short simple statement on their everyday life.
Literacy rate – men	The percent of men/heads of household who completed sixth grade or can read all or part of a short simple statement on their everyday life.

Annex II: Summary of available data by country and source

Country	Census[1]	DHS[2]	MICS II[3]	LSMS[5]
Afghanistan	1979, 2004		Yes[a]	
Albania	1989, 2001		Yes[a]	1996, 2002
Algeria	1998		Yes[a]	
Angola	2004		Yes[ab]	
Armenia	2001	2000		1996
Azerbaijan	1999		Yes[a]	1995
Bangladesh	2001	2000, 2004		
Benin	2002	2001		
Bolivia	2001	2003	Yes[a]	2001
Bosnia & Herzegovina	2001		Yes[a]	2001
Burkina Faso	1996	2003		
Burundi	1990	1987	Yes[ab]	
Cambodia	1998	2000	Yes[a]	
Cameroon	2002	2004	Yes[a]	
Cape Verde	2000			
CAR	1988, 2003	1994/95	Yes[b]	
Chad	1993	2004	Yes[ab]	
China	2000			
Colombia	1993, 2003	2004		1995 & 1997
Comoros	2002	1996	Yes[ab]	
Congo	2000			
Côte D'Ivoire	1998	1998/99, 2005	Yes[ab]	1985-88
Cuba	1981		Yes[a]	
Dominican Republic	1993	2002	Yes[a]	
DPRK	1993		Yes[a]	
DRC	1984		Yes[a]	
East Timor	2000			
Ecuador	2001	1987	Yes	1994-95, 98
Egypt	1996	2004		
El Salvador	2002	1985		
Eritrea	2003	1995, 2002		
Ethiopia	1994, 2004	2000		
Gambia	2003		Yes[a]	
Georgia	2002		Yes[a]	
Ghana	2000	1998, 2003		1998/99
Guatemala	2003	1998/99		2000
Guinea	1996	1999, 2004		
Guinea Bissau	1991		Yes[a]	
Haiti	2001	2000		
Honduras	2001			
India	2001	1999	Yes[a]	1997-98
Indonesia	2000	1997, 2002	Yes[a]	
Iran	1996		Yes[a]	
Iraq	1997		Yes[a]	
Jordan	1994, 2004	1997, 2002		
Kenya	1999	1998, 2003	Yes[a]	
Kyrgyzstan	1999	1997		1998
Laos	1995		Yes[a]	
Lesotho	2001	2004	Yes[a]	
Liberia	1984	1986		
Macedonia	2002			
Madagascar	2003	1997, 2003	Yes[ab]	
Malawi	1998	2004		
Mali	1998	1996, 2001		
Mauritania	2001	2000/01		
Morocco	1994	1992, 2003	Yes	1991
Mozambique	1997	1997, 2003		
Myanmar	2003		Yes[a]	
Nepal	2001	1996, 2001		1996
Nicaragua	1995	1998, 2001		2001
Niger	2001	1998	Yes[ab]	
Nigeria	-	2003		

Country	Census[1]	DHS[2]	MICS II[3]	LSMS[5]
Pakistan	1998	1990/91		1991
Peru	2003	2003		1994
Rwanda	2002	2005	Yes[ab]	
Senegal	2002	1997, 2005	Yes[ab]	
Sierra Leone	2004		Yes[a]	
Somalia	1987		Yes[a]	
Sri Lanka	2001	1987		
Sudan	2003	1990	Yes[a]	
Swaziland	1997		Yes[a]	
Syria	1994		Yes[a]	
Tajikistan	2000		Yes[a]	1999
Tanzania	2002	2004		1993
Turkmenistan	1995, 2004	2000		
Uganda	2002	2000/01		
Yemen	1994, 2004	1997		
Zambia	2000	1996, 2002	Yes[a]	
Zimbabwe	2002	1999		

[1]Source: www.un.org/Depts/unsd/demog/cendate/index.html & www.census.gov/ipc/www/cendates
[2]Source: www.measuredhs.com
[3]Source: www.childinfo.org [a]Report available [b]Data set available
[4]Source: www.undp.org/hdro
[5]Source: www.worldbank.org/lsms/guide/select.html

Annex III: Sample child health and nutrition module

Section 12 – Child health and nutrition

Enter the name of each living child born since (5 years before survey dates) in the table. Ask the questions about all of these births. Begin with the most recent birth.

Now I would like to ask you questions about the health of all your children born in the past 5 years. We will talk about one child at a time.

12.1	Child(ren)'s name and birth date	**Most recent birth (1)** Name: _____ Birth month: _____ Birth Year: _____	**Next-to-last birth (2)** Name: _____ Birth month: _____ Birth Year: _____	**Next-to-last birth (3)** Name: _____ Birth month: _____ Birth Year: _____
12.2	Child's age in months	|__|__| months	|__|__| months	|__|__| months
12.3	Child gender	Male……..1 Female……..2	Male……..1 Female……..2	Male……..1 Female……..2
12.4	When you were pregnant with [NAME], did you see anyone for antenatal care for this pregnancy? If YES, whom did you see? RECORD ALL PERSONS	Doctor……1 Nurse……2 Midwife ……3 Relative/friend……4 Other_____…5 No one……6	Doctor……1 Nurse……2 Midwife ……3 Relative/friend……4 Other_____…5 No one……6	Doctor……1 Nurse……2 Midwife ……3 Relative/friend……4 Other_____…5 No one……6
12.5	When you were pregnant with [NAME] were you given an injection in the arm to prevent the baby from getting convulsions after birth? (anti-tetanus shot – an injection at the top of the arm or shoulder).	Yes……1 No……..2 Don't know……9		
12.6	When you were pregnant with this child, did you have difficulty with your vision during the daylight?	Yes……1 No……..2 Don't know……9		
12.7	During this pregnancy did you ever suffer from night-blindness (local used term) where you had difficulty seeing at dusk?	Yes……1 No……..2 Don't know……9		
12.8	When [NAME] was born, was he/she: Very large, Larger than normal, Normal, Smaller than normal, or Very small?	Very large……..1 Larger than normal…….2 Normal……3 Smaller than normal….4 Very small……5	Very large……..1 Larger than normal…….2 Normal……3 Smaller than normal….4 Very small……5	Very large……..1 Larger than normal…….2 Normal……3 Smaller than normal….4 Very small……5

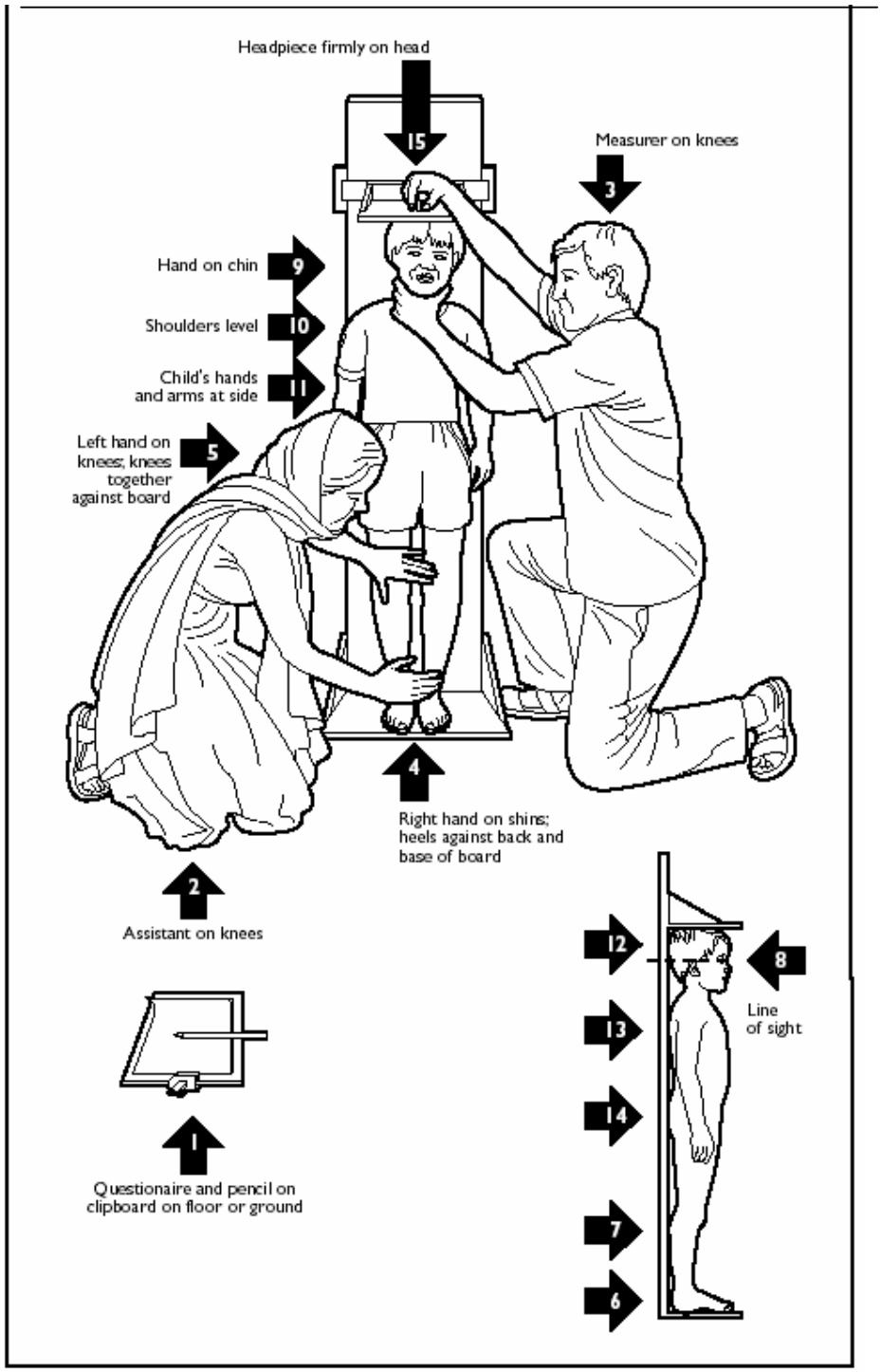
12.9	Did you ever breastfeed [NAME]?	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2
12.10	Is [NAME] still being breastfed?	Yes.....1 No.....2 *(skip to 12.13)*	Yes.....1 No.....2 *(skip to 12.13)*	
12.11	How long after birth did you first put [NAME] to the breast? *If less than 1 hour, choose 'immediately'. If less than 24 hours, record hours. Otherwise, record days.*	Immediately.....00 Hours.....|__|__| Days.....|__|__|	Immediately.....00 Hours.....|__|__| Days.....|__|__|	Immediately.....00 Hours.....|__|__| Days.....|__|__|
12.12	**FOR YOUNGEST CHILD ONLY if < 24 months** Since this time yesterday, did [NAME] receive any of the following? *(circle all that apply)*	Vitamin supplements or medicine.....1 Plain water.....2 Sweetened water or juice.....3 Oral Rehydration Solution (ORS).....4 Tinned, powdered or fresh milk.....5 Any other liquids.....6 Solid or semi-solid (mushy) food.....7		
12.13	Has [NAME] ever received a vitamin A capsule (supplement) like this one? *Show capsule or dispenser*	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9
12.14	How many months ago did [NAME] take the last dose?	Months ago.....|__|__| Don't know.....99	Months ago.....|__|__| Don't know.....99	Months ago.....|__|__| Don't know.....99
12.15	Has [NAME] been ill with a fever at any time in the past 2 weeks?	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9
12.16	Has [NAME] been ill with a cough at any time in the past 2 weeks?	Yes.....1 No.....2 *(skip to 12.18)* Don't know.....9 *(skip to 12.18)*	Yes.....1 No.....2 *(skip to 12.18)* Don't know.....9 *(skip to 12.18)*	Yes.....1 No.....2 *(skip to 12.18)* Don't know.....9 *(skip to 12.18)*

12.17	When [NAME] had the cough, did he/she breathe faster than usual with short, rapid breaths?	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9
12.18	Has [NAME] been ill with diarrhoea in the past 2 weeks? *(Diarrhoea: perceived by mother as 3 or more loose stools per day or one large watery stool or blood in stool)*	Yes.....1 No.....2 *(skip to 12.20)* Don't know.....9 *(skip to 12.20)*	Yes.....1 No.....2 *(skip to 12.20)* Don't know.....9 *(skip to 12.20)*	Yes.....1 No.....2 *(skip to 12.20)* Don't know.....9 *(skip to 12.20)*
12.19	Was [NAME] seen at a health facility during this illness?	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9	Yes.....1 No.....2 Don't know.....9
12.20	**Child weight** – *Enter weight in kilograms, with one decimal place.*	**|__|__|.|__| (1)**	**|__|__|.|__| (2)**	**|__|__|.|__| (3)**
12.21	**Child height/length** *(in centimetres, with 1 decimal place)*	**|__|__|__|.|__| (1)**	**|__|__|__|.|__| (2)**	**|__|__|__|.|__| (3)**
12.22	Measurement made lying or standing? *(If < 24 months, must be measured lying down)*	Lying.....1 Standing.....2	Lying.....1 Standing.....2	Lying.....1 Standing.....2
12.23	**Child haemoglobin** *(if tested)*	**|__|__|.|__|**	**|__|__|.|__|**	**|__|__|.|__|**

Annex IV: Local Calendar of Events for use in age estimation

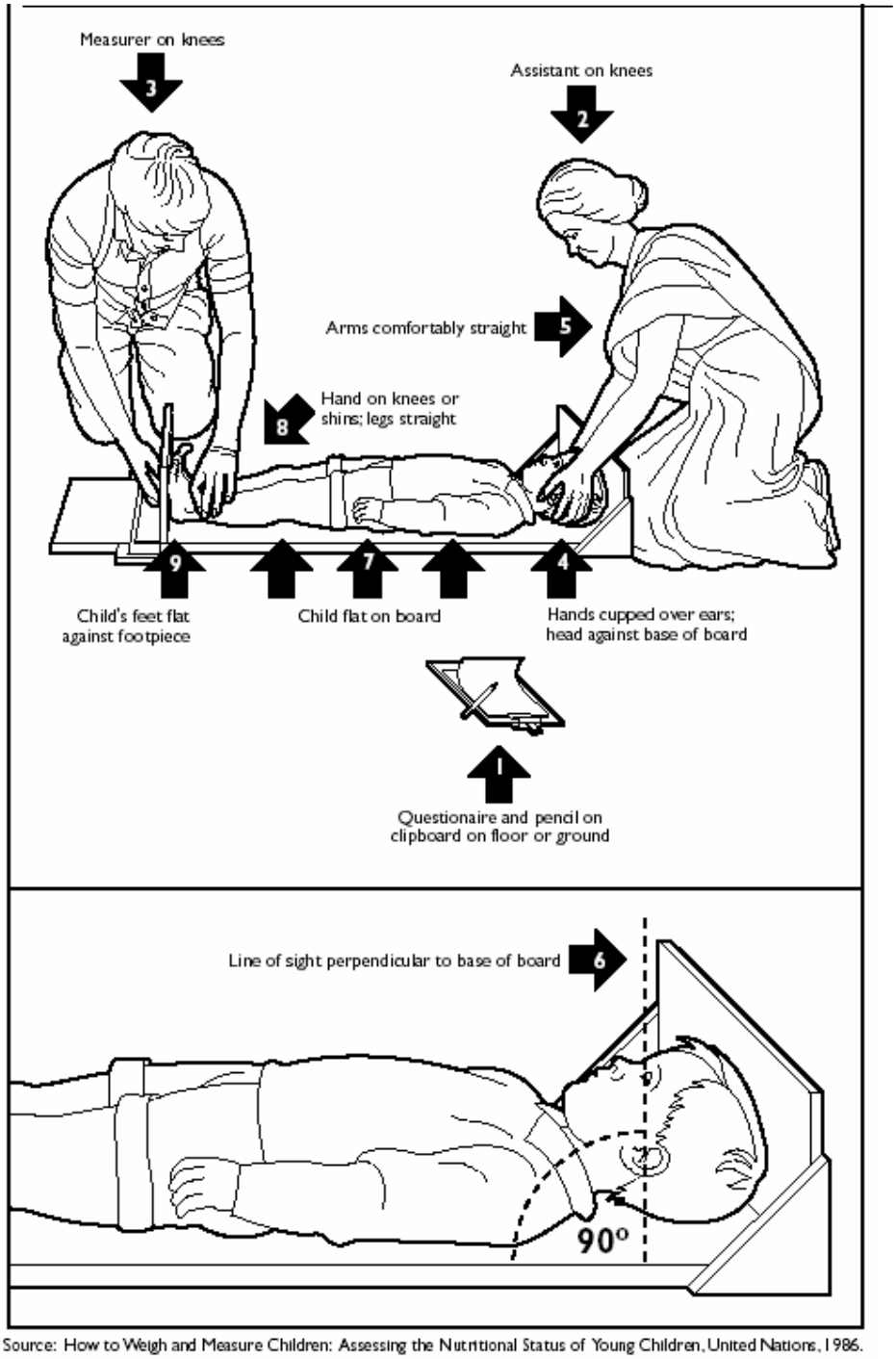
Month	Annual National Events	Local Events					
		1999	***2000***	***2001***	***2002***	***2003***	***2004***
January	*1st New Year 26th Victory Day*		**53**	**41**	**29**	**17**	**5**
February	*Clearing field, schools open*		**52**	Gulu is declared Ebola free **40**	**28**	**16**	Burning of Pabbo camp **4**
March	*8th Women's Day*		ACF Nut survey in Gulu IDP camps **51**	Presidential Elections in Uganda **39**	**27**	**15**	**3**
April	*Easter*		Beginning of wet season **50**	Beginning of wet season **38**	Beginning of wet season **26**	ACF Nut Survey in Gulu IDP camps **14**	Beginning of wet season **2**
May	*1st Labour Day*		**49**	**37**	**25**	**13**	**1**
June	*3rd Martyrs day 9th Heroes Day*		National referendum held **48**	**36**	Increase in rebel activity **24**	**12**	ACF Nut survey in Gulu IDP camps **0-1**
July	*Harvest of maize / beans*	First Harvest **59**	First Harvest **47**	First Harvest **35**	Burning of Alero, Marawobi **23**	First Harvest 11	
August	*Ascension Day*	NIDS survey **58**	**46**	Last NIDS survey **34**	release of children & women in Atiak **22**	**10**	
September	*Weeding of second season*	**57**	ACF survey **45**	**33**	population census **21**	**9**	
October	*9th Independence Day*	**56**	Ebola outbreak in Gulu **44**	**32**	**20**	**8**	
November	*Harvest of maize / beans*	prayers in Keyo Hills **55**	prayers in Keyo Hills **43**	prayers in Keyo Hills **31**	**19**	**7**	
December	*25th Christmas Day 26th Boxing Day*	Start dry season **54**	Death of Dr Lukwiya **42**	Start dry season **30**	Start dry season **18**	Start dry season **6**	

Annex V: Height Measurement for children 24 months and older



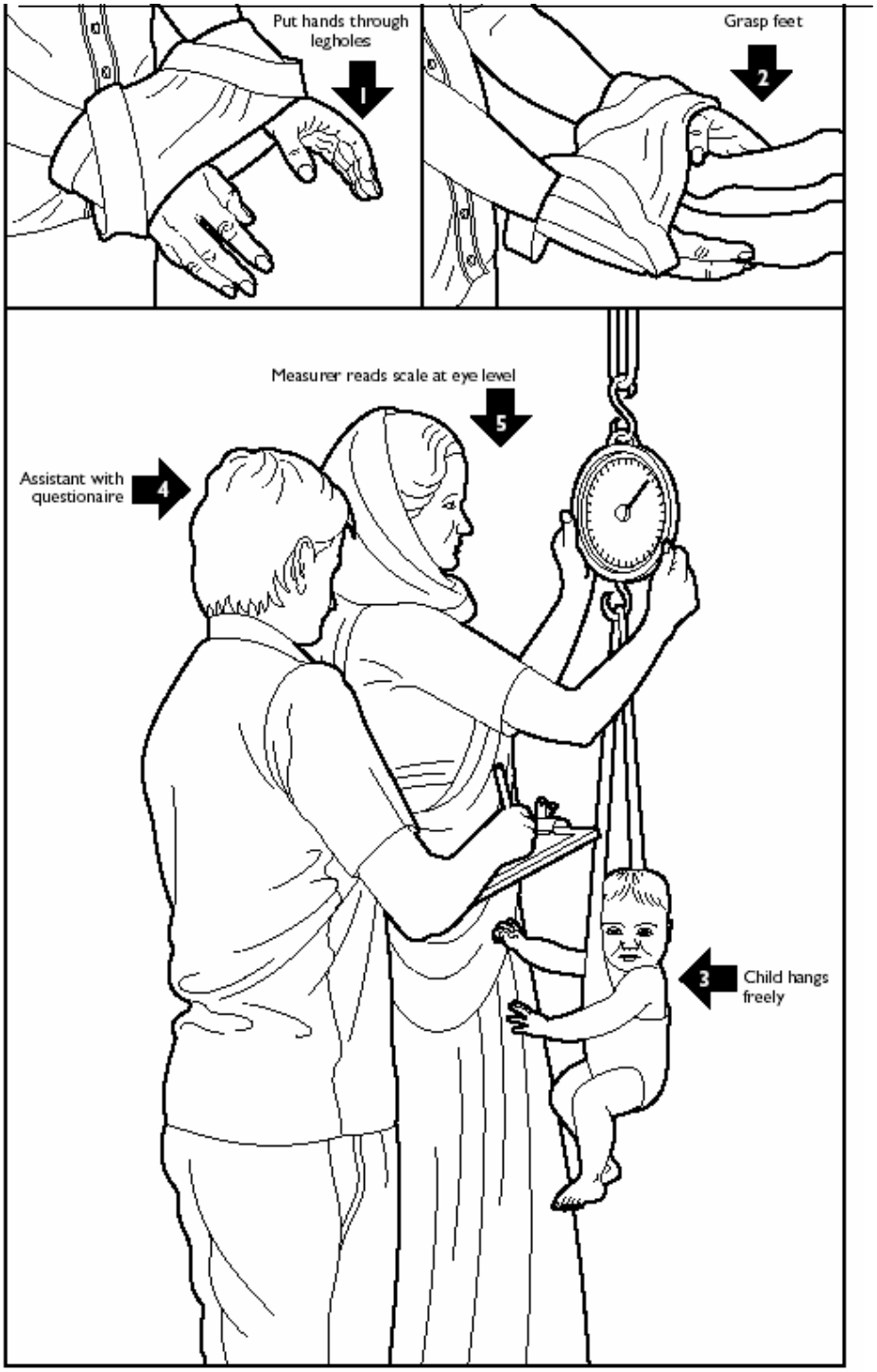
Source: How to Weigh and Measure Children: Assessing the Nutritional Status of Young Children, United Nations, 1986.

Annex VI: Length measurement for children 0 - 24 months



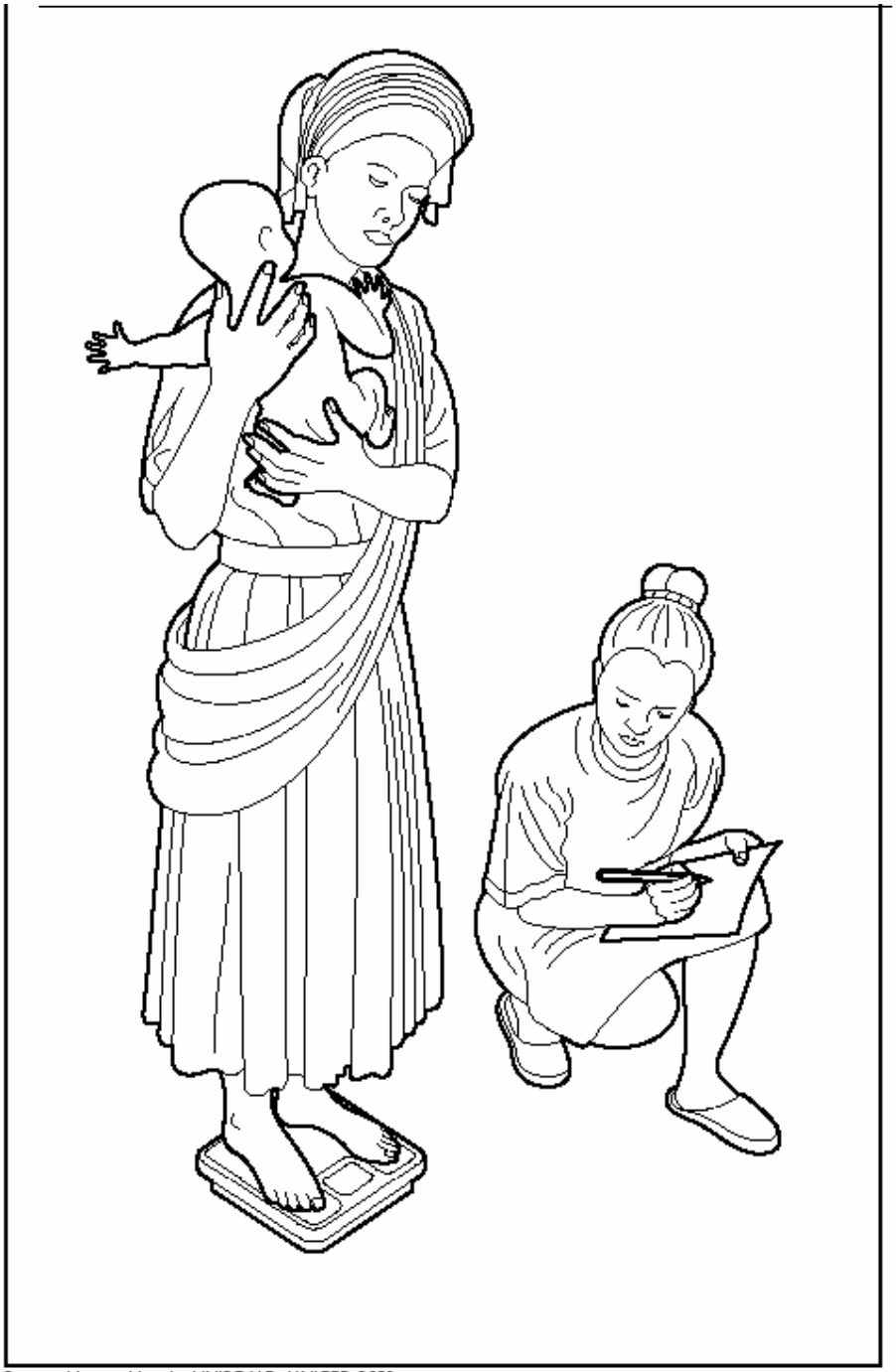
Source: How to Weigh and Measure Children: Assessing the Nutritional Status of Young Children, United Nations, 1986.

Annex VII: Child weight measurement using Salter-like hanging scale



Source: How to Weigh and Measure Children: Assessing the Nutritional Status of Young Children, United Nations, 1986.

Annex VIII: Child weight measurement using electronic scale



Source: How to Use the UNISCALE, UNICEF, 2000.

Annex IX: Recommended measuring equipment

Height/Length Measuring Equipment

Infant/Child Height/Length Measuring Board: This board has 130 cm capacity (collapses to 75cm) and has 0.1 cm increments. The board weighs 6 kg, is portable, water-resistant and has an adjustable, removable nylon shoulder strap. It is easy to assemble and dismantle, with the sliding head-foot piece stored in the base of the board for transport or storage. This board has a lifetime warranty and costs $285. For more information contact: Shorr Productions. Telephone: (301) 774 9006; Fax: (301) 774 0436; Email: ijshorr@shorrproductions.com.

Local Construction: Various plans exist for the local construction of foldable height/length boards and they can be made for around US$20. It is important that the materials are durable, lightweight and the wood should be well seasoned to guard against warping. Sealing the wood with water repellent and ensuring the measuring tape is protected from wear will improve the durability of the board. The tape measure should be durable with 0.1 cm increments and the numbers of the tape measure must be next to the markings on the board when the measure is glued to the side of the board. Designs can be found in Annex 4 of the FAO field manual. Blueprints for the construction of portable measuring boards are also available from the Center for Health Promotion and Education of the Centers for Disease Control and Prevention, Website: www.cdc.gov.

Adult tape measure: Carpenter measuring tapes can be bought locally in most cities around the world.

Weighing Equipment:

UNICEF Hanging Scale (Item No. 0145555 Scale, infant, spring, 25kg x 100g with No. 0189000 Weighing trousers/pack of 5): This is a Salter-type spring scale with a capacity of 25 kg and 100 gram increments. The price of this scale is about US$30. For more information contact: UNICEF Supply Division; Telephone: (45) 35 27 35 27; Fax: (45) 35 26 94 21; Email: supply@unicef.org. Website: www.supply.unicef.dk

Salter Hanging Scale Model 235-6S: This is a lightweight scale in a durable non-rust metal case with an unbreakable plastic face. Its capacity is 25 kgs with 100g increments. The price is US$77. For more information contact: Salter Industrial Measurement, Ltd.; Telephone: (44) 121 553 1855.

UNICEF Electronic Scale (Item No. 0141015 Scale mother/child, electronic): The scale is manufactured by SECA and is a floor scale for weighing children as well as adults (capacity 150 kg). Weighing capacity from 1 kg to 150 kg in 100 g divisions, accuracy +/- 100 g. Weight of adult on scale can be stored (tared) in memory, allowing the weight of baby or small child held by adult to show on scale indicator. The major advantage of this scale is the micro-computer chip so that it can adjust to zero and weigh people quickly and accurately. The child may be weighed directly. If a child is frightened, the mother can first be weighed alone and then weighed while holding the child in her arms, and the scale will automatically compute the child's weight by subtraction. The portable scale, weighing 4 kg, includes a solar cell on-switch and is powered by long-life lithium battery. Instructions are available in English, French and Spanish. The price of this scale is about US$90. For more information contact: UNICEF Supply Division; Telephone: (45) 35 27 35 27; Fax: (45) 35 26 94 21; Email: supply@unicef.org Website: www.supply.unicef.dk

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Ruel, Marie T. 2002. *Is Dietary Diversity an Indicator of Food Security or Dietary Quality? A Review of Measurement Issues and Research Needs.* Food Consumption and Nutrition Division Discussion paper. Washington, D.C: International Food Policy Research Institute.

Relevant Guides

Anthropometric Indicators Measurement Guide (2003): This guide, revised in 2003, focuses on the anthropometric assessment of infants and children to assist PVOs in improving their M&E. It includes information on how to collect, analyze, and report on key anthropometric indicators. http://www.fantaproject.org/publications/anthropom.shtml

Generating Indicators of Appropriate Feeding of Children 6 through 23 Months from the KPC 2000+ (2003): This report suggests small modifications to the **Knowledge, Practice, and Coverage Survey (KPC) 2000+** Infant and Child Nutrition module and tabulation plan to improve the ability to measure, interpret, and analyze several key infant and young child feeding practices of children in the 6 through 23 month age range. The authors also make recommendations for presenting infant and young child feeding practices survey results. http://www.fantaproject.org/publications/kpc.shtml

Assessing Care: Progress Towards the Measurement of Selected Childcare and Feeding Practices and Implications for Programs (2002): An important sub-theme of the Accra Urban Food and Nutrition Study (AUFNS) was the specific role of childcare as one determinant of the nutritional status of children. The objectives of this report, which is based on findings from the AUFNS, were to summarize progress toward the measurement of selected childcare and feeding practices and discuss the feasibility of these measurements in research and program contexts. The report includes an extensive literature review on measuring selected dimensions of care. http://www.fantaproject.org/downloads/pdfs/AssessingCare_Aug02.pdf

Recommended Tabulation Guidelines for Displaying Complementary Feeding Data When Using the Demographic and Health Surveys (Measure DHS+Series) (2002): This report suggests tabulation guidelines for use with DHS data from the most recent round of surveys, the Measure DHS+, and presents tables and figures to describe complementary feeding practices. The starting points for these guidelines are the MEASURE DHS+ Model A Questionnaire (ORC Macro 2001) and the DHS III codebook (version 1.1.), both available from the ORC Macro DHS website at www.measuredhs.com. http://www.fantaproject.org/downloads/pdfs/Tabulation_Guidelines_Dec02.pdf

Summary Indicators for Infant and Feeding Practices: An Example from the Ethiopia Demographic and Health Survey 2000 (2002): This document describes analysis of the infant and child feeding data available in the Ethiopia Demographic and Health Survey 2000 (EDHS). The main purpose of the analysis is to support USAID/Ethiopia in the use and interpretation of the infant/child feeding practices data. More broadly, the goal is to promote greater use of the rich information on feeding practices contained in the DHS data sets, and to demonstrate the usefulness of this information for exploring relationships between infant/child feeding practices and nutritional status outcomes.
http://www.fantaproject.org/downloads/pdfs/ChildFeeding_Ethiopia02.pdf

Development and Validation of an Experience-based Tool to Directly Measure Household Food Insecurity Within and Across Seasons in Northern Burkina Faso (2004): FANTA funded two multi-year field validation studies that used the HFSS approach to develop experiential food insecurity scales and validate them primarily as impact indicators for the access component of household food security (see *Measuring Food Insecurity: Going Beyond Indicators of Income and Anthropometry* below). The objectives of the studies were to develop a household food access measure (Household Food Insecurity Scale: HFIS) based on locally recognized behaviours that distinguish food insecurity in developing countries, test the HFIS's relationship to conventional indicators of food insecurity (such as income or food consumption), and test the HFIS's performance and sensitivity to change related to program impact.
http://www.fantaproject.org/downloads/pdfs/Burkina_Faso_Nov2004.pdf

Measuring Household Food Consumption: A Technical Guide (2004): The guide describes the process and procedures for collecting information to assess the food intake requirements of a household and a step-by-step analysis of the food consumed. Appendices present detailed information about analyzing the data.
http://www.fantaproject.org/downloads/pdfs/foodcons.pdf

Food Access Indicator Review (2003): The measurement of food access is critical to food security programming. However, for most Title II Cooperating Sponsors, determining changes in food access has not been easy, particularly because appropriate indicators are not standardized and are hard to measure and interpret. Guidance and tools to assist in measuring access indicators are limited or not readily available to the field. The objective of this study was to review how Title II Development Assistance Programs designs address food access, assess how Title II PVOs currently monitors and evaluates food access and identify good measurement practices. The results of the review will provide the basis for a follow-on food access monitoring and evaluation guide to be used by CS field staff.
http://www.fantaproject.org/downloads/pdfs/accessIndicator_Dec03.pdf

Dietary Diversity as a Household Food Security Indicator (2002): Both the report and the technical note describe a user-friendly, cost-effective approach to measuring changes in dietary quantity and quality and feeding behaviors at both the household and individual levels. Dietary diversity, defined as the number of unique foods consumed over a given period of time, appears to show promise as a means of measuring food security and monitoring changes, particularly when resources for such measurement are scarce. As described in the report, FANTA's subcontractor, the International Food Policy Research Institute (IFPRI), analyzed ten household data sets (collected in India, Mozambique, Mexico, Bangladesh, Egypt, Mali, Malawi, Ghana, Kenya and the Philippines) to assess whether dietary diversity can be used as a tool in evaluating the efficacy of food security interventions. The study validated the dietary diversity indicator as a measure of access to food (per capita expenditures) and a measure of consumption (caloric availability at the household level).
http://www.fantaproject.org/downloads/pdfs/DietaryDiversity02.PDF

http://www.fantaproject.org/downloads/pdfs/techAppendix.pdf