NUTRITION

A guide to data collection, analysis, interpretation and use

FSAU is managed by FAO

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Food Security Analysis Unit
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P.O. Box 1230, Village Market, Nairobi
Tel: +254 (020) 374–1299
Fax: +254 (020) 374–0598
Email: fsauinfo@fsau.or.ke
Website: www.fsausomalia.org

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The current revision has been undertaken following the use of the manual during numerous training workshops throughout Somalia. Valuable comments have been made by Nurah Gureh, Sicily Matu Nyamai, Mohamoud Hersi, James King'ori, Mohammed Moalim, Osman Warsame, Ahono Busili, Khalif Nouh, Abukar Nur, Mohammed Haji, Mohammed Hassan, Abdikarim Dualle, Abdikarim Aden, Fuad Hassan Mohammed, Abdirahaman Hersi, Ibrahim Mohamoud and partners involved in the workshops

A revision by FSAU's team has been found necessary to expound on evolving issues such as dietary assessments, sentinel sites surveillance and micro-nutrient deficiencies.

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Foreword

Nutrition is about people and the measurement of the nutritional status of a population is one of the most useful indicators of a population's overall welfare. Nowhere is this more important than in countries prone to crises and emergencies like Somalia. In the absence of other basic sources of data in Somalia, the demand for good quality nutrition information has increased. Both governmental and non-governmental bodies collect, understand and use information. The continued high levels of malnutrition among Somali populations (including areas in neighbouring Ethiopia and Kenya) calls for a greater analysis of the causative factors.

As part of its commitment to improve the nutritional status of the Somali people, the United Nations Food and Agriculture Organization (FAO) supports the Food Security Analysis Unit (FSAU) in the implementation of food security and nutrition analysis. FSAU works with partners to strengthen the quality of nutrition-related information in Somalia. These partnerships have strengthened over the past four years. FSAU now acts as the focal point for the collection, analysis, storage and dissemination of this information. As a result of these partnerships, there has been strong collaboration across sectors, in particular food security and health.

In response to demands from partners for specific information on nutrition data management, a wide range of materials have evolved over the past four years. Methodologies have been standardized and guidelines have been developed through a process of consultations and field testing. During the past two years, these materials have been compiled and used during training sessions for mid-level management. The training sessions were held in various locations throughout Somalia, Somaliland and Puntland, and the materials developed formed the basis for the production of this manual.

This manual targets mid-level managers in all sectors who would like to better understand nutrition information and its use. In addition, certain sections have been adapted and translated for use by survey enumerators, health facility workers and other field workers. Additional materials have also been prepared to support the use of the manual during training.

Noreen Prendiville
Project Manager
FSAU

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1 Introduction to nutrition information

1.1 Background

Measurement of nutritional status is one of the key indicators for:

- monitoring the overall welfare of a population and
- measuring the impact of change in factors that affect the welfare of a population.

Negative change in the nutritional status of a population indicates a problem. The effects of increasing malnutrition are felt in a society both in the short term and long term. In much of sub-Saharan Africa, measurement (anthropometry) of children under the age of five is the most commonly used method for estimating the nutritional status of the population as a whole, although strictly speaking, one cannot imply that because children are malnourished, that the whole population is malnourished.

The availability of good data provides a strong foundation for the more important next step - the analysis of the information. Malnutrition rates are meaningless without explanations for the levels and trends. Frameworks help in the analysis of information and facilitate a better understanding of the factors that interact to influence nutrition at both the individual and population level.

A better understanding of causes of malnutrition provides a sound basis for the design and implementation of interventions across the sectors. Understanding the roles of different actors leads to more effective strategies and efficient use of limited resources.

1.2 Use of nutrition-related information

Using information on nutrition and other background information supports analysis and decisions on interventions and programs for both short and long-term projects. More specifically, nutrition information:

- Serves as a vital indicator of the overall health and welfare of populations especially where regular demographic and health surveys are lacking.
- Is critical *during crises* and emergencies for (i) the identification of most vulnerable or affected individuals or groups, (ii) as a screening tool to identify malnourished individuals needing special assistance, (iii) to evaluate the progress of growth amongst the nutritionally vulnerable groups and (iv) to monitor effects of nutrition interventions among vulnerable groups.
- Is invaluable for program management (planning, implementation, monitoring and *evaluation)* in many sectors including food security (agriculture and livestock), health, water and sanitation, education and environment.
- Nutrition information can contribute to designing of food, health and other development policies.
- Facilitates *analysis* of socio-economic factors, demographics, food security and cultural aspects of a population.
- Can be used in crisis mitigation especially as an early-warning indicator. This speeds up response to threats like droughts or disease outbreaks.

Knowing what people eat is critical for nutritional analysis
(photo by FSAU)

The principal users of nutrition information are:

- Government authorities and Non Governmental Organizations (NGOs) that support food security, health and nutrition-related programs
- Donors

- Communities involved in the design, planning and management of nutrition-related programs
- Health workers who produce the data
- Food aid agencies like WFP and CARE

1.2.1 Nutrition information in early warning

Populations respond to changes in their environment in many ways and these responses can ultimately be reflected in changes in food consumption and health status. These population responses vary from one situation to another with some populations changing their nutrition related behaviour, manifesting as increasing malnutrition quite early in a crisis and before any apparent deterioration in food security. On the other hand, other populations will use all means available to avoid any reduction in the quality or quantity of food, often sacrificing livelihoods in the process. Therefore, a deterioration in nutritional status can be an early indicator of impending hardship if interpreted together with disease and food security patterns. Continuous analysis of the nutrition situation combined with reliable measurement of outcomes can help to identify the stages of a drought process and the response of the population to events around them.

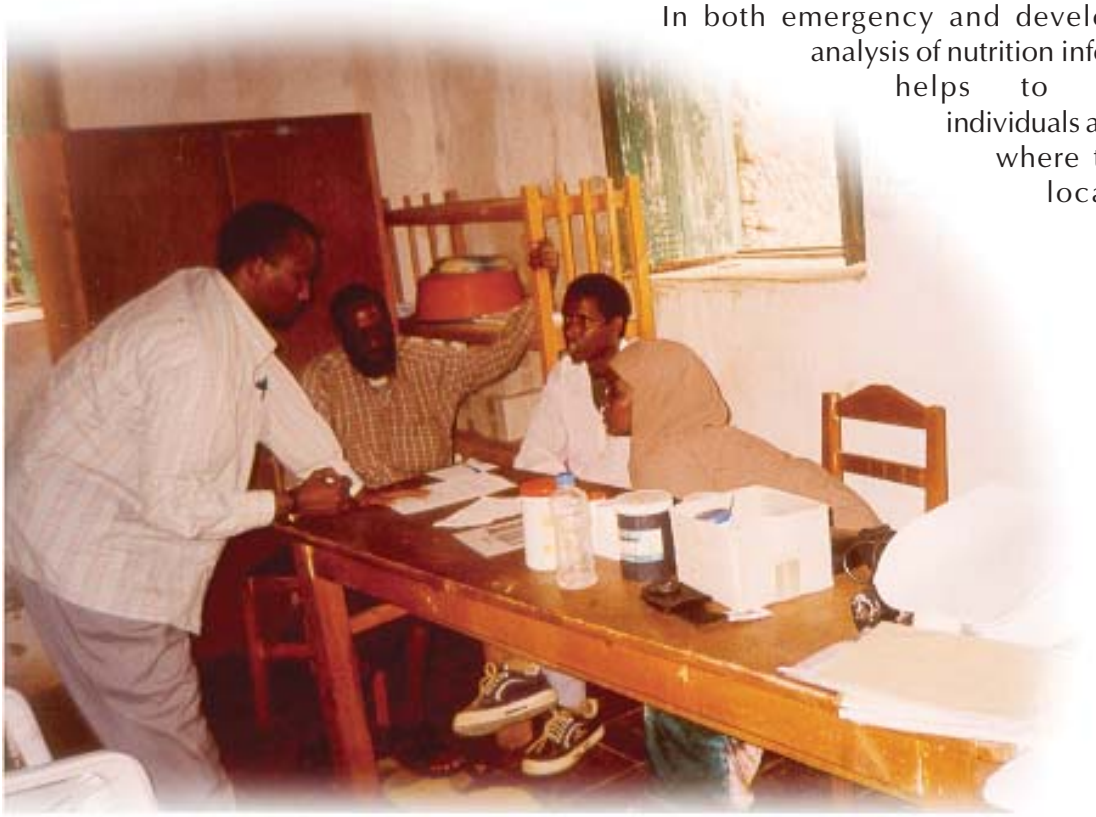
Nutrition-related information provides an authoritative basis for the formulation of an appropriate response. Once data is available, appropriate emergency preparedness and response can be undertaken well in advance. However, for nutritional surveillance to be used as an effective tool for early warning, it must incorporate both quantitative and qualitative aspects of data collection, analysis and interpretation.

1.2.2 Nutrition information in program management

Planning and Implementation

Planning involves assessing, analyzing problems and opportunities, setting objectives and designing appropriate interventions that can achieve objectives. Nutrition-related information is used to analyze the situation in relation to factors across the sectors – in particular health, food security, care practices, livelihoods and other underlying factors. The causes of malnutrition may not be obvious. It is important to differentiate the immediate life-threatening problems from the underlying causes and to develop appropriate interventions.

In both emergency and development, analysis of nutrition information helps to identify individuals at risk and where they are located. It



FSAU staff sharing information with health facility staff (photo by FSAU)

facilitates the design of appropriate interventions based on the causes and effects. The analysis helps to formulate goals, objectives, strategies and activities that the project/program intends to address. The severity of malnutrition, its nature and the related health risks determine the choice of response from the problem analysis. Where lives are threatened, quick action is necessary.

Monitoring and evaluation

Nutrition information is useful for monitoring and evaluation in both emergency and development interventions. Nutrition-related information is used during project implementation for monitoring purposes. It is also used at the evaluation stage to assess the extent and impact of the project.

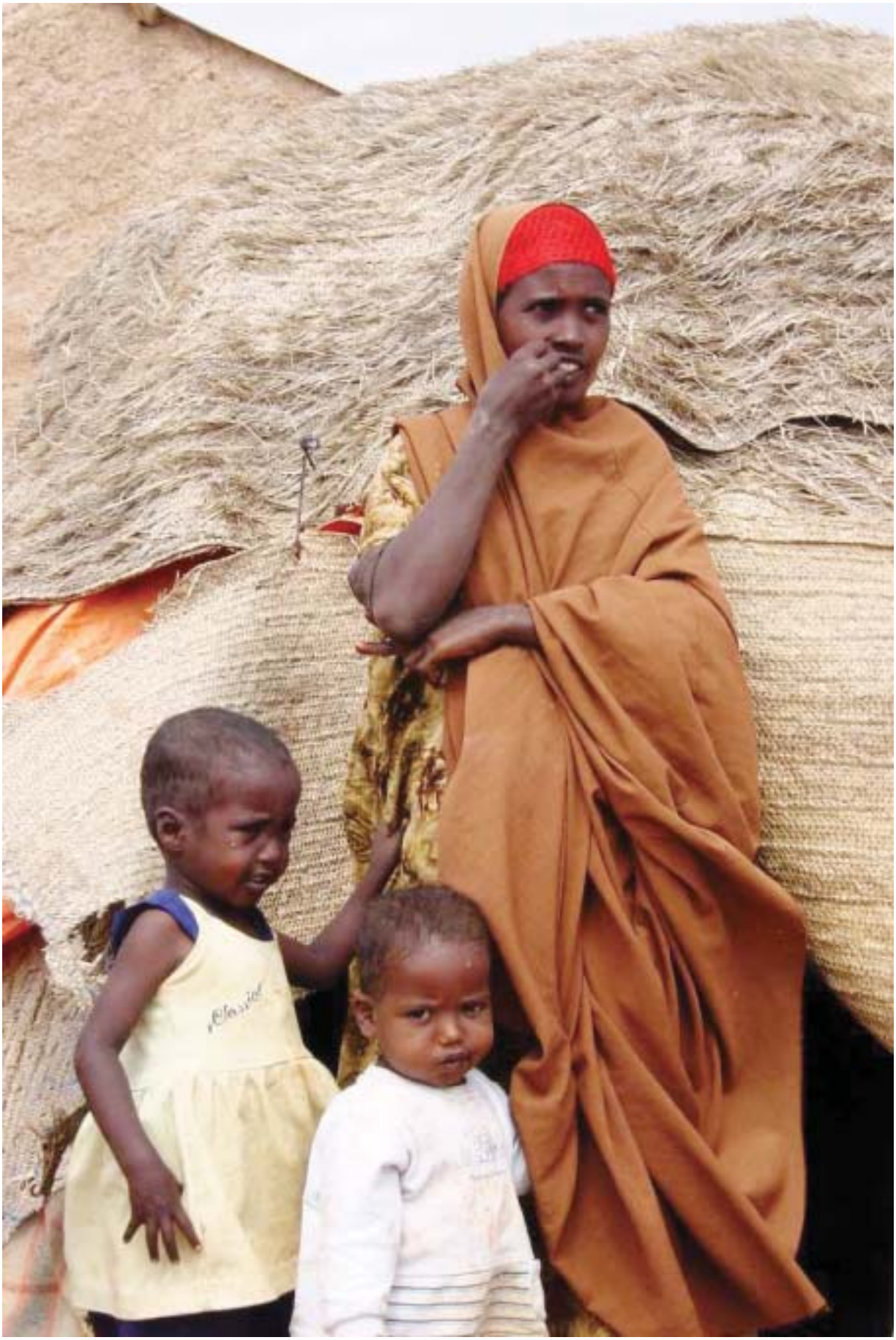
Monitoring and evaluation assesses the nutritional performance against set objectives. It ensures that the planned activities are conducted accordingly. Project monitoring is continuous and focuses mainly on short-term activities and results. Evaluation on the other hand is periodic and focuses on the achievement of the project objectives and the impact of the project.

Monitoring can therefore be defined as the continuous process of collecting information and presenting data, through out the project cycle, in order to assess the impact and lead to improvements in the effectiveness of the program.

Evaluation focuses on:

- Relevance
- Appropriateness
- Effectiveness and efficiency
- Timeliness and management of the project
- Achievement of the project overall goal
- Lessons learned for future planning

Nutrition provides us with both a tool and a forum to monitor and evaluate interventions.



Mother with two children, close in age (photo by FSAU)

2 Understanding nutritional vulnerability

2.1 Overall concepts related to nutrition

Food insecurity and therefore nutritional vulnerability is complex. It is attributed to a range of factors that vary in importance across regions, countries, socio-economic groups and time. These factors can be grouped into four areas of potential vulnerability:

1. Socio-economic and political environment
2. Food security
3. Care practices
4. Health and sanitation

Fragile socio-economic and political environment, food insecurity, unfavourable care practices and health environment lead to a cycle of malnutrition and further inadequate intake of energy and other nutrients. The conceptual framework in this chapter illustrates how key factors interact to influence nutritional status.

2.2 Nutritional vulnerability

Nutritional vulnerability occurs when consumption and utilization by the body of food of adequate quality and quantity is threatened. This can occur during period of food insecurity, high incidences of communicable diseases or when care is substandard (as a result of destitution, illiteracy, displacement or tradition).

In any population or sub group, some members are at higher risk of becoming malnourished, usually with more serious consequences. They include:

- Infants and young children (due to their proportionately high demand for nutritional requirements). Consumption of

Children with their mothers awaiting nutrition screening (photo by FSAU)

Pastoral livelihood (photo by FSAU)

inadequate proteins, calories and micronutrients retard growth and development, often irreversibly.

- Pregnant and lactating mothers (nutrient requirements increasing during pregnancy due to physiological changes associated with the growing foetus). Malnutrition has a direct impact on maternal and infant mortality and morbidity.
- The elderly. (Diminished sense of taste and isolation affect dietary intake) Malnutrition causes general ill-health and early debilitation due to osteoporosis.
- Those with chronic disease.
- Socially marginalised groups including displaced and orphans.

2.3 Conceptual framework for understanding possible causes of poor nutritional status

Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status.

A number of frameworks are in use, each assisting in the development of a better understanding of the possible causes of malnutrition. The most popular of these are the FIVIMS Framework shown here and the UNICEF Framework (Refer to appendix 6). With slight variations in the approach used, both demonstrate the need to examine a wide range

of factors during analysis. Both frameworks point to the importance of addressing the problem of malnutrition using broad multi-sectoral approaches. As shown in the framework diagram, the possible causes of low food consumption and poor nutritional status falls under the following headings:

2.3.1 Socio economic and political environment

At the national level, socio-economic and political environmental issues include:

- population (movement, characteristics/ dynamics),
- education (institutions, policies and levels),
- macroeconomic factors (inflation rates, money supply and employment levels),
- natural resource endowment (productive land, minerals, forests, water bodies like. rivers for irrigation or sea ports),
- market conditions (availability of market channels for local produce and operation of such markets) and
- the agricultural sector (livestock condition and productivity, crude or mechanised crop farming).

The political environment determines the appropriateness of all the above factors. Allocation of resources and investment in the economy largely depends not on the political will but also on the political condition.

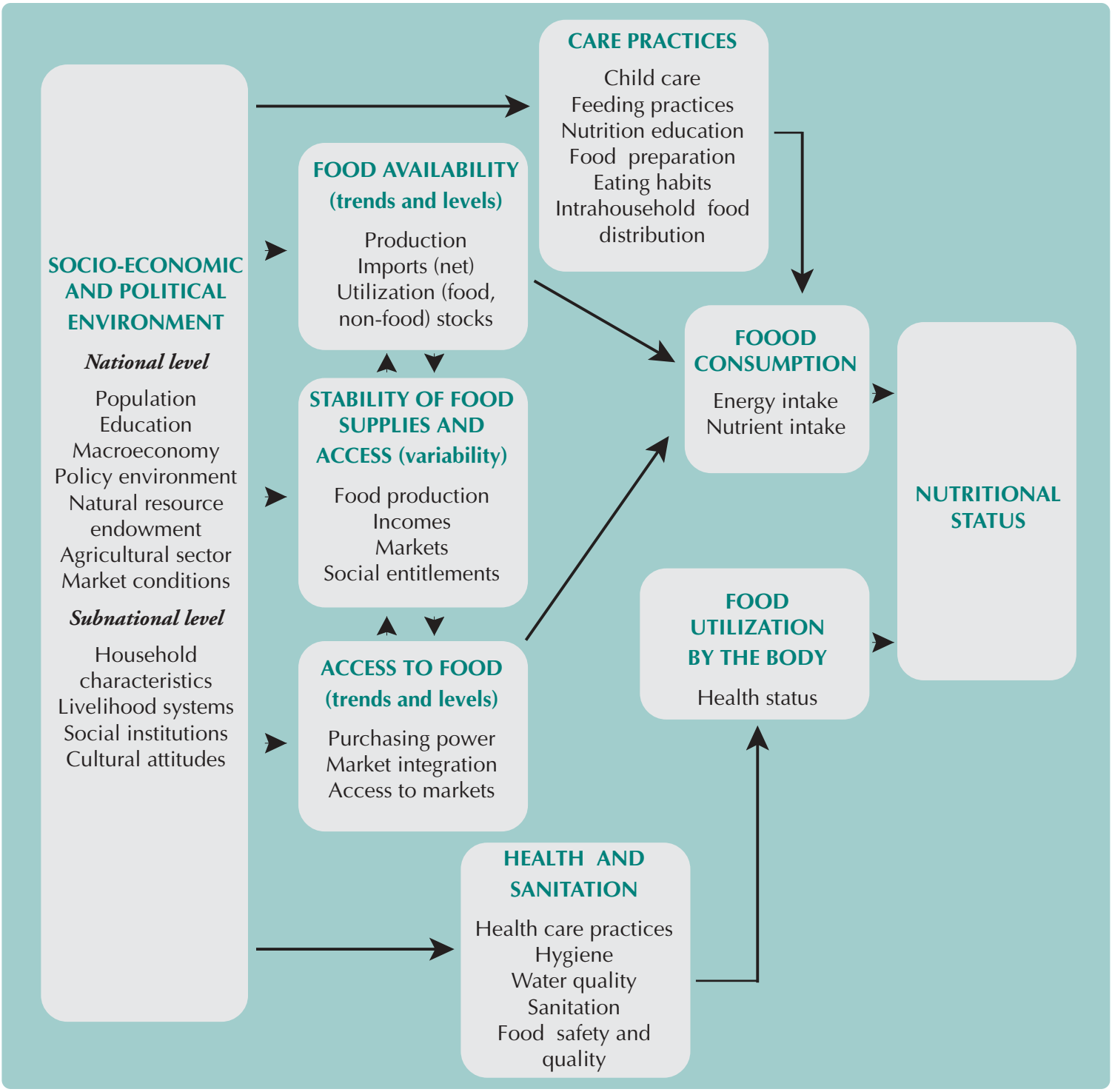
In Somalia where the political climate has been fragile, there are high levels of illiteracy. There are few institutions and policies in place to address agriculture. Few powerful clan leaders and businessmen mainly influence money supply and inflation. These factors directly affect the food security, health services and general development of the country.

At sub-national or regional level, cultural attitudes towards what to eat, what to own; the social institutions like clan set-up and relationships, livelihood systems (agro-pastoralists, pure pastoralists and pure crop producers) and household characteristics such as proportion of working adults affect food security.

In Somalia, the main livelihood systems include pastoralism, riverine, agro-pastoralism and urban. Riverine are normally more permanent and prone to heightened food insecurity and nutritional vulnerability. This results from localized seasonal rainfall and crop production failures. Pastoralists who may have the option of moving to a different locality where water and pasture are available, are less vulnerable to food insecurity.

A pastoral household migrating due to stress (photo by FSAU)

Figure 1 FIVIMS Nutritional status conceptual framework



2.3.2 Food security

Food security has been defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life. Thus, **food insecurity** is a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at the household level. It may be chronic, seasonal or transitory.

Sale of livestock products e.g. milk as one of the income sources (photo by FSAU)

Among chronically food insecure people, both macro- and micronutrient deficiencies are likely to be present. Diversification of diets is usually sufficient to redress these imbalances, but the cost is often too high. People may experience nutritional imbalances even when obtaining sufficient dietary energy.

Food security has three basic components—food availability, food stability and food access although some frameworks also include food utilization.

Food availability

Food availability is a factor of production capacity, amount of imports and amount that is normally used at a given period in time and of the availability of storage. Food availability is also influenced by the availability of seeds, pest infestation/attack, weather conditions, availability of pasture, land acreage under cultivation, labour availability and insecurity issues. The amount of food used by households, traded or stored, all influence food availability at the household level.

In Somalia, there have been varying weather conditions characterized by frequent localized droughts. The droughts have reduced the people's capacity to produce food (crop and livestock production) in some areas. Infestation of crops by insects and pests like quela quela has also affected the food production. In the urban centres of Somalia the presence of imported food commodities is common.

Food stability

Food stability is influenced by both supply and access factors. Seasonal fluctuations in production and access are a major feature in Somalia. There are many incidences of recurrent localized droughts, unpredictable weather changes and seasonal employment opportunities. These factors affect income opportunities for the Somalia population. As a result, there are variations in food production, food prices, export prices of food items, movement of food commodities, and changes in production techniques.

During the 'hunger gap' period in southern Somalia (between late May and early July), food intake is low. Malnutrition and food insecurity is normally heightened unless the stored stocks from previous harvests were substantial.

Food access

Many factors affect people's access to food. These include:

- Cultural factors. (when women are not 'allowed' to eat certain foods)
- Reduced purchasing power (where households can't afford the food in shops/markets)
- Logistical/geographic obstacles to markets (rivers becoming impassable)

- Insecurity (food may be in the market but the market may be inaccessible because of fighting)

In Somalia where a significant proportion of the population is considered poor (especially in urban centres) accessibility to food is a major problem even when food is available in the markets. For instance, in 2003 there was a significant deterioration of food security and nutritional status of the population in Sool plateau of Northern Somalia. Food items remained largely available in the market. The prices were relatively low but the population could not access the food as all their income sources had been depleted by recurrent droughts.

Household food access is also determined by seasonal patterns. For instance, the main food crop produced may not be sufficient to meet the household needs at all times. Among pastoral communities, milk production varies with rainfall and availability of grazing lands. Furthermore, opportunities for employment, migration and the availability of fish and wild foods are often highly seasonal. Household income and expenditure may vary according to season hence affecting food consumption patterns.

Coping strategies

Coping strategies are means adopted by populations to survive a change for the worst in their circumstances. They save the population from deterioration of their well being. In Somalia, this could be in the light of income sources, food access, movement from problem areas, as well as other resilience in lifestyle. Household members may split, move, change foods consumed or sell their assets.

Water catchment, a common water source in Somalia
(photo by FSAU)

2.3.3 Health, water and sanitation

Practices that promote and maintain good health in the population are influenced by a number of factors including knowledge and environment. During ill-health, these practices include seeking health services from qualified personnel; access to health services; as well as control and treatment of communicable diseases.

The poor health of individuals is normally associated with the inability to engage in meaningful productive activities, and higher expenditures on treatment at the expense of food items. Poor health increases vulnerability to food insecurity and therefore nutritional vulnerability. There is also a synergistic interaction between malnutrition and poor health status as one fuels the other.

Sanitation issues like disposal of human waste, disposal of garbage and cleanliness of the household environment affect the health of a population. Sanitation is especially important in urban areas where people are relatively congested. Poor sanitation results in disease outbreaks and also interferes with food consumption and utilization.

Water availability is also an important indicator of food security. Access to sufficient quality and quantity of water is essential to nutritional security. Households require water for chores like cooking, cleaning clothes and drinking. This water must be safe for consumption and sufficient in quantity. Distance to water points determines the amount of time dedicated to other productive activities like childcare.

In Somalia, the main water sources are open wells, berkards, boreholes and rivers. A significant proportion of these sources are unprotected and are prone to contamination. Consumption of contaminated water predisposes humans to diarrhoea, diseases that interfere with food absorption. Furthermore, drinking water sources are commonly shared with animals thus increasing the possibility of contamination. The problem becomes acute during dry seasons. In wet seasons, there is often flooding along the riverbanks. The floods not only destroy crops but are also a breeding place for mosquitoes.

A severely malnourished child (photo by FSAU)

2.3.4 Care practices

The environment, tradition and practices within the household and the community influence nutritional status. Good care at the household level ensures that the food and healthcare resources provided to individual members result in optimal survival, growth and development. Care practices vary with age and culture. Beneficial practices need to be supported and harmful practices need to be discouraged. In Somalia, care practices like the provision of inappropriate liquids to infants immediately after childbirth, delays in starting to breastfeed and discarding of colostrum impact on a child's nutritional status.

Care practices involve:

- Psychosocial care: Responsiveness and attention to the needs of individual household members
- Food preparation (cooking and presentation methods, hygienic storage).
- Hygienic practices. (bathing, hand-washing, food hygiene, hygiene of clothing, bedding, contact environment).
- Home health practices. (Promotion of good health, home remedies and management of common ailments, recognizing ill-health, deciding to seek assistance
- Specific care during periods of vulnerability e.g. childhood, pregnancy, illness.
- Intra-household food distribution. Ensuring that needs of all household members are met, prioritizing the vulnerable members.
- Eating habits: This dictates the quantity, type of food and frequency of eating. For instance, pastoralists normally do not eat vegetables if animal products are available.

Care resources

Caregivers need the following resources to provide adequate attention and focus on children.

- Human resources: Caregiver's knowledge, beliefs, education and the ability to put knowledge into practice.
- Economic resources: Finances and time required for the provision of adequate care.

- Organizational resources: Alternative caregivers and community arrangements to facilitate care practices.

2.3.5 Food consumption

Food availability, stability, accessibility and care practices influence the amount (quantity) of food consumed, variety (diversity) of the diets, frequency of consumption, quality of food, proportion of cereals and of other essential foods in the diet.

While the intake of energy is important in the diet, other nutrients such as vitamins, proteins, and minerals are also required. Nutritional wellbeing is determined by the proportions of essential nutrients in the diet. Micronutrient deficiencies are common even in areas where macronutrient intake is adequate and stable. Hence food diversity in the diet is an important pointer to nutritional security.

2.3.6 Food utilization in the body

Eating enough food may not necessarily lead to nutritional security. The food eaten must be utilized by the body for nourishment. The health status of an individual influences food utilization by the body. Illness often leads to increased dietary requirements for body repair of tissues damaged by the disease and to cater for increased loss of nutrients caused by the disease condition, malabsorption of nutrients, altered metabolism and loss of appetite. Poor health also leads to poor appetite thus reducing intake. Measles, diarrhoea, HIV/AIDS, tuberculosis (TB), and respiratory infections have a major influence on an individual's nutritional status. Undernourished children are also likely to be ill more often due to their inability to resist or fight infections.

Variety of food in the diet also influences food utilization in the body. Due to inter-nutrient interaction, some foods enhance the absorption of others for instance fruits, vegetables and oil enhance the absorption of some proteins and cereals. Foods can also interact negatively as in the case of tea inhibiting the absorption of iron, or sugar upsetting the calcium: phosphorus balance, leading to increased calcium reabsorption from the bone tissue, and resulting in depleted bone density.

2.3.7 Nutritional status

The complex interaction of different factors within the framework is finally reflected in the welfare or nutritional status of an individual or the population. ***Good Nutrition*** is therefore an outcome of the individual or population receiving and utilizing the appropriate diet. This diet maintains normal functions in processes like growth, maintenance of tissues, resistance to disease and participation in active physical work.

Malnutrition on the other hand, is an imbalance or deficiency of nutrients in the body. It is a condition caused by inadequate intake or inadequate digestion and utilization of nutrients.

2.4 Summary of the framework

The main issues that arise from the framework are:

- Poor nutritional status or malnutrition results from a complex set of elements and not one simple cause.
- Food, care and health are all necessary conditions, but not sufficient on their own. They must also be linked to the socio-economic and political environment.
- The different elements that cause malnutrition interact with one another.
- The framework can help to analyze and understand the causes of poor nutritional status
- Poor nutritional status or malnutrition cannot be overcome by 'simply' improving access to an adequate diet. This would only solve one or a part of the problem. Diseases and infections, poor maternal health and childcare practices may be as important a cause of malnutrition as inadequate food intake. Solutions are not found on one level only. Different levels need to improve at the same moment.
- Understanding the cause of nutritional vulnerability and malnutrition will enable decision makers to address both the underlying and the direct factors that influence nutrition.

3 Measuring nutritional status

Nutritional assessment is the process of evaluating the nutritional status of an individual. Four methods are available that can be referred to as the 'ABCD' of nutritional assessment.

1. Anthropometric assessment
2. Biochemical or laboratory assessment
3. Clinical assessment
4. Dietary Assessment

3.1 Anthropometric assessment

Anthropometry is the measurement of the body's physical dimensions. The physical dimensions are used to develop an understanding on an individual's nutritional status. The following measurements are commonly used.

Weight: Changes in weight among young children can be a useful indicator of the general health and wellbeing of the entire population.

Under certain special circumstances however, it may be essential to measure other age groups.

Height/Length: Height or length of children changes over time and is dependent on their nutrient intake and utilization.

Mid Upper Arm Circumference (MUAC): These are rapid and effective measures that predict risks of death among children aged 12 - 59 months. MUAC is a useful screening tool for determining children at risk in emergencies.

Body Mass Index (BMI): Is a useful tool when measuring an adult's nutritional status. Weight and height measurements are taken, then used to compute the index. Use of BMI in older people can be unreliable as accuracy in height may be impeded by age-related factors like spinal curvature. MUAC is therefore an appropriate measure since is relatively independent of aging.

Oedema: Abnormal accumulation of fluid indicating severe malnutrition.

Age as an indicator

Age is used to develop nutritional indicators in combination with certain anthropometric measurements like height and weight. For nutritional assessment in emergencies, children less than 5 years are commonly measured since their measurements are more sensitive to factors that influence nutritional status such as illness or food shortages.

Anthropometry related indicators

The body measurements of weight, height and age are converted into nutritional indices. To generate the indicators, any of the two variables measured are related. That is, weight, height and age as follows:

- Weight for height
- Weight for age
- Height for age

Weight for Height/Length (W/H)

- measures 'wasting' or 'acute' malnutrition

- Expresses the weight of the child in relation to the height.

- In children under 5 years of age, the relationship of weight to height is almost constant regardless of their sex or race and follows a constant evolution as they grow. Internationally accepted reference values of weight-for-height for under five-year-old children are available.
- Body weight is sensitive to rapid changes in food supply or disease, while height changes very slowly.
- Low weight for height is characterized by wasting and loss of muscle fat. It is an indicator of thinness and identifies acute malnutrition.
- This is the most useful index for screening and targeting vulnerable groups in emergencies. It is a useful indicator for admissions and discharge in and out of feeding programs.
- Alongside oedema, it is the most appropriate index used to detect existing malnutrition or recent onset of malnutrition in the population.

Height for Age (H/A)

- measures "stunting" or chronic malnutrition

- It is a measure of chronic malnutrition. That is, long-term and persistent malnutrition normally associated with long-term factors such as poverty and frequent illness.
- A child's height is compared to the median height (length) of the reference population of the same age and sex to give H/A index. Children falling below the cut off point of –2 SD from the median of the reference population are classified as too short for their age or stunted.

Weight for Age (W/A)

- measures underweight

- It conveys the weight of a child in relation to the child's age.
- WH index is a useful index for monitoring growth and development of children.
- When used in growth monitoring at health facilities, a child's W/A is commonly plotted on the Road to Health growth chart. This allows for better understanding of the child's positive or negative growth.
- At population level, the measurement indicates the total proportion of underweight children.

Oedema

- It is the abnormal accumulation of large amounts of body fluid in the intercellular tissues.
- It is a key clinical feature of severe malnutrition and is associated with high mortality rates in children.
- Oedema increases the child's weight. It therefore tends to hide the true picture of the nutritional status of the child.
- All cases of oedema should be separated from the rest of the respondents during analysis and treated as severe acute malnutrition.
- Oedema should always be used as a major criteria for admission into therapeutic feeding programs.

Mid Upper Arm Circumference (MUAC)

- MUAC measurements are a good predictor of immediate risk of death.
- It is an initial screening tool in feeding programs as it is simple and fast to use.
- It is useful when access to population is difficult, resources limited or when WH measurement is not possible.
- MUAC results provide indications for nutritional status and are less accurate.

Taking anthropometrical measurements (see appendix 1)

3.2 Biochemical methods

This is a measure of nutrients in blood, urine and other biological samples. Compared to other methods, biochemical methods of nutritional assessment provide the most objective and quantitative data on nutritional status. The usefulness of biochemical tests is that they provide indications of nutrient deficits long before clinical manifestations and signs appear.

Biochemical tests are also important in validation of data especially where respondents are under-reporting or over-reporting what they eat. These tests are therefore particularly useful in complementing and validating dietary intake surveys.

The major disadvantages of biochemical methods is that they are complex, expensive and require a high level of expertise.

3.3 Clinical assessment

Clinical signs in the assessment of nutritional status result from both lack of nutrients and non-nutritional causes. Signs and symptoms should be investigated and combined with anthropometrical, dietary evaluation and biochemical tests for accurate analysis and interpretation of data.

Clinical assessment involves:

a) medical history,
b) dietary history and
c) physical examination by a health professional to identify signs and symptoms associated with malnutrition.

The medical history of the respondent is the first step in clinical analysis. This can be obtained by:

- Finding out the respondent's past and present health status. Many diseases such as malaria, measles, tuberculosis and HIV/AIDS can affect the nutritional status.
- Identifying conditions such as diarrhoea and lack of appetite.
- Evaluating a child's age, or a woman's obstetric history.
- Analysing socio-economic support and access to healthcare.

Dietary history includes determining the respondent's eating habits. For instance timing and frequency of meals, tastes, allergies, ability to access food physically and economically, how food is prepared and how food is distributed at household level.

3.3.1 Detection of malnutrition during clinical assessment

Acute malnutrition

This is a classical form of malnutrition related to low intake of energy-giving foods and proteins in the body. Acute malnutrition is the most common form of malnutrition. The term covers a range of clinical disorders that occur as a result of an inadequate intake of energy, protein and other nutrients. The most severe clinical forms of acute malnutrition are marasmus and kwashiorkor. These conditions are characterized by growth failure. Acute malnutrition has a wide range of manifestations that range from weight loss (thinness) to stunting (shortness) or a combination of both.

Marasmus: This is a very serious form of acute malnutrition characterized by severe weight loss or wasting. Marasmus is a condition commonly associated with low intake of energy-giving foods. It requires immediate treatment.

Kwashiorkor: This is a very serious form of acute malnutrition characterized by oedema, apathy and loss of appetite. It is a condition commonly associated with low intake of proteins or inadequate synthesis of proteins in the body. The condition requires immediate attention.

Oedema

This is fluid accumulation in the body as a result of severe nutritional deficiency. Bilateral oedema is an indicator of acute malnutrition and may be detected by pressing the thumb on the feet just above the ankle for three seconds. This will leave a dent.

Bilateral oedema is a manifestation of severe acute malnutrition and requires immediate treatment.

Micronutrient deficiency

This is a deficiency that results from the inadequate intake of nutrients required by the body in minute quantities for the normal function of the body. The main micronutrient deficiencies of public health concern are Iron Deficiency Anaemia (IDA), Vitamin A Deficiency (VAD), Iodine Deficiency Disorder (IDD) and Zinc deficiency. These deficiencies may cause permanent damage to health and even death.

Outbreaks of other types of micronutrient deficiencies occasionally experienced in emergencies include vitamin C (scurvy), niacin (pellagra) and thiamine (beriberi).

Signs and symptoms of malnutrition

	Clinical assessment	Possible nutritional deficiency
Hair	Dull, dry, brittle, wire-like Thin, wider gaps between hairs Lightening of normal hair colour Can be pulled out easily	All associated with acute malnutrition
Eyes	Bitot spots Dry greyish yellow or white foamy spots on whites of the eye.	Vitamin A deficiency
	Conjunctival Xerosis. Inner lids and white of eyes appear dull dry and pigmented.	Vitamin A deficiency
	Corneal Xerosis Cornea (coloured part of the eye) becomes dull, milky, hazy, opaque.	Vitamin A deficiency
Teeth	Mottled Enamel White or brownish patches in tooth enamel; pitting of enamel most obvious in front teeth.	Excessive fluorine
Gums	Purplish, red, spongy and swollen. Bleed easily with slight pressure	
Glands	Enlarged Thyroid. May be visible or felt. More visible with head tipped back	Iodine deficiency
Subcutaneous	Oedema	Sodium and water retention
Tissue	Bilateral swelling usually of ankles and feet first.	associated with acute malnutrition
Bones	Knock-knees - Curve inward at knees Bowlegs - Legs are bowed outward.	Past Vitamin D and Calcium deficiency
	Osteomalacia	Calcium deficiency
	Tender and brittle bones in adults Joint pain	 Possible Vitamin C deficiency
Muscles	Muscle wasting	Associated with severe acute malnutrition
	Excess folding of skin under buttocks	
Skin	Dry or Scaly skin; cracking, yellow pigmentation	Vitamin A, Zinc, and Vitamin C deficiencies.
	Pellagrous dermatitis	Niacin deficiency
	Flaky paint dermatitis	acute malnutrition
Other	Poor wound healing	Associated with Zinc deficiency
	Weakness and fatigue	Iron and Vitamin B1 deficiency

Children of school going age engaged in herding rather than attanding school (photo by FSAU)

3.4 Dietary methods

Dietary methods generally involve the assessment of food consumption over a period of time. In nutrition surveillance, the dietary assessment involves identifying food availability, accessibility, who consumed and at what frequency. Data on foods consumed assist in the identification of nutrient intake. Interpretation of dietary intake involves use of food consumption tables. Nutrient intake in dietary methods is used to complement anthropometry, biochemical or clinical data.

Analysis of dietary intake involves:

- grouping of foods according to a predetermined system (e.g. FAO or USDA) to determine diversity
- Determining the frequency of consumption of foods in each food group.
- In some circumstances, based on this baseline and the level of acute malnutrition, using regression analysis to project the level of acute malnutrition in foreseeable circumstances

Food frequency recall

This is an assessment method commonly used in nutrition assessments or surveys to determine dietary intake. It involves establishing the frequency of which certain types of foods (those of particular interest in the survey) are consumed over a specified time-frame normally a week or two. It is easier to administer than the 24-hour recall method. The frequency of consumption could be coded as:

a) 'Frequently consumed' - food item consumed once a week to many times a day.
b) 'Not frequently consumed' – food item consumed no more than twice a month
c) 'Never Consumed' – food item not consumed at all.

The 24-hour dietary recall

In this method, the respondent is asked to remember in detail the type and quantity of foods consumed during the previous 24 hours. Asking respondents about their activities during the day can assist in recalling what they ate and provides valuable information in estimating the level of activity and energy expenditure. The values of these measurements are converted into grams or millilitres (drinks and beverages). The amounts of various nutrients are then calculated using the food composition tables and/or nutrition computer packages designed for this particular nutritional assessment method.

The method is reasonably quick and inexpensive but respondents may withhold or alter information about what they ate due to embarrassment or to influence the research. To develop an understanding of seasonality, the assessment should be repeated at intervals throughout the year. (see Appendix 3)

An enumerator interviewing a mother during a nutrition survey (photo by FSAU)

4 Methods of nutrition surveillance and analysis

4.1 Current sources of information on nutrition

Nutrition surveillance undertaken by FSAU and partners utilizes a diverse range of information sources on nutrition. These include nutrition surveys, health facility information, rapid assessments and sentinel site surveillance (being developed). Information on the wide range of factors affecting nutrition is also collected from partners in other sectors including, health, food security, water and security.

1. **Nutrition surveys:** Use weight for height indicator and standard survey methodologies as per nutrition survey guidelines for Somalia. These methodologies are endorsed by the Nutrition Working Group of the Somalia Aid Coordination Body.
2. **Health facilities:** Currently there are around two hundred health facilities throughout Somalia. Over one hundred of these health facilities collect nutrition data on a monthly basis through anthropometrical measurements of children under the age of five. Nutrition data collected from these facilities serves as an early-warning indicator in case of a crisis. The health facility data also indicates trends in malnutrition rates over a period of time. Health facility data are not representative of the entire population given that not all children are brought to the health centre. Caution should therefore be exercised when interpreting this data.

   Some of the health facilities provide therapeutic and supplementary feeding services to severely and moderately malnourished children, respectively. The trend of admissions and re-admissions may be a pointer to the incidences of acute malnutrition in the facility's catchment area.
3. **Rapid assessments:** These are mainly carried out on an ad hoc basis and are useful when nutrition information is urgently needed or when resources for carrying out a nutrition survey are limited. A combination of methods is used to conduct rapid assessments. MUAC is one of the methods of data collection during rapid nutrition assessment.
4. **Sentinel site surveillance:** This involves surveillance in a limited number of sites or population for the purpose of detecting trends in the overall well being of the population. The sites may be specific population groups or villages which cover populations at risk. FSAU usually undertakes this in highly vulnerable areas that require close monitoring. Trends are monitored for various indicators including nutritional status, morbidity, dietary issues, coping strategies and food security. In Somalia, sentinel sites surveillance has been undertaken in parts of Sool, Sanaag, Nugal and Bari regions.
5. **Dietary assessments:** These are part of nutrition surveys and sentinel site surveillance. The general objective is to obtain information on the overall adequacy of the diet consumed by households.

   The 24 hour recall method is used to determine dietary intake. Depending on the objective of the dietary assessment, actual estimates of amounts of food consumed may be determined through weighing or volume estimates

4.2 Data collection methodologies

Information on nutrition can be collected using either quantitative or qualitative research methodologies. ***Quantitative approaches*** provide actual statistics on nutritional status while qualitative research methodologies offer explanations into the actual causes of malnutrition. The use of both approaches is required to develop a useful understanding of the nutrition situation in any population.

Qualitative research explores, discovers; asks why, how and under what circumstances. It involves respondents as active participants rather than subjects. The investigator is an instrument of research. In qualitative research, there is the participant who contributes the information and the researcher who guides the research process

A survey team member reviewing health facility information (photo by FSAU)

and knowledge generation. These two are essentially partners and the process towards knowledge generation is based on mutual trust and understanding of a common goal.

4.2.1 Nutrition survey

Standard survey methodology is used in all surveys. Guidelines are available from the Nutrition Working Group of SACB

During a survey, anthropometric and other quantitative data are collected on individual children. Sampling procedures are used to ensure that the children are representative of the whole population. Qualitative data on nutrition and related factors are collected to enable an interpretation of the quantitative data collected.

Issues of interest in planning a survey

A nutrition survey is used to determine the nutritional status of a population when:

- No major differences are expected between the various groups in that population
- Access to all populations in the area of interest is possible to ensure that random sampling is undertaken

Remember:

- A nutrition survey will provide one result that is relevant to the whole area surveyed; it is not possible to break down the results by cluster and to draw conclusions for use in targeting
- Nutrition surveys require a serious investment in time - around one month and in budget.
- The survey should never be attempted without the support of technical expertise during planning, implementation and analysis.

Main functions of a survey

- To establish a baseline
- To measure impact of impending or actual food insecurity on population
- To measure progress or impact of nutrition projects

Steps in conducting a nutrition survey

1. Plan the survey
2. Administer the survey

Plan the survey

Successful planning is guided by the following principles:

i. **Review existing information** related to the anticipated survey area. In particular, determine the nutritional and health status, socio-economic background, food security, cultural issues, geographic location, population and settlement patterns. Such information is useful in understanding the actual nutrition problem, defining appropriate objectives, selecting relevant resources,

planning for adequate equipment and developing the survey schedule.

ii. **Identify survey goals and objectives.** Set objectives for the survey to ensure effective outcome of the survey results. All nutrition surveys should be guided by clearly stated objectives. The survey coordinator needs to know:
   - Why is the nutrition survey being conducted?
   - What types of nutrition information are needed?
   - How will the survey information be used?

iii. **Identify survey indicators.** It is important to establish a range of variables well in advance. The survey indicators include anthropometric indicators and mortality data with the possible addition of morbidity prevalence, infant feeding, care practices and household food consumption patterns.

iv. **Selecting survey methodology.** Is important to determine the type of the survey design during planning. For example, is the survey focusing on all households in the project area or targeted populations only?

v. **Select survey sample.** When dealing with large population groups it is not possible to survey the entire population due to cost and time constraints. For this reason, a portion of the population is selected. This proportion of the whole population is the ***sample***.

   Four main ***sampling methods*** are used (See appendix for details)
   1. Two-Stage Cluster sampling
   2. Random sampling
   3. Systematic sampling
   4. Stratified sampling

vi. **Identify types of personnel, equipment and resources** needed for conducting the nutrition survey.

vii. **Agree on roles and responsibilities of partners.** Ensure that partners in all sectors are involved in the survey.

viii. Plan a detailed time and **activity schedule** to be completed within the set time frame and cost.

A enumerator pre-testing data collection instruments (photo by FSAU)

ix. **Develop data collection instruments** like questionnaires, focus group discussion guides, interview schedules and observation checklists.

x. **Pre-test** the data collection instruments.

Administer the survey

- The plans are translated into actions and include:
- Logistical arrangements
- Selecting the survey team
- Training research personnel
- Supervising the survey process
- Data collection activities like anthropometric measurements
- Selecting appropriate data processing methods and ensuring quality control procedures
- Analyzing data using appropriate statistical tools
- Interpreting data
- Report writing
- Discussing findings and recommendations
- Sharing the survey findings with partners

On completion of the survey, there is need to follow up with stakeholders on how to use nutrition data generated from survey;
Implement nutrition survey recommendations continue monitoring and evaluation of the situation.

Weight measurment during a nutrition survey (photo by FSAU)

Interpreting nutrition survey data

Cut off points for indicators of malnutrition

Description of Nutritional Status	Weight for Height Index		Oedema	MUAC
	W/H % of the Median	Z Score (SD)		
Severe Acute Malnutrition	< 70%	<-3 Z scores (less than minus 3)	Present	<11 cm
Moderate Acute Malnutrition	≥ 70% and < 80%	Less than - 2 Z-scores BUT greater than or equal to -3 Z-score		<12.5 cm ≥ 11 cm
Global / Total Acute malnutrition (moderate plus severe)	< 80%	<-2 Z scores	Present	<12.5 cm
Normal	≥ 80%	≥-2 Z-scores (Greater than or equal to -2Z-scores)		≥ 13.5 cm
At risk				<13.5 cm ≥ 12.5 cm

≤ means less than or equal to; < means less than; ≥ means greater than or equal to

**The presence of oedema always implies severe malnutrition.*

Classification of global acute malnutrition using Z- scores

The following classifications for malnutrition have been established by WHO as levels for interpreting weight for height Z-score in emergencies.

Global Acute Malnutrition W/H Z score	Interpretation
< 5%	Acceptable level
5 – 9.9%	Poor
10 – 14.9%	Serious
> 15%	Critical

Mortality assessment

In Somalia, mortality data has been concurrently collected during standard nutrition surveys (as described above). Mortality data collection uses the same methodology except that while the nutrition data requires thirty under-five children in each cluster (which might be found in twenty households), mortality data collection will require a minimum of thirty households. The mortality questionnaire is administered to a responsible member of that household and death statistics are collected retrospectively. The recall period commonly used is three months. All households encountered in the sampling process for under-five children should be included until the desired sample size is attained regardless of whether a child below the age of five is present or not as a household with no children could indicate that a child or children had died prior to the survey.

Classification of mortality data

Indicator	Definition	Interpretation
Crude Mortality Rate (CMR)	An estimate of the rate at which members of the population die during a specified period. This is the number of deaths from all causes per 10,000 people per day.	<1/10,000/day indicates a situation that is acceptable ≥1 to <2/10,000/day indicates a situation of alert ≥2/10,000/day indicates an emergency situation
CMR=***Total number of deaths over a specified time period* 10,000*** Total estimated population (current)* specified time period in days		
Under Five Mortality Rate (U5MR)	The number of deaths among children between birth and their fifth birthday expressed per 10,000 live births. This is the number of deaths from all causes per 10,000 of under five year old children per day.	<2/10,000/day indicates a situation that is acceptable ≥ 2 to 4/10,000/day indicates a situation of alert ≥4/10,000/day indicates an emergency situation
U5MR= ***Total number of under 5 deaths over a specified time period* 10,000*** Total estimated under 5 population (mid/current)*specified time period in days		

Note:

Anthropometric data alone is not sufficient for analysis and interpretation. Contextual information collected during the survey or from other sources is crucial for an in-depth and broad interpretation of the results. Verification of both qualitative and quantitative data is important.

4.2.2 Rapid assessment

As the name suggests, this is a method used to gather nutrition information within the shortest time possible and is particularly useful in situations where physical access to population is limited or when the speed of the assessment is a major consideration. The results of rapid assessment provide a basis for planning during an emergency. The purpose of rapid assessment is to determine the severity and extent of the nutrition situation without embarking on a full scale survey.

In carrying out a rapid nutritional assessment, Mid Upper Arm Circumference (MUAC) is the commonly used screening tool in measuring malnutrition levels especially in emergencies. MUAC assessments are further complemented by qualitative methods to generate information on such issues as food security, health, environment, and care practices.

Rapid assessments need to involve intersectoral teams and a variety of data collection methods will be required to facilitate triangulation and verification of all information.

Steps in planning Rapid Nutritional Assessment:

- Define objectives of the assessment
- Determine target site, area or population
- Develop most appropriate methods of data collection
- Identify and train personnel to be involved in the assessment
- Assemble materials and equipment needed during the assessment
- Develop the time plan and activity schedules

Using MUAC in Rapid Nutritional Assessment

Like data collection during nutrition surveys, selection of survey children should be as representative as possible. Depending on the size of the population either total population or a sample may be assessed using MUAC. If a sample is to be used, a 30 by 30 cluster methodology will be adopted as used in surveys

or in other random sampling procedure. But since MUAC assessment is rapid, an assessment of all children in selected clusters/villages is commonly used. All children aged 12-59 months in the selected villages are measured.

Data for assessing the nutritional status using MUAC is taken for all children ages 12-59 months. MUAC should be taken by the most experienced member of the team to ensure accuracy in data collection.

Use of MUAC alone is not a sufficient tool for screening during rapid nutritional assessment. Qualitative data is used to complement MUAC using semi-structured interviews with key informants and various groups in the community. Direct observation, seasonal calendars, transect walks, review of documents including health facility records are additional methods used.
*For detailed steps used in Measuring MUAC (See appendix 1)

Using the methodologies described elsewhere in this chapter, information should be collected on the issues influencing nutritional status in all sectors. These will include the following, among other issues:

- Food availability in area under assessment (Is food readily available? What foods are available?)
- Water sources (type, number and status)
- Common diseases in the area
- Accessibility to health services (What is the distance of the health facility from the village?)
- Any livestock movements (If yes, from where to where and what is the reason for that movement)
- Any population movements (If yes, from where to where and why)
- Weaning foods for children aged 6-59 months
- Feeding pattern (usual number of meals per day, current number of meals; usual and current composition of meals
- Security situation

Other methods of information collection used in the analysis of the nutrition data

Focus Group Discussions: Group discussions of 6-12 people that engage in understanding the qualitative aspects of the nutritional status of a given population.

Direct Observation: Involves observing visible indications of malnutrition and related issues that could influence nutritional status like poor environmental health and sanitation.
Key Informant Interviews: Involves interviewing key persons with specialized information on the subject under study like nutritionists, health officers and agriculturalists.
Case study: involves an in-depth and focused study on subjects with similar characteristics like less than 2-year old children with episodes of diarrhoea.
Transect Walks: Observations of all aspects of life in the area of interest during a walk from one edge of the area to the other.
Mapping: Supports focus of questions, identification of resources and understanding of livelihoods.

4.2.3 Health facility data

Nutrition data is collected at health facilities and summarized at the end of each month. FSAU monitors nutrition data from over 100 health facilities. Data from health facilities is entered in the Health Information System (HIS) database. This database also contains components on diseases (morbidity) and immunization. Health facility personnel are encouraged to provide explanations for upward or downward trends in levels of malnutrition among children attending the health facility.

The major limitation of the health facility data is that not all children are brought to the health centre for growth monitoring. The method is therefore not representative of the entire population. Care should be taken when interpreting health facility data.

FSAU undertakes on-the-job training and follow-up support at health facility level that covers the following areas:

- Importance of carrying out nutrition surveillance
- Methods of carrying out nutrition surveillance
- Anthropometric measurement procedures in terms of accuracy and possible errors
- Recording and reporting procedures through use of standard registers and (HIS) forms
- Interpretation of nutrition data using Z scores

- Diagnosis of the causes of malnutrition both at individual and population level
- Integrity of the equipment
- Flow of information
- Growth monitoring process
- Supplementary (SFP) and Therapeutic Feeding Programs (TFP). Data is collected on new and re-admissions, origin and age of the participants.

4.2.4 Sentinel sites surveillance

The sentinel sites are purposively selected in highly vulnerable areas following a predefined criterion. Selection of households in each site is then undertaken in a random manner and a household questionnaire administered in each by FSAU staff in collaboration with key partners and community assistants on the ground. Qualitative data is collected through focus group discussions, key informants and observations. Data analysis is further undertaken using EPIINFO and Microsoft Excel. Trends observed on the key indicators especially nutritional status indicate the sites for continuation in monitoring.

4.2.5 Dietary assessments

A section of the household survey comprises of a table on dietary intake data collection. The respondents are required to recall the foods consumed in the previous 24 hour.

Key issues like food frequency, types of food groups consumed and the relationships between malnutrition and dietary diversity are investigated. At the analysis stage, diversity of the diet is determined by analysing the range of food groups consumed during the recall period.

4.3 Qualitative data

Qualitative research techniques:
A number of qualitative research techniques are used for nutrition studies. They include:

_ Focus group discussions
_ In-depth interviews
_ Case studies
_ Observational studies
_ Experience survey

Focus group discussions

In a focus group discussion, the interviewer acts as a moderator/facilitator of the group discussion process, his/her role involves introducing the topics, probing questions and eliciting responses from the respondents. The moderator's role should be passive and should not dominate the discussion.

Focus groups are composed of people with common characteristics such as age, sex, social or economic background. Interaction is best within a small group of participants ranging from six to twelve persons. Every participant is encouraged to express views. The type of response generated from the discussions determines the quality and interpretation of results.

In-depth interviews

This is an exchange between the interviewer and the respondent that allows investigation at a greater level of detail. The interview probes for feelings, attitudes, opinions and views. It requires the interviewer to be skilled in the questioning technique so as to elicit the required response.

A team examining existing documents during a nutrition assessment (photo by FSAU)

Both the interviewer and the participant work together in a relaxed setting, a conversation is created by making participants talk freely on an identified topic.

Observation

It involves watching people and events to see how something happens rather than how it is perceived. This is called direct observation. In nutrition studies, one can observe child caring practices or child feeding practices in a given household over a period of time without interviewing that family.

Direct observation can be used to confirm information that respondents may provide on the same matter. Observations are useful for overcoming contradictions provided in interviews by respondents.

In most observation sites such as the health facility, the researcher should prepare a list of things to observe. What is seen or heard will give meaning and new insights into a nutritional issue being investigated. The observation process should be discreet.

Documentary evidence

This involves analyzing existing material for a special purpose such as the creation of a database. Content analysis can be used to determine a trends analysis in nutritional status over a period of time, examine food patterns and habits across communities, food and nutritional policy, cultural beliefs and practices concerning food consumption.

Case study

The study concentrates on the history and the 'story' of a specific individual or situation. Factors that contribute to malnutrition of an individual child in a refugee camp would constitute a case study. The case must be understood in its own context. However, by undertaking a number of such studies, some trends might be identified or further investigation might be prompted.

Basic steps in qualitative data analysis and interpretation

- **Data organization:** To analyze qualitative data, the researcher should first review the research questions or objectives. The process begins by reading and fully comprehending the field notes. As the researcher reads and transcribes field notes, the researcher should watch out for emerging themes. Such themes can be disease prevalence, infant feeding habits, commonly consumed foods and foods in season.
- **Displaying data and establishing patterns:** The researcher should examine data layout more closely. What patterns are emerging from the relationships? Which ideas are related?
- **Data analysis and interpretation:** The researcher requires analytical skills. These develop with guidance and experience. Data analysis involves sieving information to establish relationships between concepts. For instance, relationships between morbidity and nutritional status in a community. Interpretation involves communicating essential ideas of the study to identify connections and links with major themes. It is processing of findings to create connections and gaps.
- **Triangulation of the qualitative and quantitative data** is done during interpretation. Triangulation is the integration of two methodologies to give data an in-depth and richer meaning. It is usually after establishing the nutritional status of a population, that linkage is made between the prevalence of malnutrition and causal factors in the community.
- **Intervention programme data:** Consideration of the supplementary and therapeutic feeding data (wherever available) is important to monitor the incidence of malnutrition. Special focus is made on the new admission and re-admission rates as well as the places of origin of the malnourished cases. Details of the age categories to facilitate establishing the vulnerable population groups are needed.
- **Report Writing:** It is both a descriptive and narrative account of the nutrition situation. The report states the problem, significance of the study, objectives, methodologies, findings and consequently, recommendations. Appendix 7 provides a general format for report writing.

Water is the only food for these teenage girls, during the long hours of herding (photo by FSAU)

5 Analysis and intepretation of the nutrition situation

Analysis and interpretation of nutrition data is carried out in a systematic manner in order to develop an understanding of such questions as:

- What is the population's nutritional status?
- Is the current nutritional status acceptable or not
- Is the situation improving or deteriorating?
- What are the key factors influencing the current nutritional status?
- Which interventions are most appropriate in protecting or promoting better nutrition?
- Under the prevailing circumstances how is the nutritional status expected to evolve over the coming months?
- What is the likely situation in the neighbouring areas (i.e. extrapolation)

Notes

The sources of nutrition information are surveys, rapid assessments and health facility data. Each of these data sets should be analyzed in the context of the season in which it is collected as this will influence e.g. food supply, disease patterns and water availability. Additionally, reference should be made to past nutrition information for the study area so as to avail a clear indication on whether the nutrition situation has improved or deteriorated over time.

Nutrition surveys provide the most accurate data and the results can be seen as relevant for the population with similar characteristics. While manual analysis can be used to generate descriptive statistics, EPIINFO is useful for both descriptive and inferential detailed analysis.

Health facility data is mainly from a self selected group and attendance will be influenced by many factors e.g. disease outbreaks, quality of service and availability of drugs. Though not representative, the data is useful in indicating trends in nutritional status.

Rapid assessments data gives an indication of the situation during critical periods and when surveys are not possible.

No single source of data is used in isolation. Triangulation of information is carried out for a better analysis of the situation.

The term '*study*' is used to refer to the various sources of data in this chapter.

Steps in data analysis and interpretation

a) Collate relevant data.
b) Establish links and associations among the various variables and the nutritional status, considering all data collected.
c) Identify areas requiring interventions.
d) Prepare study findings/results.
e) Discuss findings with study population and partners.

A Collate relevant data

Gather the historical data for the area or population. This includes baseline information and previous surveys or assessments data. Past relevant background information including morbidity data, food security information and trends in malnutrition as reported in health facilities. This information helps identify trends and whether the nutrition situation is improving or deteriorating.

B Establish links and associations of the various variables and the nutritional status.

Analyze and interpret both qualitative and quantitative data. The causes of malnutrition vary from one population to another hence the need to define the specific factors that contribute to nutritional status in each population. Statistical analysis of nutrition survey data can be used to determine the links/ associations while this is not possible for rapid assessments and health facility data. Further links between qualitative data and the resulting nutritional status can also be established guided by the conceptual framework. (figure1)

Socio-economic and political environment.

- What is the estimated population size and how is this distributed among the various livelihood or food economy groups? Is there a particular group that is more affected than any other?
- How do the macroeconomic factors like inflation rates, money supply and employment levels affect food security?
- How does the current situation affect trade and food marketing activities (locally,

Milk market (photo by FSAU)

nationally, regionally) for instance sanctions, ban on exports, restrictions on movements of traders?

- How do the cultural attitudes influence what people eat, own or the social institutions.
- What is the security situation in the area?

Food security situation.
(Food availability and access)
Type, quality and quantity of food available.

- The food economy group of the population plays a vital role in guiding this process. For instance in the case of an urban population that mainly relies on purchases to obtain food, determining the prices and availability of food in the markets is important. In the case of an agro pastoral population that mainly relies on its own production for food, determining whether there was good harvest over the seasons and if sufficient food stocks were available at the time of the survey is important.
- Weather conditions determine if good harvests will be realized, if pasture and water supply is good hence influencing animal production.
- Interpretation should take into account availability of food stocks and an estimation of how long these would last the families.
- Seeds availability and pests, rodents and disease infestation on crops influence food availability.

Access to food

- Food access is influenced by purchasing power. Definition of income availability and the proportion spent on food items is crucial especially for urban populations. In the case of agro pastoral and pastoral populations that also need to purchase

certain foodstuffs to supplement their production, it is important to establish the selling prices of their products or their terms of trade.
- Availability of foods in markets at unaffordable prices can limit food access.
- Logistical or geographical obstacles to markets and insecurity can limit access to food
- If families harvest or obtain food but they sell or use the bulk of it to settle past debts there is need to analyse if the balance is sufficient to meet their needs over a given period.
- Estimating the quantities of food eaten by family members can help define if members are meeting daily food requirements or not. In the case of children, frequency of meals per day is important and more than three nutritionally balanced meals per day are recommended.
- Coping strategies in times of stress contribute to food access in Somalia. The normal means of accessing food for a given population may be constrained at a given time but since the people have viable coping strategies, their access to food may not be limited.
- Establish if there is a change in coping strategies from the normal
- The prevailing food security situation could guide in predicting future nutritional status for instance if low malnutrition rates are reported in times of relatively poor food security, the nutritional status is expected to deteriorate in the future.
- The analysis may coincide with a season characterized as a hunger gap and with a possibility of improvement if the seasonal variables get better.

Health and sanitation.

- Nutritional status and diseases are closely linked. A high incidence of important childhood illnesses (those that have strong associations with nutritional status like measles, diarrhoea, ARI and malaria) prior to or around the period of analysis will influence nutritional status.
- A disease outbreak or high disease incidences in a given area will compromise nutritional status.
- Understanding seasonal trends in disease contributes to the analysis.
- Does the community have access to quality health services and is the health services seeking behaviour positive?
- Immunization is the safest way to protect children from immunizable diseases like measles and poliomyelitis. Once immunized, bodies are more able to fight diseases. If the immunization coverage is low, the population is more vulnerable to outbreaks of communicable disease. Understanding the factors that contribute to a high or low immunization coverage rate guides in defining possible interventions; it is indicative of the level of contact with the formal health services, the quality of those health services and ultimately the extent to which the population chooses to use the health services.
- Supplementation of certain micronutrients is usually undertaken among certain population when deficiency is suspected and when foods rich in these micronutrients are not readily available. In Somalia, vitamin A supplementation is usually done on a regular basis. High vitamin A supplementation coverage could indicate a low likelihood of vitamin A deficiency.
- Poor sanitation practices predispose populations to illnesses like diarrhoea and malaria which in turn contribute to malnutrition. High proportions of the population without access to clean sanitary facilities could account for a high diarrhoea incidence.
- If a large proportion is relying on a clean source of drinking water, there is need to determine if this is sustainable or not.
- Hygiene practices in homes, around water points and when handling foods can explain certain disease outbreaks like cholera.

Care practices for mothers and children.

- A child's health and nutritional well being depends on the type of care that child receives. Poor care practices will contribute to a deterioration in nutritional status. For example a lactating mother who lacks good care might not have enough

milk or even adequate time to breastfeed her child while an expectant mother without good care will most likely deliver an underweight child.
- Low birth weight and poor childcare practices (breastfeeding, weaning, feeding frequencies) are likely to contribute to poor nutritional status.

Food consumption

- Both quantity and quality of food consumed are important in determining the well being of an individual. The body requires certain amounts of the various nutrients on a daily basis for proper growth. A limitation in any of these will have negative consequences on an individual's nutritional status.
- In most cases, people will consume the foods that are readily available to them for instance among the pastoral communities, the quantities of milk consumed during the good seasons is high unlike in the lean seasons.

Food utilization by the body

- For certain foods/nutrients to be better utilized by the body, they need be consumed in combination with others. For instance, for the body to utilize fat-soluble vitamins, fat consumption is important. Vitamin C helps the body to absorb iron. Likewise, some foods inhibit the absorption of other foods. [Consumption of tea (containing tannins) soon after meals inhibits iron absorption.]

Mortality

- This indicates a crisis. It marks the highest level of deterioration of life and livelihoods. A low malnutrition rate while the under five mortality rate is high does not essentially mean that the nutritional status of the population is good. It is possible that some of the severely malnourished children died prior to the survey hence the low malnutrition rates.

Children recovering from severe malnutrition in a therapeutic feeding centre (photo by FSAU)

Livelihood assets:

These define the context, options and constraints available to households and individuals in their livelihood strategies. Analysis is undertaken at the zonal and/or household level, with consideration made to privately and public owned assets (or capitals).

- Physical Capital:This defines the basic infrastructure and producer goods needed to support livelihoods. (e.g. transportation, shelter, water supply and communications)
- Financial Capital. This refers to the financial resources people use to achieve their livelihood objectives; and flows and stocks that contribute to consumption and production. (e.g. flows of cash income, livestock holdings, credit)
- Human Capital: These are the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies. (e.g. the amount and quality of labour available, skills and health status.)
- Social Capital are the social resources from which people draw, in pursuit of their livelihood objectives. (e.g. networks and connectedness, relationships of trust)
- Natural Capital are the natural resource stock from which resource flows and services useful for livelihoods are derived. (e.g. land, trees, pasture).

C Identify areas requiring interventions

- Interventions that contribute positively to the nutritional status include adequate health services; availability of clean and reliable water sources; income generating projects; education facilities; seed distribution programmes and veterinary services. If present, are they accessible to all and sustainable?
- Are certain factors contributing negatively to the nutritional status for example low knowledge on nutrition-related issues, lack of sanitation facilities; inadequate health services; low immunisation rates, low vitamin A supplementation coverage and insufficient food. Have these been addressed at all? If yes is it sufficiently so?
- Which interventions require immediate or long term response
- Recommendations on interventions need to be guided by the analysis and ideally not by the focus of particular organizations.

D Prepare study findings

- Prepare study results highlighting the impor-tant findings.

E Discuss study findings with study population

- Share the main study findings with the study population and partners.
- This discussion will provide an opening for more comprehensive and longer term community based analysis of issues that can be addressed more efficiently and effectively by the community themselves.

Case study

A case study on Bulla Hawa Nutrition Survey in Gedo region undertaken in October 2002 is presented to illustrate data analysis and interpretation.

Gedo is the most chronically food insecure region in Somalia, partially explained by recurrent drought and insecurity incidences. Consequently, the acute food insecurity and human suffering was manifested by the unacceptably high global acute malnutrition rate of 37% (using <–2 Z-score cut-off) in the December 2001 Belet Hawa nutrition survey accompanied by high mortality. These provoked significant humanitarian responses. Both food aid (general and selective feeding) and basic healthcare services in the district were supported by CARE and Gedo Health Consortium (GHC) amid serious insecurity. Following the relatively good 2002 GU season, it was felt that food security and nutritional status might have improved although the effect of recurrent insecurity and the diminished asset levels in households was not clear. Implementing organisations and the Humanitarian Response Group of the Somalia Aid Coordination Body (SACB) therefore, recommended a repeat survey in the district which was undertaken in October 2002. Some of the survey results are as presented on the table.

Indicator	No.	%
Children under five years screened during the survey	907	100
Global acute malnutrition – W/H <-2 Z-score or with oedema	195	21.5 (CI: 18.9%-24.5%)
Severe acute malnutrition– W/H <-3 Z-score or with oedema	20	2.2 (CI: 1.4%-3.4%)
Global acute malnutrition – W/H in Z-Score (<-2 Z-score) or presence of oedema in agro-pastoral villages	71	26.6
Global acute malnutrition – W/H in Z-Score (<-2 Z-score) or with oedema in Belet Hawa town including IDP village	77	21.0
% of children with diarrhoea in two weeks prior to the survey	234	25.9
% of children with ARI in two weeks prior to the survey.	186	20.6
% of children with malaria in two weeks prior to the survey	212	23.4
% of children that received Vitamin A within last six months	797	88.1
% of children immunised against Measles	621	72.0
% of children from displaced households	95	10.5

Substantial food aid (that is, both from general distribution by CARE and GHC/UNICEF's selective feeding programme), harvests from relatively good 2002 Gu rains and accompanying migration of some livestock, more aggressive/improved health service provision (manifested by improved measles immunisation and vitamin supplementation), and relatively low incidences of common child illnesses (compared to 2001) played a key role in explaining the significant improvement in nutritional status since the December 2001 nutrition survey. In addition, the use of bush products increasingly provided a significant income source to most households in the district. The survey reveals that with a population of about 65,000 residents (WHO 2002) in Belet Hawa, the relief food services distributed between December 2001 and October 2002 was capable of providing about 70% of the daily food requirements to all individuals assuming minimal losses and use of all the rations within the district.

Continued limited food availability and the almost constant insecurity; poor childcare/feeding practices and high disease incidences, all contribute to the persistent poor nutritional status of the population in Belet Hawa District. The significant statistical association between the observed malnutrition and diseases like diarrhoea and malaria confirms that disease prevalence is still a major problem that calls for continued support to comprehensive health and nutrition intervention programmes.

About 27% of the children fed once or twice a day. The overwhelming majority of the children (99%) included in the survey were not exclusively breastfed in their first six months while nearly 98% received foods other than breast milk in their first three months of life. Mothers reported having to travel increasingly long distances in search of water (especially before the Gu 2002 rains). Some responses to limited food access like collecting bush products leads long separation from their young children further compromised childcare.

Both the survey and other FSAU food security information indicate significant shifts in people's livelihood patterns in recent years with many more households now categorised as 'urban' and fewer as 'pastoralist'. Purchases and food aid were the main food sources while casual work and sale of bush products were the dominant income sources. Borrowing and food aid reliance ranked highly as coping strategies.

Recommendations following the survey include adequate general ration and selective feeding concurrent with continued support to the health, livestock and water sectors as immediate

responses. Income generating activities are also key to revive the Belet Hawa economy. An improvement on the security situation in the region will also work positively for the Bulla Hawa population.

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A nutrition survey enumerator measuring height of a child (photo by FSAU)

Appendices

Appendix 1

Procedure for taking weight, height/length and MUAC measurements

Body measurement	Type of equipment
Height/Length	Height or length boards (cm); Head block, Foot piece
MUAC	MUAC tape
Weight	Salter scale (235), plastic pant, rope

Height measurement

A child aged 2 years (24 months) and above or taller than 85 cm should be measured while standing.

1. Place the measuring board on a smooth level, flat hard surface preferably against a wall, tree or a doorpost.
2. Remove shoes, sandals, socks, headgear or any other heavy items.
3. Assist the child stand with its back against the measuring board. Ask the assistant to help keep the child calm and composed
4. Position the child with bare feet together. Check on the position of the heels, buttocks, shoulders and back of the head touching the board.
5. Hold the chin so that the child is looking up straight
6. Adjust the headpiece so that it is level
7. Lower the headpiece until it is firm on top of the head. Press gently to ensure that it's in contact with the head.
8. Read the child's height to the nearest 0.1cm.
9. Record the reading immediately.
10. Remove the headpiece and repeat the instructions once more.

**Note that in weight for height, children <5years or those whose measurements are between 65 and 110cm are considered.*

Length measurement

Children less than two years old or children whose length is shorter than 85 cm should be measured lying on their back.

1. Where the child is <2 years old, use horizontal measuring board.
2. Lay the child on the measuring board with the top of the head pressed firmly against the fixed ends .
3. Make sure the child is lying flat in the centre of the board.
4. Hold knees straight and bring the movable footboard firmly against the heels so that the feet are at right angles.
5. Check the child's position.
6. Read and record the length to the nearest 0.1 cm.

Always note that measurements and reading are taken twice.

Weight measurements

Rope for hanging scales, Measuring sling, Plastic pants

1. Ensure that the Salter scale is hooked onto the ceiling or a tree branch and that the scale is stable and hanging freely. The scale should hung on a strong support.
2. Always adjust the 'scale to zero' with weighing pants hanging on the scale before weighing the child.
3. Request the mother to undress the child. She should remove as many clothes as possible.
4. With the mother's assistance, put the child into the weighing pants.
5. Gently lower the child onto the Salter scale while the mother holds the baby.
6. Read the child's weight. Ensure that the child is hanging freely and not holding on to anything.
7. Read the weight to the nearest 0.1 kg.
8. Repeat the procedure of reading and recording the child's weight. Record the average of the two measurements.
9. Gently remove the child from the scale. Do not lift the child by the straps or weighing pants.

A nutrition survey enumerator measuring length of a child (photo by FSAU)

Mid Upper Arm Circumference (MUAC) measurements

In young children, the target group is usually the age group12 -59 months.

- Request the mother to uncover the child's left arm as far as the shoulder.
- Bend the arm and place the lower arm across the stomach.
- Find the tip of the bone at the back and top of the shoulder with your fingertips and mark it with a pen.
- Mark the second spot at the tip of the elbow.
- Measure the distance between the two marked spots while standing behind the child and divide this measurement by two.
- Using a MUAC tape, wrap the tape around the arm at the midpoint between the shoulder and the tip of the elbow.
- The tape should be comfortably crossed over from 0 mark.
- Take the measurement to the nearest 0.1 cm where the tape crosses at 0.
- Record down the data on the data entry form.
- The entry form should bear the following details: child's sex, age, presence of oedema, and MUAC measurement.

To determine a child's age various methods could be followed:

- Examining the documentary evidence of birth date such as Road to Health Card from the MCH Centre.
- Where such evidence is missing, estimate date of birth using parent's estimates or local event calendars.

Appendix 2

Sources of error in taking anthropometrical measurements

Common errors	Solution
1. All measurements	
Restless child	Postpone measurement. Involve parent in procedure.
Inaccurate reading	Training and retraining stressing accuracy.
Recording	Record results immediately after taking measurements and confirm record.
2. Length/Height	
Incorrect method for age	Use length only when child is <2 years old
Foot wear/headgear	Remove
Head not in correct plane, child not straight, knees bent, or feet not flat on floor	Correct technique with practice and regular retraining. Provide adequate assistance. Calm the child.
Child not straight along board and foot not parallel with movable board	Parent or assistant should be present. Don't take measurements while the child is struggling.
Sliding board not firmly against heels/head	Settle child. Correct pressure should be practiced. Move head board to compress hair.
3. Weight	
Scale not calibrated to zero	Recalibrate after every measurement.
Child wearing heavy clothing	Remove or make allowances for clothing.
Child moving or anxious	Wait until child is calm or remove cause of anxiety.
4. MUAC	
Child not standing in correct position	Position subject correctly.
Mid arm point incorrectly marked	Measure midpoint carefully.
Examiner not level with subject, tape around the arm not at mid point, tape too tight/ too loose	Correct techniques with training, supervision and retraining. Take into account cultural practices for example. wearing of armbands.

Appendix 3

An Example of a 24-hour dietary recall checklist

Name of person interviewed .....

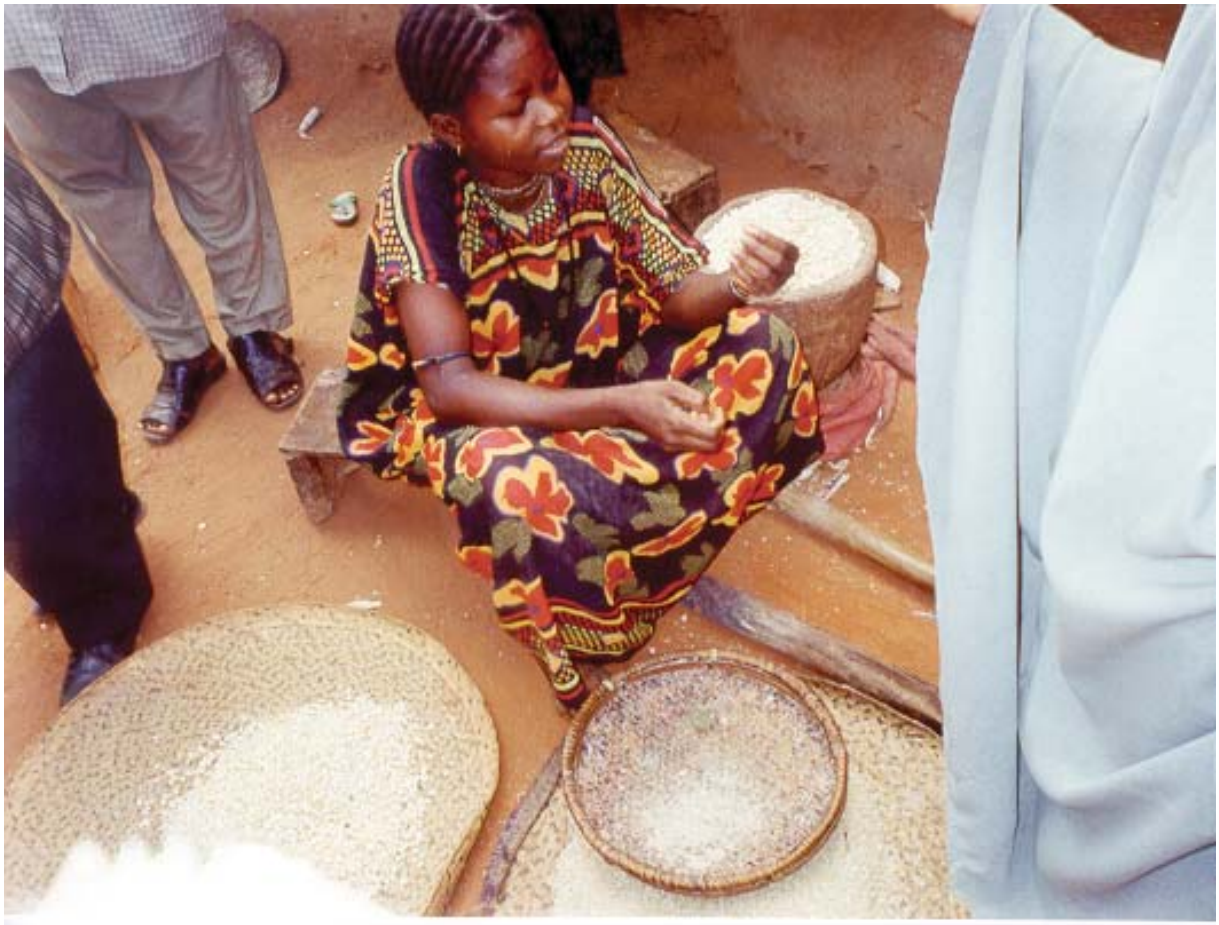
Date .....

Date & Day of week .....

Name of interviewee .....

Food Type & Beverages	Breakfast	Lunch	Supper	In-between snacks	Amount/portion eaten and why?	Which foods foods are not
1.						
2.						
3.						
4.						

**Note also that main ingredients in mixed dishes should be identified.*



Traditional method of processing cereals before cooking (photo by FSAU)

Appendix 4

Basic statistical concepts

Variables

These are items for which data is sought e.g. name, level of education, age etc. variables are categorized under the following two groups;

Qualitative variables: these are variables whose values are descriptive and cannot be quantified e.g. sex of a child (male/female), household source of income (remittances, sale of animals, diarrhea in last two weeks (yes/no) etc. These values do not compare numerically.

Quantitative variables: these are variables whose values arise from counts or measurements expressed numerically. For instance weight of a child, age of a child, household size, height of a child etc.

Steps in Data Analysis:
The first step in quantitative data analysis is to summarize data to make it easier to understand. The commonly used tool in summarizing data is through use of frequency distribution.

1 Frequency Distribution: Frequencies are counts of different values of a particular variable e.g. finding out how many of the surveyed children are boys and how many are girls. A set of all frequencies occurring values is called a frequency distribution. It comprises of counts, percentages and cumulative percentages. The frequency distribution gives a general picture of the values of the variable. Summaries can further be made through use of average values (central tendency) and other spread values (measures of dispersion).

2 Measures of Central Tendency (Mean, Mode and Median)
Mean: This is the sum of the values of a variable divided by the number of values (n).
Median: This is the value that divides the distribution in half when the values are either arranged in ascending or descending order. It therefore becomes the middle value in the distribution.
Mode: this is the most frequent value among all values in a variable.

3 Measures of Dispersion
Range: The difference between the minimum and the maximum values of all values to a variable
Standard Deviation: this is measure of dispersion around the mean of values. It gives an idea of how the different values of a variable disperse from the mean value. It has the unit of values of the variable and the square root of the variance.

4 Determining Nutritional Status
Nutritional indicators are developed through comparing a child's measurements to reference measurements. The reference data has been developed from the children of the same age, weight and height respectively. Results of nutritional status are expressed as,
- Standard deviation scores (Z-Scores)
- The percentage of the median or Percentiles

Standard Deviation Score (Z-Score)

- Are measures of the distance of how far the child's measurement e.g. a child's weight is from the median weight of the child of the same height in the reference data. The distance is expressed in standard deviation. Its computed as follows:

$$\text{Weight-for-height Z-Scores} = \frac{\textbf{Observed weight} - \textbf{reference median weight}}{\text{Standard Deviation of the reference population}}$$

- Z-scores has greater compatibility with the NCHS/WHO reference values and suitability for selecting malnourished children irrespective of height
- Z-scores are particularly useful for determining differentials in malnutrition rates
- Z-scores Involve a complex process in calculation
- Z-score relies on fitted distribution of indices across age and height values If a child's SD score falls outside the normal range (-2 and +2), then this signals a deviation from the norm in the nutritional status
- Has a greater capacity to determine proportion of malnourished cases.

Percentage of the Median

Demonstrates the child's anthropometrical measurement as a percentage of the expected value of the reference population. It is the ratio of a child's weight to the median weight of a child of the same height in the reference data, expressed as a percentage. For instance, assuming that the median weight of the reference data for a particular height is 10 kg, then to say that the child is 80% weight for height suggests that the child is 8 kg.

Percentage of the median is calculated as follows:

$$\% \text{ of the median} = \frac{\textbf{\textit{Actual weight of the child being measured X 100}}}{\text{Reference weight of the child}}$$

The usefulness of the percentage of the median is that its widely used in the field than SD scores. Besides it is typically used for admissions into feeding centers.

Also, these calculations are easy to understand, calculate and interpret given that tables of reference values are readily available

Determination of Population's Nutritional Status

A child's body measurements are compared with the reference values by calculating either their percent of the reference median or by calculating their standard deviation scores
In the theoretical perspective of normal distribution, the mean is normally equal to the median and also to the mode i.e. mean=median=mode
In such a distribution, about 70% of subjects will lie within1SD about the mean, 95% within 2SD and 99% within 3SD about the mean. Normal distribution therefore refers to the distribution where individual measurements are symmetrically distributed around the mean (it normally takes the bell shaped curve as is shown in the box.)
Normally, the child's nutritional status is determined by her/his weight compared to a standard child with the same height
Standard median weight for each height measure of children has been developed and used as reference data for determination of nutritional status for by the United States National Centre for Health Statistics (NHCS). The reference population data has been recommended by the World Health Organization.
This reference data is based on basic tenets of a normal distribution. For instance, if a child falls below –2SD or 80% then that child is considered to have a negative deviant of the 5% minority for that height group. If a child's weight on the other hand falls below -3SD or about 70%, then it is a negative deviant of the 1% minority for that height group and as a consequence considered as severely malnourished.

Confidence Intervals

The nutritional status developed from samples only gives a rough estimate of the situation in the general population. However when the sample is selected through some random method, then we can use properties of distribution to describe the general population. For example, a 95% confidence interval around the sample estimate will imply that we are 95% confident that the interval contains a true population measure. So, a prevalence of 12.5% (CI: 10.8% -14.1%) will mean that at least we can be 95% confident that the true population prevalence is between 10.8% and 14.1%.

Inter-relationship Between Anthropometric Data and Other Variables

Further statistical analysis mainly using inferential statistics is normally performed to relate anthropometric data to other variables collected during survey e.g. sex of the child, age groups of the surveyed children, household sources of income, food economy groups, disease prevalence, breastfeeding and infant feeding patterns etc.

When conducting this kind of analysis, statistical tests such as chi square analysis, analysis of variance (ANOVA), regression analysis and other statistical investigations are carried out. This is normally an advanced level of analysis and requires assistance by a statistician in order to help determine the type of analysis that is suitable for the data collected.

Significance tests are performed. These are facilitated through use of computer packages as manual packages are time consuming and requires even more statistical expertise.

Always consult a statistician before embarking on this type of analysis.

Appendix 5

Technical Terminology

Household food access is determined by seasonality patterns e.g. the main food crop produced may not be sufficient to meet the household needs at all times. Amongst pastoral communities, milk production varies with rainfall and availability of grazing lands. Further, opportunities for employment, migration, availability of fish and wild foods are often highly seasonal. In addition, household income & expenditure may vary according to season thus affecting food consumption patterns.

Household Economy - the sum of ways in which the household produces food and non food items (assets, livestock, land) for its own use and also how households obtain non food items by exchanging production and labor.

Vulnerability - the extent to which a household is affected by a defined event or risk - whatever the risk of that event occurring. For example a household might be regarded as vulnerable to a defined level of crop failure if this would reduce its income by, say, 50%, even if crop failure in that area were rare. Vulnerability can be reduced by having greater diversity of activities to reduce degree of exposure to any one risk, and greater range of coping options.

Shock or Risk - events with potentially adverse consequences for the household . Shock or risk is unpredictable and out of household's control. Can be natural or man-made, slow or rapid-onset.

Effect of a shock (or shocks) on a household in any location will depend on ;

- The magnitude of the shock (scale/severity/ duration)
- The "normal" household economy
- Opportunities to compensate for loss of income
- Choices that the household makes &
- Degree of market dependency

Risk Minimization - Strategies employed to reduce the anticipated exposure to risk e.g. storage of crops, pesticide use, splitting herds, castrating male animals, planting drought-resistant crops and maintaining good relationships with other people/groups/ populations.

Expandability - Refers to how much extra food and income can potentially be obtained if the household needs to increase access to income or food and reduce expenditure by:

- Expanding existing food and income options of households
- Additional food and income generating options and
- Reduction in spending to "minimum" levels

Coping Strategies - are the ways in which households try to make up in some activities losses suffered in others.
Understanding coping strategies helps determine an appropriate response. Coping strategies change as stress continues. Early coping strategies are highly reversible (e.g. short-term dietary change) and require a low commitment of domestic resources. There are also irreversible coping strategies which involve a high commitment of domestic resources (such as productive asset sales, or out-migration). Some examples of coping strategies include: food reduction, increased labor, consumption of wild food, migration, sale of assets, reduced expenditure patterns and splitting household members amongst relatives.

Cost of Coping - include financial, time, social costs.

Opportunity Cost - the hidden cost of expanding an activity. For instance, increasing casual labor for other people will imply neglecting ones own land. This will have long-term consequences since it will affect food production the following year. Similarly, taking a child out of school might imply receiving additional cash for food in the immediate term but , it will result in the loss of potentially higher earnings and social benefits in the future.

Distress Strategies - are strategies employed when coping mechanisms fail, e.g. Eating budgeted stores, or wild foods that wouldn't normally be eaten and which may be detrimental to health. Slaughter/sale of livestock to unsustainable levels - jeopardizing future livelihoods. Detrimental non-economic or social costs – for instance women who respond to a shock by becoming commercial sex workers.

Adaptive Strategies - The continuation of a shock, or series of shocks, forces the household to adapt its old way of life into a new one. Thus the economy becomes new or different. e.g. pastoralists who "drop out of" pastoralism or permanent migration to a new location

Health - A state of physical, social, mental and psychological well-being and not just the absence of disease

Morbidity - ill health or disease.

Immunization - is a process of inoculating attenuated or live organisms into the body in order to stimulate production of antibodies against a particular disease. All children under five years of age are susceptible to communicable diseases, many of which can be preventable through vaccination. Somalia has developed an Expanded Program for Immunization (EPI) addressing vaccine preventable diseases such as tuberculosis, diphtheria, tetanus, poliomyelitis, and measles, that follow recommendations of WHO.

Nutrients are the constituents of food or substances that the body uses for various functions. They can be either macro- or micro-nutrients.

Macronutrients are food nutrients that are required by the body in large quantities. They comprise the bulk of our diets and include, proteins, carbohydrates and fats. proteins are used for building body tissues; carbohydrates for producing energy

Micronutrients are substances needed by the body in very minute quantities for growth, development and maintenance of a wide variety of bodily functions. They include iron, iodine, Vitamin A, Vitamin B Complex, Vitamin C and Zinc.

Nutrition surveillance - is the process of monitoring changes in the nutritional status of a population or subgroup on a regular and timely basis. Nutrition surveillance involves data collection, processing, analysis, interpretation and communication. Nutrition surveillance is an important process during normal and emergency situations.

The Food Security Assessment Unit (FSAU) supports nutrition surveillance activities in Somalia and aims to provide timely and appropriate information on the nutritional status of the population along with possible explanations for potential or real change.

Nutrition - The subject of nutrition is concerned with how people stay alive and well by consumption of food. It includes how people obtain their food, how it is processed, handled, prepared, shared, eaten and with what happens in the body- how it is digested, absorbed and used by the body to contribute to good health.

Nutrients - Nutrients are small parts of food that the body uses for various body functions.

- Proteins- for building body tissues
- Carbohydrates -for producing energy
- vitamins and minerals- for fighting infections

Nutrients be classified into macronutrients and micronutrients for sources see appendix 8.

Macronutrients - The foods that we consume comprise of the some major food nutrients, which comprise the bulk of our diets, and they are known as macronutrients. Examples of macronutrients include; proteins, fats and carbohydrates as well as water. Ideally, these nutrients supply all the energy requirements needed by the body. In addition, macronutrients comprise the bulk of our diets. It is well established that about 80% of our food intake is composed of macronutrients. In order for the body to discharge its normal functions it needs, proteins, carbohydrates and fats.

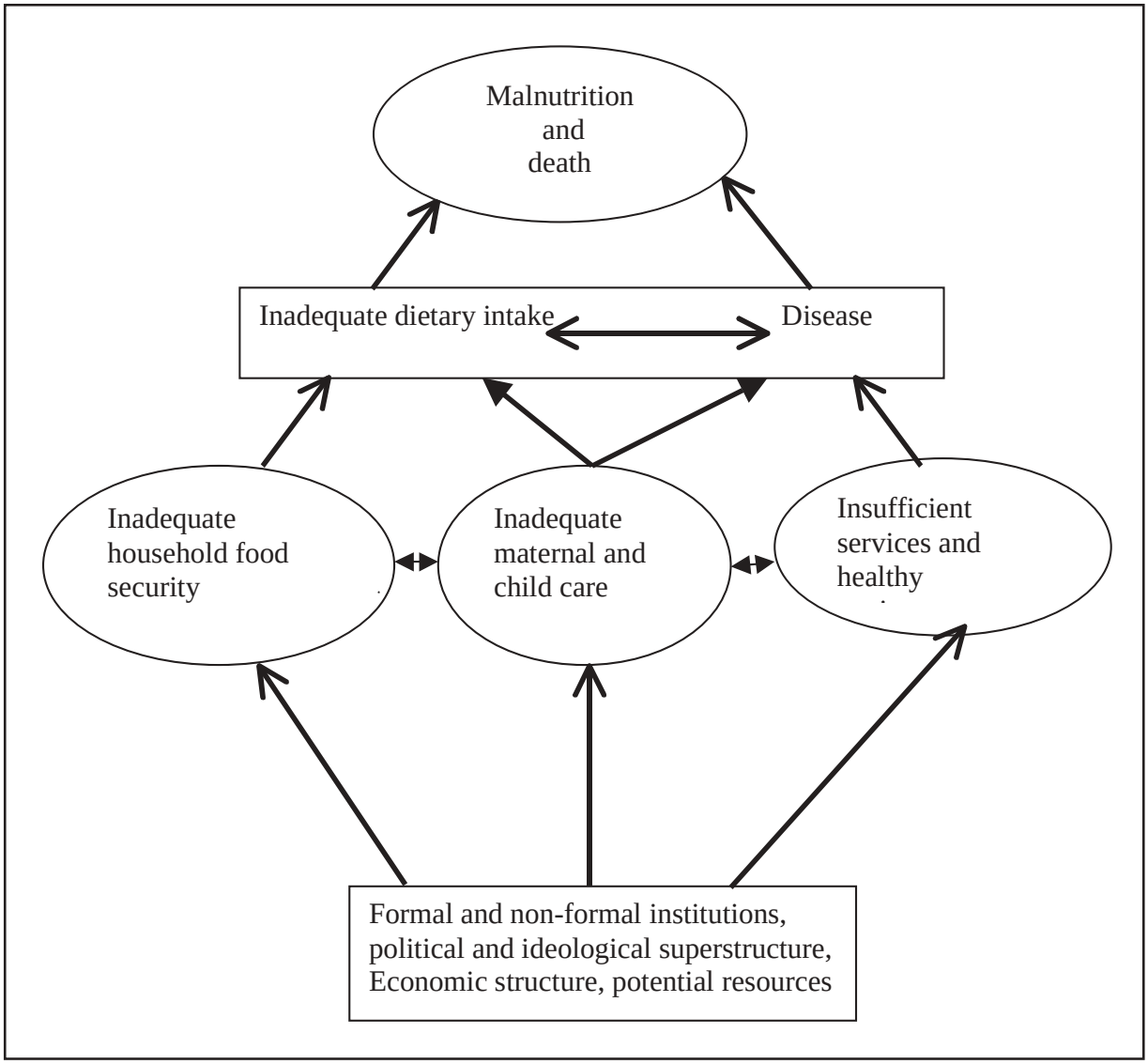
Micronutrients - These are substances needed by the body in very small quantities for growth, development and maintenance of different body functions. They comprise of vitamins and minerals. The important vitamins are vitamin A, the B vitamins, C, D and E while important minerals include iron, zinc and iodine. Vitamin A helps the body resist infections and to keep all the cells on the surface of the body healthy

Malnutrition - Malnutrition may be defined as a state in which the physical function of an individual is impaired to a point where she or he can no longer maintain adequate performance in such processes as growth, pregnancy, lactation, physical work, resisting and recovering from disease" (Pacey and Payne, 1985).

Under Nutrition - Malnutrition should not be confused with under nutrition, which refers to reduced overall food intake in relation to the recommended daily dietary nutrition requirements.

Appendix 6

UNICEF's Conceptual Framework showing the causes of malnutrition



Appendix 7

Format for Nutrition Assessment Reports

Executive summary
Introduction
Survey/ assessment justification
Background information
Methodology
Results and analysis
Conclusion
Recommendation
Annexes (e.g. of tools and references)

Appendix 8

Micro-Nutrients: Functions and the consequences of deficiencies

Definition of micronutrients - Micronutrients are nutrients that are essential for healthy growth and development but required only in small amounts. Micronutrients play very important roles in the body. They affect adult productivity, resistance to illness, educational achievement (cognitive impairment), child survival and maternal health.

Important micronutrients - Iron, Vitamin A, Iodine, Vitamin C and Zinc

Iron - Iron helps to make blood, particularly in the production of haemoglobin, the protein in red blood cells that carries oxygen. Iron also helps to make essential enzymes that enable the brain, muscle, and immune systems to function properly.

Iron deficiency - Low levels or lack of iron in the body leads to iron deficiency. Severe lack of iron leads to iron deficiency anaemia (IDA). Iron deficiency is the most common nutritional deficiency. Young children and pregnant women suffer high rates of IDA. The main symptoms are pallor, fatigue, brittle fingernails, sore tongue, and brittle hair, shortness of breath, unusual food cravings, low blood pressure, rapid heartbeat, low immunity, headache, decreased appetite, severe menstrual pain and bleeding and disturbed sleep.

Dietary sources of iron - Some of the sources include meat (spleen, kidney and liver especially), chicken, fish, eggs, dried fruits, legumes (beans, peas), cocoa and cocoa products and dark green leafy vegetables. Cereals (maize, rice and wheat) contain moderate amounts but since they are consumed in large amounts they provide most of the iron. It is also obtained from iron cooking pots.

Vitamin A - It is essential for vision, growth and skeletal development. Assists in maintaining health skin and mucous membranes, protecting the body's major organs, enables proper function of most body organs, assists maintaining health skin and mucous membranes and provides optimum immune function.

Vitamin A deficiency - Low levels or lack of vitamin A in the body leads to vitamin A deficiency (VAD). The main symptoms of vitamin A deficiency are: eye symptoms (eye blindness, inflammation of the eye, inflammation of the cornea, eye lesions, and dry eyes), skin symptoms (rough skin, dry skin), decreased immunity (frequent infections of common diseases like diarrhoea and measles) and loss of appetite as well as growth retardation in children.

Dietary sources of vitamin A - Some of the main sources include breast milk (especially the colostrums), animal products (cheese, butter, egg yolk, milk, meat specially liver and kidney, and oily fish), green vegetables (carrots, pumpkins, parsley, amaranth, spinach, sweet potato and cassava), fruits (mangoes, papayas and tomatoes), yellow varieties of sweet potato, yellow maize, red palm oil and fortified foods like margarines, vegetable ghee and dried milk.

Iodine - The body needs iodine for normal mental and physical development. Iodine is essential for the function of the thyroid gland, which is responsible for development. Iodine is also essential for foetal development.

Iodine deficiency - The main symptoms are goitre (enlargement of thyroid gland), protruding eyes, hypothyroidism (fatigue, weight gain, weakness and depression) and hyperthyroidism (weight loss, rapid heartbeat, and appetite problems). IDD (Iodine Deficiency Disorders) in pregnancy causes dwarfism and cretinism (severe mental retardation, stunted physical growth, enlarged head and deafness) to the newborn.

Dietary sources of iodine - The main sources of iodine are sea fish, milk, seaweed, green vegetables grown near the sea (especially spinach), iodated salt and fresh water (depending on area).

Zinc - Zinc promotes normal growth and development. It promotes wound healing, maintains a healthy immune system and helps prevent diarrhoea in young children.

Zinc deficiency - Main symptoms of zinc deficiency are slow growth in children, hair loss, various skin lesions, peeling skin, slow healing of wounds, frequent and recurring infections, severe diarrhoea, poor appetite, loss of taste and smell, fatigue, and sterility in males.

Dietary sources of zinc - Zinc is readily available in breast milk for the young children, vegetables, seafood, meats (including chicken and fish), eggs and whole grain cereals and legumes.

Vitamin C - Vitamin C (also called ascorbic acid) is essential for healthy teeth, gums and bones. It helps to heal wounds, produce red blood cells, build immunity and fight bacterial infections. Vitamin C helps to form collagen, the 'cement' that holds tissues together. Vitamin C enhances the absorption of iron in the body. Vitamin C deficiency leads to a disease known as scurvy.

Vitamin C deficiency - Main vitamin C deficiency symptoms includes bruising, swollen or painful joints, bleeding gums, nosebleeds, fatigue and weakness, easily gets colds, anaemia, poor digestion, scurvy (skin that bruises and bleeds easily, bleeding on fingertips, old scars and internal bleeding, nose bleeds, soft swollen purple gums, bleeding gums, tooth decay, hair and tooth loss, bones that easily fracture, swollen and painful joints, slow healing wounds and fractures, loss of appetite, weakness, fatigue and irritability.

Dietary sources of vitamin C - The main sources include fruits (like kiwi fruit, oranges, grapefruits, lemons, strawberry), vegetables (amaranth, spinach, broccoli, cabbage and green pepper) and various leaves (e.g. baobab). Young maize, sprout cereals and pulses as well as plantains and bananas also contain fair amounts of vitamin C.

Calcium - Calcium is the most abundant mineral in the human body. The body requires calcium in relatively larger amounts than the other micronutrients. Calcium is used for building bones and teeth and in maintaining bone strength. Calcium is also used in muscle contraction and blood clotting.

Calcium deficiency - Main calcium deficiency symptoms are weak teeth that easily fall out, lack of sleep, premenstrual cramps, high blood pressure, large forehead, sunken chest, protruding chest, osteoporosis (bones easily fracture due to minor falls i.e. bones break under their own weight), hump in the back, curvature of the spine, rounded shoulders, losing height (becoming shorter) and inability to hold the body upright.

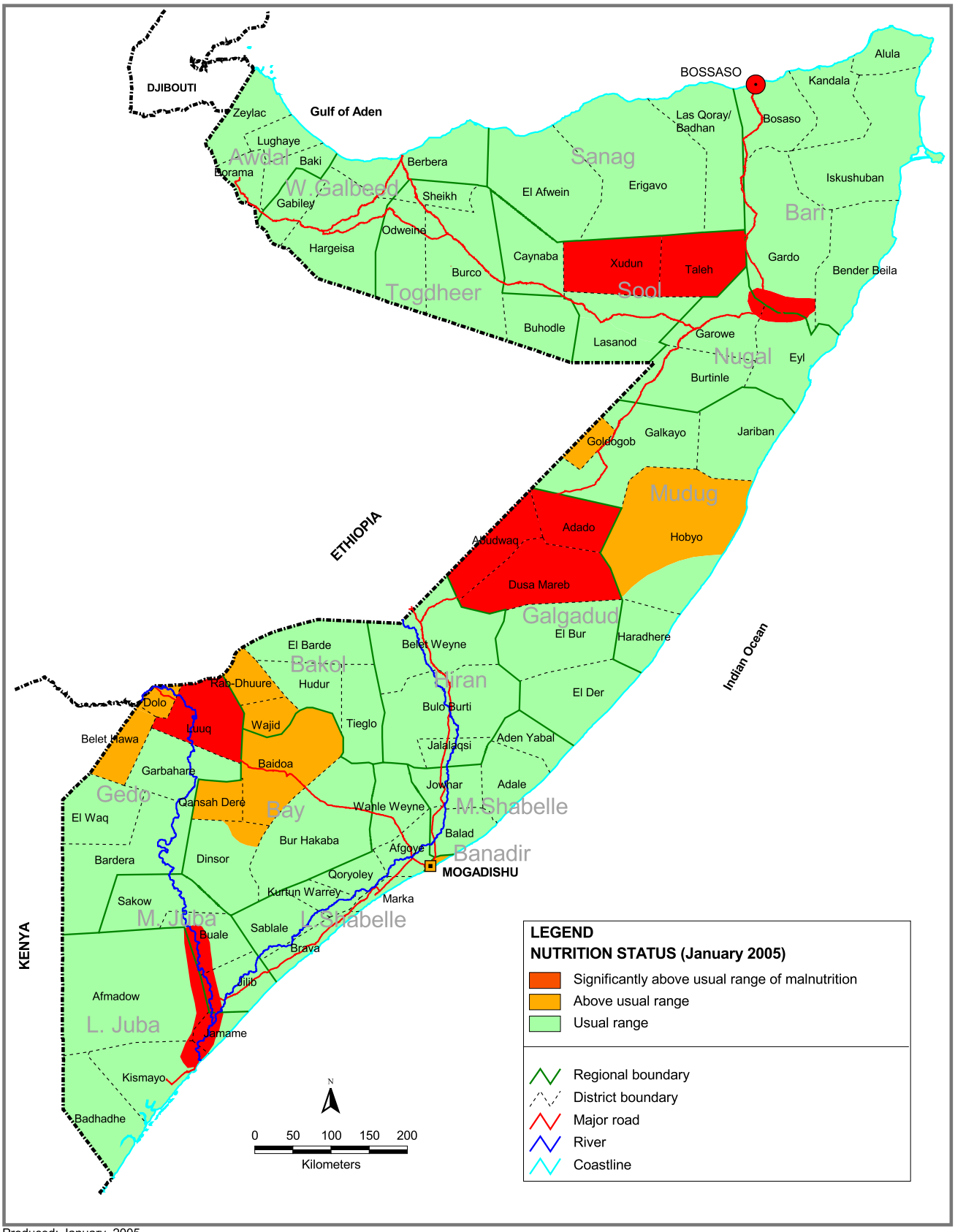
Dietary sources of calcium - Breast milk for the young children, milk and milk products like cheese and yoghurt, bread (added to white flour by law), finger millet, small saltwater and bones of fresh water fish (e.g. sardines and sprats) and hard water. Dark green vegetables and pulses (beans and peas) have small amounts of calcium.

Vitamin D - The major function of vitamin D is to maintain normal blood levels of calcium and phosphorous. Vitamin D helps the body to absorb calcium; helping to form and maintain strong bones.

Vitamin D deficiency - Lack of vitamin D can lead to calcium deficiency. Vitamin D prevents rickets in children (soft bones that bend in abnormal way, bowed legs) and osteomalacia in adults (weak bones, bone pain, spinal bone pain, pelvic bone pain, muscle pain, muscle weakness, bowing legs and fractures) which are skeletal diseases that result in defects that weaken bones.

Dietary sources of vitamin D - Egg yolk, fortified foods like margarine, cheese, milk, butter, fish liver oils, liver are good sources of vitamin D. Meat and fish contribute vitamin D in small amounts.

Figure 2 Somalia: Current nutrition situation, January 2005



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Food Security Analysis Unit - Somalia
P.O. Box 1230 Village Market, Nairobi, Kenya Email: fsauinfo@fsau.or.ke tel: 254-20-3745734 fax:254-20-3740598
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Figure 3 Somalia: Nutrition surveys (1999-2004)

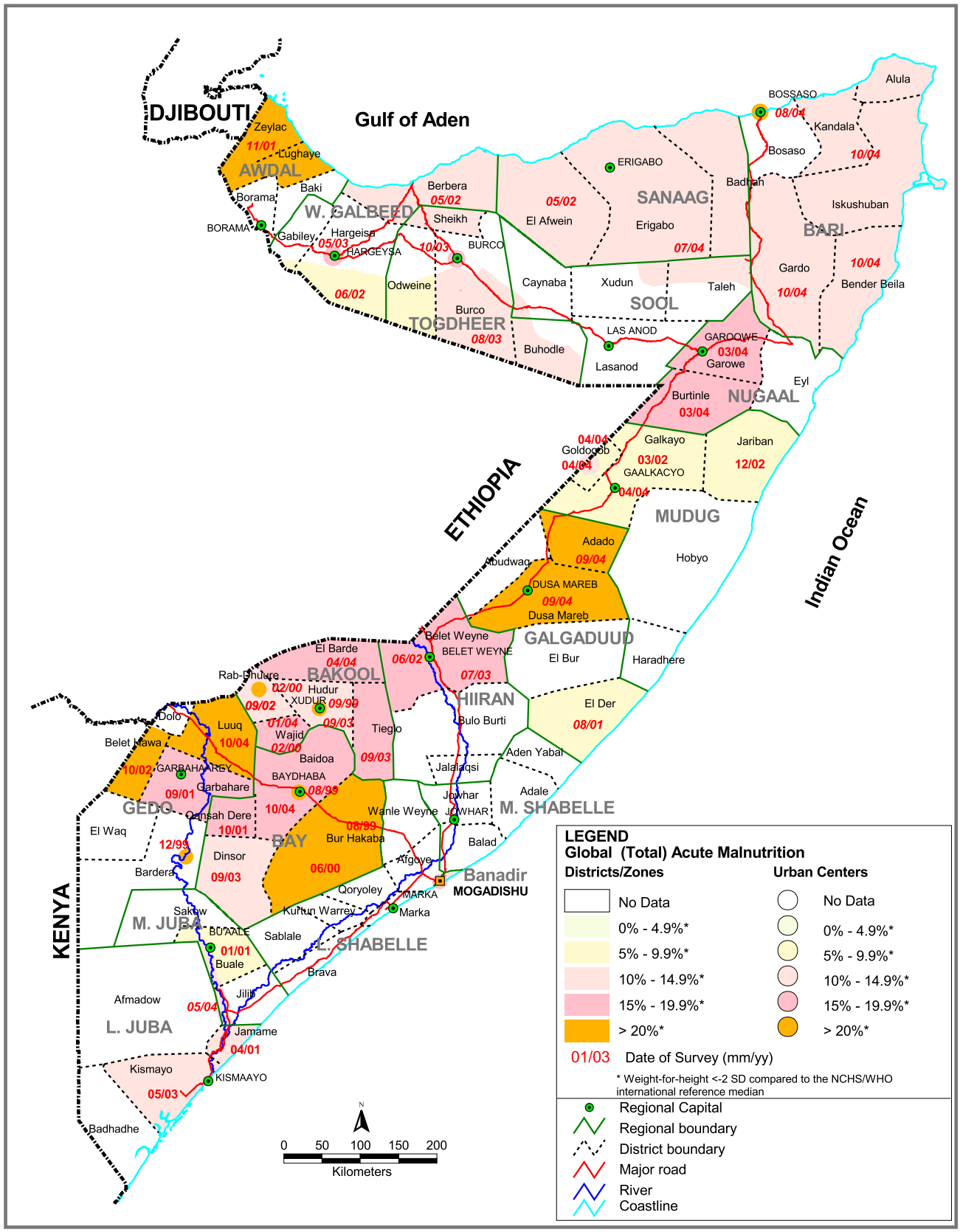

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Figure 4 Somalia: Nutrition surveillance locations (health facilities)

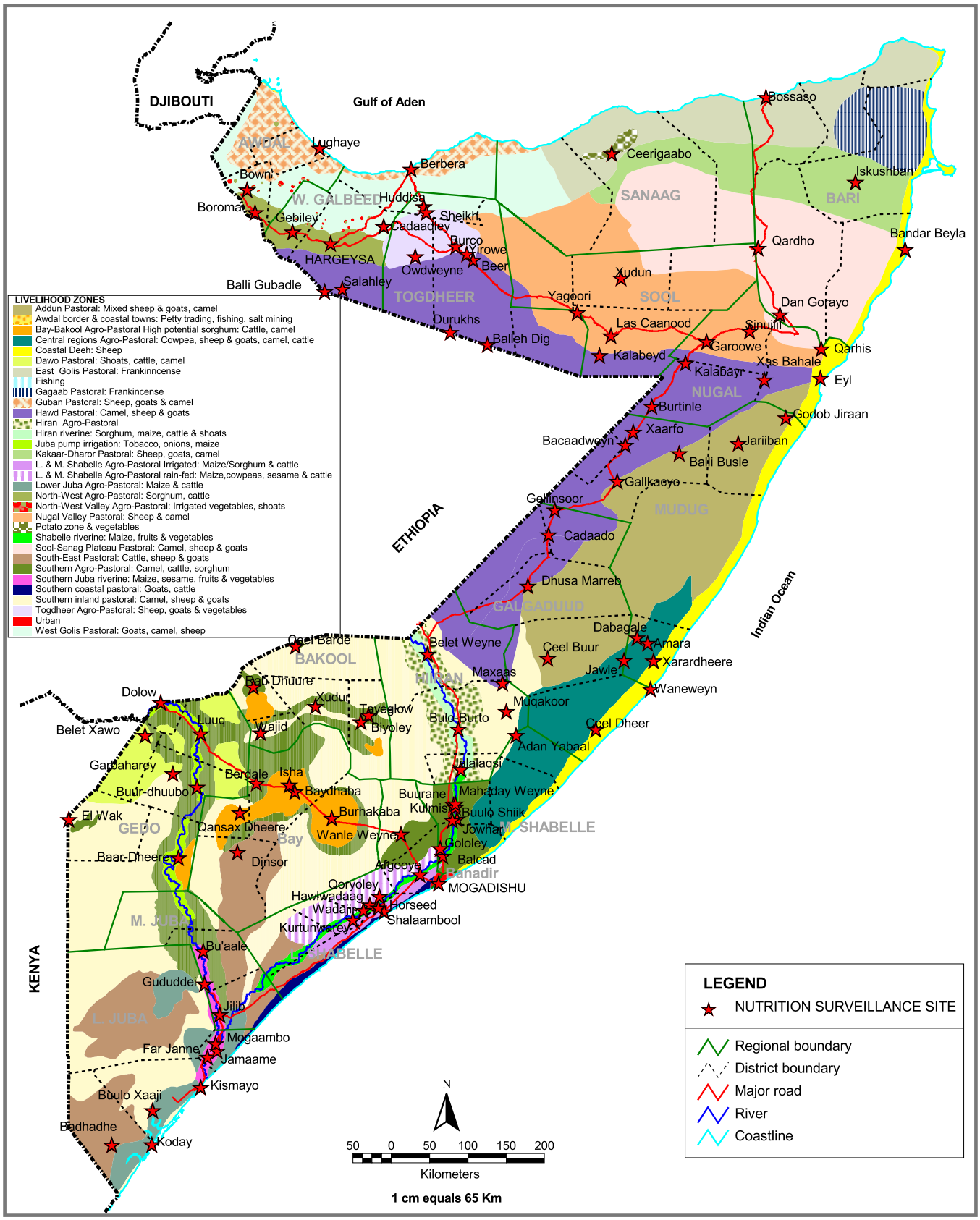

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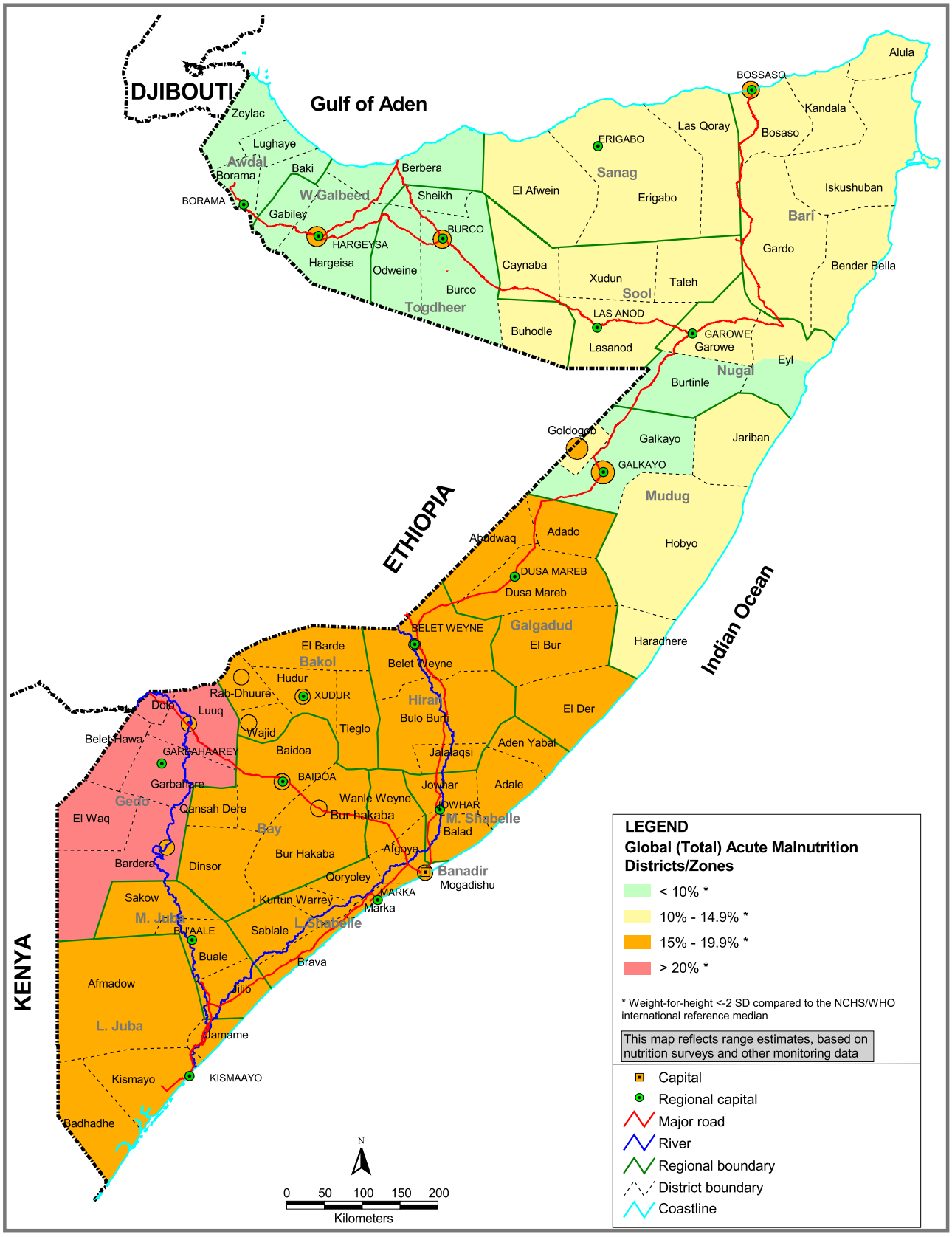
Figure 5 Somalia: Nutrition status trends (1999-January 2005)



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Food Security Analysis Unit for Somalia
P.O. Box 1230, Village Market, Nairobi
Tel: +254 (020) 374–1299 Fax: +254 (020) 374–0598
Email: fsauinfo@fsau.or.ke
Website: www.fsausomalia.org

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