World Food Programme

Food and Nutrition Handbook

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INTRODUCTION

The World Food Programme is the food aid organisation of the United Nations. Food is the primary input into programmes it supports, while nutrition is a core outcome. WFP's mission is to use food aid for three strategic goals:

- *to save the lives of people caught up in humanitarian crises, through Food-For-LIFE;*
- *to support the most vulnerable people at the most critical times of their lives, through Food-For-GROWTH; and*
- *to help the hungry poor become self-reliant and build assets, through Food-For-WORK.*

Through all three of these goals, WFP focuses on the most vulnerable: women, children and the elderly.

WFP works closely with a wide range of partners and has signed Memoranda of Understanding (MOUs) and Letters of Agreement with many United Nations organizations, intergovernmental, non-governmental organizations and national entities. Two of the most important MOUs which are utilised in a wide range of emergency food and nutrition programmes, have been signed with UNHCR and UNICEF.

This handbook is aimed at WFP staff at all levels who are involved with the delivery of food assistance to WFP beneficiaries. It should serve as both a reference and training manual, providing staff with:

- A better understanding of food and nutrition issues as they relate to WFP.
- A practical tool to tackle a number of basic nutrition related tasks, relevant to situations in which they work.
- The ability to judge when specialised nutrition advice should be sought.

The handbook will enable staff to assess and analyze the nutrition situation in their country or region of responsibility and help manage the design, implementation, monitoring and evaluation of interventions.

The handbook has been designed as a stand-alone document, referring to other WFP operational guidelines where relevant. It is not, however, a substitute for expert technical consultation or for other key reference material on the subject of nutrition (e.g., UNHCR and WHO documents, and the SPHERE Minimum Standards for Humanitarian Assistance, 1998). Each chapter includes a list of relevant readings.

The handbook is divided in two sections.
Chapters 1-5 are concerned with basic food and nutrition concepts and the process of assessing and analysing types of nutritional problem and their causes. The second section, Chapters 6-11, covers the practical applications of nutrition interventions: the range of nutrition related programmes supported by WFP, the tools for planning an adequate ration, selective feeding modalities , general food distribution, and the core principals of nutrition information, education and communication as complementary intervention strategies.

Each chapter begins with a statement of purpose, and a summary. A list of learning objectives at the start of each chapter indicates the knowledge or skills WFP staff might be expected to gain from reading that chapter.

1 BASIC NUTRITION CONCEPTS

The purpose of this chapter is to provide a common understanding of basic concepts in nutrition.

Summary

This chapter describes the difference between macronutrients and micronutrients and briefly explains their role and importance in the diet. All foods are made up of five nutrients: protein, fats, carbohydrate, vitamins and minerals. Water is also essential to life.

Learning objectives

After reading this chapter, WFP staff should be able to:

- Understand the differences between macronutrients and micronutrients, and give examples of each.
- Identify the main food sources of macronutrients and of key micronutrients, including vitamin A, iron, iodine, and vitamin C.

Nutrients

All foods are made up of a combination of macronutrients (protein, fat, carbohydrate) and micronutrients (vitamins and minerals). Together with water, these nutritients are essential for life.

Macronutrients

Macronutrients consist of carbohydrate, protein and fat. These nutrients form the bulk of the diet and supply all the energy needed by the body.

Carbohydrates are made up of carbon, hydrogen and oxygen. They are burned during metabolism to produce energy. Carbohydrates in the human diet are mainly in the form of starches and sugars. For many (poorer) people in the developing world, carbohydrate is the main source of energy, accounting for as much as 80% of the food they eat.

Fats are also comprised of carbon, hydrogen and oxygen. The term fat encompasses all fats and oils that are edible and found in human diets. Fats in the body are divided into two groups: storage fat, which provides a reserve of fuel for the body; and structural fat, which is part of the essential structure of cells. In developing countries, dietary fat provides a smaller part of total energy (8 to 10%,) than carbohydrates.

Proteins are made up of 'building blocks' called *amino acids*, composed of carbon, hydrogen, oxygen and nitrogen (amino group). Proteins from different food sources contain different amounts of amino acids. Proteins from animal origin, such as meat, milk and eggs, contain all *essential amino acids* in balanced amounts. Essential amino acids are those that the body cannot make itself and must therefore be eaten. In contrast, proteins of vegetable origin (e.g., cereals and pulses) contain on their own insufficient quantities of some of the essential amino acids. By combining different foods, however (e.g., cereals with beans), adequate levels of all amino acids can be obtained without requiring protein from animal sources.

Proteins are required to build new tissue, particularly during the rapid growth period of infancy and early childhood, during pregnancy and nursing, and after infections or injuries. Excess protein is burned for energy.

Energy provided by macronutrients

Energy is needed for the essential body functions (such as breathing), growth (especially during childhood), and physical activities (working and playing).

Macronutrients provide different amounts of energy, expressed as kilocalories (Kcals). Fat provides approximately twice as much energy (9 kcals/g) as the same weight of protein or carbohydrate (4 kcal/g). As stated above, more carbohydrate than fat is usually eaten in developing countries and, therefore, most food energy in the diet in these countries is derived from carbohydrate sources.

The relative concentration of protein and fat in the diet is important and is expressed by the percentage of energy in the diet provided by either fat or protein. For example, if a diet provides 2,000 kcal, of which 200 kcal is provided by fat, that fat is described as providing 10% of total energy. Chapter 8, Planning Food Rations, describes the optimal nutritional composition of a ration in terms of energy, protein and fat.

Energy and protein requirements

The total amount of energy and protein needed by different individuals varies a great deal, depending primarily on the amount of physical activity but also on age, sex, body size and, to some extent, climate (see Chapter 8 and Annex 8.1). Extra energy is needed during pregnancy and lactation.

Micronutrients

Micronutrients include all vitamins and minerals. Required in only tiny amounts, they are nonetheless essential for life and needed for a wide range of body functions and processes. Vitamins are either water-soluble (e.g., those found in fruits and vegetables such as the B complex vitamins and vitamin C) and generally not stored by the body for future needs, or fat-soluble (e.g., vitamins A and D), which can be stored by the body.

Micronutrient deficiencies are widespread and affect large numbers of people in developing countries. Approximately 2 billion people worldwide suffer from some kind of micronutrient deficiency, causing a wide array of disorders and increasing the risk of death, disease and disability. For example, between 250,000 and 500,000 children a year become blind because of vitamin A deficiency. One quarter of the world's people consume insufficient iodine, causing not only widespread endemic goitre but also retarding growth and mental development; in its extreme form, this retarded mental development is known as cretenism. Anaemia, or iron deficiency – characterised by breathlessness and fatigue - is also prevalent worldwide and, unlike deficiencies in vitamin A and iodine, occurs in both industrialized and developing countries

Micronutrients are variously distributed in food. Some micronutrients, such as riboflavin, are widely available in a range of foods and hence deficiencies of these are extremely unusual. Deficiencies are more common when a particular micronutrient, such as Vitamin A, is found in only a limited range of foodstuffs. Table 1.1 lists the most important micronutrients, their functions, and sources. Annex 1.1 provides more detail.

An individual's requirement for different micronutrients depends on age and sex. There are also key periods when micronutrient requirements increase: pregnancy and lactation, early infant and child growth, and during certain illnesses. Annex 1.2 and 1.3 contain tables of vitamin and mineral requirements. There is a risk of toxicity with excessive intakes of some micronutrients; a high intake of vitamin A, for example, is especially dangerous for pregnant women as damage to the growing baby can occur.

Table 1.1 Major Micronutrients: Functions, Sources

Vitamin A	
Function	Vitamin A is a fat-soluble vitamin required for the normal functioning of the eyes, the immune system, growth and development, maintenance of healthy skin, and reproduction.
Forms	Vitamin A is present in food in two forms: as preformed vitamin A (retinol) contained in foods of animal origin and easily absorbed; as carotenoids (largely β-carotene) contained in plant foods, these can be biologically transformed to vitamin A but are less easily absorbed
Sources	Retinol is chiefly found in dairy products, liver and some fatty fish. Carotenoids are found in yellow and red fruits and vegetables, and in green leafy vegetables, especially the green outer leaves. Vitamin A is absent in vegetable oils with the exception of red palm oil and fortified vegetable oils or margarine.
Vitamin C	
Function	Vitamin C is a water soluble vitamin and serves a number of essential metabolic functions. It also assists in absorption of non-haem iron and is an important anti-oxidant.
Sources	Fresh fruit and fruit juices are the richest sources of vitamin C, but amounts vary greatly in different fruits.
Niacin	
Function	Niacin is water-soluble and plays a central role in the utilization of food energy.
Sources	Niacin is widely distributed in plant and animal foods, but only in small amounts. Meat (especially offal), fish, milk and groundnuts are rich sources of niacin. Dried fruits, nuts and pulses contain smaller amounts.
Thiamin	
Function	Thiamin is water-soluble and is required mainly for the metabolism of carbohydrate, fat and alcohol. It is also necessary for the proper function of the nervous system and the heart.
Sources	Unrefined cereals, yeast, nuts, legumes, organ meats (e.g., liver and kidney).
Riboflavin	
Function	Riboflavin is water-soluble and is a component of enzymes, which play a role in the utilization of food energy.
Sources	Riboflavin is plentiful in animal foods, green vegetables, and whole wheat. Poor sources are maize, rice and highly refined flour.
Iodine	
Function	Iodine is an essential constituent of hormones produced by the thyroid gland in the neck. In the foetus, iodine is necessary for the development of the brain and nervous system during the first three months of gestation.
Sources	The level of iodine in the soil determines its content in plants and animals. As most soils contain little iodine, most foods are poor sources. The only rich source of iodine is seafood.
Iron	
Function	Most of the iron in the body is present in red blood cells. The main function of iron is the transfer of oxygen to various sites in the body. Lack of iron eventually results in anaemia.
Sources	Meat, fish, eggs, pulses, green leafy vegetables and fortified blended foods are good iron sources. Cereals contain moderate amounts. Milk is a poorer source.

The body's response to a deficiency of a particular nutrient varies. Chapter 4 describes types of malnutrition caused by deficiencies in both macro and micronutrients. Annex 1.4 provides more detail of micronutrient deficiencies.

The ability of the body to absorb and utilize certain micronutrients in food depends on four factors:

- *The form of the nutrient in food.* For example, iron in meat (haem iron) is much more easily absorbed than iron contained in plant foods (non-haem iron).

- *Other items in the diet, which either enhance or inhibit absorption.* For example, the absorption of iron from plant foods is enhanced by eating foods high in vitamin C like oranges or tomatoes, but inhibited by compounds such as tannin (present in tea) and phytate (present in cereals).

- *Infection.* A number of infections adversely affect the body's ability to absorb nutrients. For example, persistent diarrhoea prohibits absorption of both macro and micronutrients.

- *Food preparation methods.* Some methods of food preparation can enhance the availability of micronutrients. Table 1.2 shows the effects of storage and cooking on the micronutrient content of food commodities.

Table 1.2 Effects of Storage and Cooking on the Micronutrient Content of Food Commodities

Food commodity	Adverse effects/practices	Beneficial effects/practices
Cereals	Milling reduces folate, iron, niacin, riboflavin and thiamin content plus other trace micronutrients (calcium, phosphorus, pyridoxine, vitamin E and zinc) Excessive washing and cooking of rice reduces B-complex vitamin content	Fermentation increases the availability of iron, zinc, calcium and phosphorus and increases B-complex vitamin content Treating whole maize with lime-water before grinding releases bound niacin Parboiling unhusked rice after preliminary soaking preserves B-complex vitamin content Minimising or consuming water used for washing and cooking rice reduces losses of B-complex vitamins
Pulses	Cooking reduces folate and niacin content	Sprouting (germinating) beans increases vitamin C content
Oil	Vitamin A content in fortified fats and red palm oil is reduced during frying at very high temperatures Storage for more than 6 months reduces the vitamin A content of fortified fats and red palm oil	
Fortified blended food	Storage for more than 6 months reduces micronutrient content Cooking reduces micronutrient content	

Key Words

Anaemia	Anaemia can be caused by lack of iron, folate or vitamin B12. Though difficult to diagnose accurately from clinical signs, its symptoms include pallor, fatigue, headaches, and breathlessness.
Carbohydrate	Carbohydrates are macronutrients in the human diet, mainly in the form of starches and sugars.
Fat	Macronutrient including all fats and oils that are edible and occur in human diets.
Macronutrient	Including carbohydrate, protein and fat, macronutrients form the bulk of the diet and provide all energy needs.
Micronutrient	Micronutrients include all vitamins and minerals and, in small amounts, are essential for life.
Nutritional equirements	The amount of energy, protein, fat and micronutrients needed for an individual to sustain a healthy life
Protein	Proteins, made up of 'building blocks' called *amino acids*, are required to build new tissue.

Key Readings

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2 FOOD GROUPS AND FOOD AID COMMODITIES

The purpose of this chapter is to describe the food groups and the common food aid commodities which correspond to them. It also describes less usual commodities sometimes used in emergency situations.

Summary

For convenience, nutritionists divide foods into key food groups: cereal grains, legumes (pulses) and oilseeds, tubers and roots, vegetables and fruits, animal products oils and fats. Breast milk is an essential food for small children. A combination of these food groups is required for a healthy diet. Food aid baskets strive to ensure a proper combination of commodities. Ready-to-eat- meals are sometimes used in emergency situations.

Learning objectives:

After reading this chapter, WFP staff should be able to :

- Describe the key food groups in the diet and related food aid commodities
- Identify the uses and constraints of Ready to Eat Meals

Key Food Groups

The nutritional value of a diet depends on the individual foods that are included. For practical purposes nutritionists divide foods up between a number of 'food groups', a combination of which must be consumed on a daily basis to ensure a healthy diet and prevent malnutrition. These key food groups and the corresponding food aid commodities provided by WFP are shown in Box 2.1.

Cereal grains

Cereal grains - including wheat, rice, sorghum, maize, oats and millet - comprise the bulk of food aid delivered by WFP. As the staple food in most food aid contexts, cereals provide the largest proportion of energy in the diet, a large part of the protein, and significant amounts of micronutrients. The levels of micronutrients present depend on the type of cereal and the *extraction rate* during milling or other processing. The higher the extraction rate, the less whole cereal grain remains and, in general, the lower the level of micronutrients.

Whole grain cereals may be processed commercially to form a variety of food aid commodities:

- A range of flour and meal;
- Parboiled rice;
- Bulgur wheat;
- Soya-fortified cereal grains; soya-fortified bulgur wheat, soya fortified wheat flour (SFWL), and soya fortified corn meal (CFCM), and soya-fortified sorghum grits (SFSG);
- Blended foods, produced by extrusion, or roasting and milling (see below and also Annex 2.1).
- Pasta.

Processed cereals are usually quicker to cook and, therefore, more fuel efficient than their unprocessed counterparts. However, processed cereals are much more susceptible than whole grain cereals to

Box 2.1: Key Food Groups in the Diet

Food Group	Description	Examples (Common WFP food aid commodities in italics)
Cereals	Cereals are the staple food and main source of energy for most cultures. They also contain protein, B vitamins and iron.	*Wheat, sorghum, maize, rice, cereal flours, processed cereal grains, soya fortified grains.*
Legumes and oilseeds	Dried legumes are composed of about 20% protein and are rich in the B-complex vitamins and iron. The protein in legumes complements the protein in cereal grains. Generally, oilseeds and nuts contain fewer toxins and more and better quality protein than most legumes.	*Beans, peas, lentils, groundnuts*, soya beans, sesame, sunflower seeds, coconut.
Tubers and roots	Tubers and roots provide mainly carbohydrates; their protein content, like that of cooked rice, is usually low.	Yams, taro, cassava, sweet potato, Irish potato.
Vegetables and fruits	Fruit and vegetables are an excellent source of vitamins A (in the form of carotenes), B, and C, and iron and calcium. The darker the colour - whether green, yellow, or orange - the higher the vitamin A value.	Wide range available, green leafy vegetables, onions, brassicas (e.g., cabbages and broccoli).
Animal products	Animal products provide high quality protein, but are usually only eaten in small amounts in most developing countries.	Meat, eggs, poultry, fish, milk and milk products *(canned meat, fish and cheese, dried milk).*
Oils and fats	Oils and fats improve the palatability of the diet and are a concentrated source of food energy. Fat from milk is a rich source of vitamins A and D. Vegetable oils and fats do not contain these vitamins unless fortified.	Oil from: *groundnut, soya, sunflower, rapeseed or a mixture of these.* Animal fats*, butter oil.* *Red palm oil.*
Breast milk	Human milk is the best and safest food for infants. It satisfies their nutritional requirements up to around 6 months of age. Breastfeeding should be actively promoted, supported and protected.	

The nutritional value and use of these different foods are briefly considered below.

biological and chemical deterioration. Because they are also more susceptible to insect attack, care must be taken to keep these products clean and uncontaminated. Some processed cereals are fortified with vitamins and minerals (e.g., bulgur wheat, cornmeal, and soy-fortified cereals are enriched with B vitamins, vitamin A, iron and calcium).

Legumes and oilseeds

Pulses (peas, beans, and lentils) are rich sources of protein. When complemented with the protein found in cereals, an adequate level of amino acids can be achieved in a diet. Dried pulses commonly handled by the WFP include haricot beans, grams, horse beans, butter beans, groundnuts and lentils. Pulses require careful preparation to make them palatable, safe and digestible. They must be pre-soaked, hence the need for containers and water. They often require lengthy cooking, which increases the demand for cooking fuel. Less cooking time is needed for pulse flour and for split peas (particularly

pre-cooked yellow-split peas, a commodity sometimes provided by WFP), lentils and grams. The addition of small amounts of sodium bicarbonate, or traditional soda (ash), during cooking of pulses greatly reduces cooking time, but the alkaline pH degrades/ destroys thiamin (B-1) and riboflavin (B-2).

Groundnuts are easier to prepare than many dried beans and are an important source of niacin in maize-based diets where pellagra may be a risk.

Blended foods

Blended foods are a processed mixture of cereals and other ingredients (e.g., pulses, oilseeds, dried skimmed milk, and possibly sugar and or some kind of vegetable oil) that have been milled, blended, and pre-cooked by extrusion or roasting. All blended foods were originally designed to provide protein supplements for weaning infants and younger children or for low-cost weaning foods in developing countries. The main blended food distributed by WFP is corn-soya blend (CSB) from the USA, but WFP also purchases locally produced blended foods (e.g., Indiamix, UNIMIX, Unilitho, Famix, Lukuni Phala). Some of these products are now used in the general ration for adults and children as a means of providing an additional source of micronutrients. Blended foods are also used in nutritional rehabilitation programmes.

Blended foods should comply with the ‘’Guidelines on Formulated Supplementary Foods for Older Infants and Young Children” of the Codex Alimentarius. The nutritional value per 100g dry product should be 400 kcals, 15% protein, 6% fat and a vitamin and mineral complex. The production and specifications of blended food are covered in chapter 3 and Annex 2.1.

Oils and fats

Oils and fats are essential for improving the palatability of the diet and for increasing its ‘energy density’ (proportion of calories to weight) as oils provide 9 kcal per gram (in contrast to carbohydrate and protein which only provide 3.5 and 4.0 kcal respectively per gram). The vegetable oils most commonly used as food aid are soya bean oil and rapeseed oil. Butter oil has had the protein and moisture removed, rendering it 100% butterfat (butter is only about 85% fat). Margarine, a butter substitute, is obtained by processing vegetable oil into hardened fat in which water (20%) is emulsified to make it spreadable; it may liquefy again in hot climates. Conversely, butter oil may solidify at temperatures below 20^{o}C.

Cooking oils are susceptible to rancidity; therefore, lightproof and airtight packaging is required. Metal cans, food grade plastic bottles or jerrycans are the most suitable containers.

Animal products

Canned meat, fish and cheese are expensive and rarely available in sufficient quantities to be used in general food distribution programmes on a regular basis, unless specific donations have been made for that purpose. These products are considered ‘commercially sterile’ and hence safe because of the heat treatment they receive during processing. Cans that are badly rusted, perforated (holed) or swollen should be discarded. Any canned food which appears defective or in any way spoiled should not be eaten. Processed cheese should be kept as cool as possible.

There are many types of dried fish used as food aid, usually in small amounts. Those processed in warm climates will frequently be salted and sun-dried or smoked, whilst stockfish of Scandinavia and Canada will be unsalted and wind-dried.

Milk products

Milk products, including dried milk powders, are a rich source of quality protein, calcium and certain vitamins. Reconstituted milk is obtained by combined dried skimmed milk (DSM) with butter (or vegetable) oil. DSM should not be combined with water only; this produces skim milk containing less fat, and therefore less energy, than whole milk. The two products are not interchangeable. For emergencies, DSM is used to fortify cereals or porridges. It must be fortified with vitamin A to ensure it provides similar levels to those found in whole milk. It can also be used for therapeutic purposes when combined with a suitable oil, sugar and a vitamin/mineral preparation to make a high-energy mix. Guidelines for the use of milk powder are described in Annex 2.2

Infant formula

Infant formula is a product designed and manufactured in accordance with the Codex Alimentarius standard to substitute for human milk in meeting the normal nutritional requirements of infants

WFP complies with international guidelines on the protection and promotion of breastfeeding. For this reason, *WFP staff must never accept or distribute infant formula*. Please see Annex 2.3 for policy guidelines on infant formulas and breast milk substitutes

Emergency Rations / Ready-to-Eat Meals

Emergency rations are usually nutritionally balanced, ready-to-eat complete foods. They generally come in two forms: as compressed, vacuum packed bars or tablets made from a range of ingredients (typically, wheat flour, whole milk, sugar, dried milk products, soya flour, malt extract, fish powder, vitamins and minerals); or as more complete ready-to-eat meals (Meals Ready-to-Eat, or MREs, are the most commonly used) with several different items.

These rations are the most expensive food aid commodity distributed by WFP and are usually reserved for immediate response during the first few days of a sudden disaster or the displacement of large numbers of people.

Usually these products contain high quality protein, fat and carbohydrate with added vitamins and minerals. Vacuum packing in foil laminates ensures a shelf life of up to five years. The most commonly available emergency rations are known by their commercial acronyms (e.g., HEBs, BP5s, HDRs and MREs). They are discussed below.

Emergency ration biscuits or tablets: HEBs (high energy biscuits)/ HPBs (high protein biscuits)

HEBs and HPBs are essentially the same products, the difference being that the preferred term nowadays is “high energy” rather than “high protein” biscuits. The earlier emphasis on the word protein stems from the time when lack of dietary protein was erroneously thought to be the main cause of malnutrition.

All HEBs distributed by WFP must meet the following standards: 450 kcal with a minimum of 10 grams and maximum of 12 grams of protein per 100 grams. All HEBs are fortified with essential vitamins and minerals (50% - 75% maximum of the adult recommended daily requirement).

Biscuits have a limited number of uses. Their main use is for WFP is as emergency rations in the first days of an acute emergency or as a food to be carried by returnees or other populations during transit. A secondary use is in therapeutic feeding programmes for night feeds, or for take-home supplements to encourage appetite.

Biscuits are very expensive compared with other ration items and are not an essential part of an adequate food basket. Apart from the limited uses described above, it is generally culturally and economically inappropriate to distribute biscuits as a main source of nutrients.

Biscuits for humid areas should be packaged with a moisture barrier to prevent an increase in moisture content and subsequent deterioration. A sturdy outer package (cardboard carton or tin) is required to resist breakage. Because of the high fat content of biscuits, lightproof and airtight packaging is required to avoid rancidity. The packaging and shelf life of biscuits varies. Longer shelf lives (3-5 years) are achieved with the tins and the preferred packaging is metal containers (usually10kg), but they may come in foil wrapped packets of 200-250 grams in cardboard cartons (shelf life of at least one year and usually two). One ton costs US$1000-1200.

BP-5

BP-5s are compressed tablets, vacumn packed in foil. BP-5s contain, 458 kcal; 15,5 grams of fat and 16,7 grams proteins per hundred grams, they are also vitamin and mineral fortified. Because they are packed in foil they are moisture proof and resistant to germs, insects and rodents. They are boxed in 500 gram blocks each block containing 9 bars.

The bars are a pale blond colour and because all moisture is removed during processing they are very dry. *They need to be eaten slowly and chewed well. Water must be provided with them.* The manufacturers recommend 100-150 mls of water for each two biscuits consumed. If they are to be eaten by infants, it is advisable to dissolve them in boiling water and make them into a porridge.

BP-5s are distributed to needy populations in terms of grams rather than ration size. Amounts vary according to the needs of the population receiving the BP-5s. Six bars of BP-5 biscuits (330 grams, 1,500 kcal) per day provide all the necessary nutrients for short-term maintenance of a healthy body. One ton of BP5s costs US$3,000.

Ready-to-eat meals: HDRs (humanitarian daily rations) and MREs (Meals Ready-to-Eat)

HDRs were developed by the United States Department of Defense and are specifically designed to meet the nutritional needs of civilians in humanitarian crisis. One HDR provides about 1900 - 2000 kcal and an adequate supply of protein, fat and essential micronutrients (vitamins and minerals) – enough to cover the average daily needs of one civilian individual. They contain no animal products.

Each HDR contains two entrees and five complementary products. To provide variety, 4 different entrees in 6 different combinations are available. The HDRs come in a toughened, waterproof plastic bag. They are very difficult to open without a knife or scissors. The food is contained in individual vacuum-sealed packets.

The major problem with these products is that the food items contained are unfamiliar to many emergency affected populations and, therefore, some food may be discarded by the beneficiaries. The plastic packages are also difficult to dispose of. One day's ration costs US$4.

MREs (Meals Ready-to-Eat):

MREs are army rations that are designed to provide 1 meal 3 times per day (3,600 kcal). Their packaging, presentation and constraints are similar to HDRs (see above); however, unlike HDRs, MREs contain fish and meat products. There are over 25 different varieties. A one days MRE ration costs US$13.

Salt, Sugar and Tea

Sugar can play an important role in the diet by improving palatability and, particularly in the case of a child's diet, energy density. For take-home supplementary feeding programmes, sugar is often added to blended foods - together with oil - to produce porridge pre-mix. The importance of sugar for palatability should not be underestimated: blended foods without sugar are sometimes not acceptable to children. Though sugar contains no nutrients other than carbohydrate, it is nevertheless important for increasing the energy of foods for young children. This is particularly relevant for high energy milk and high energy porridge used in therapeutic feeding programmes. By adding sugar to milk, additional energy is provided within the same volume of milk.

Similarly, salt improves palatability and, when iodized, serves a crucial nutritional function. WFP policy requires the use of iodized salt (fortified with iodine) in its food rations. For practical purposes (stability), iodine for salt fortification is used in the form of iodate. Levels between 20 to 40 mg iodine/kg salt or 20 to 40 mg iodine/ g salt are recommended (WHO/ UNICEF/ ICIDD Consultation, 1997). This level is based on 10 g. or salt per person, per day.

Tea and coffee make virtually no nutritional contribution to the diet, although they may serve as a vehicle for milk or sugar. In general, WFP does not provide tea and coffee in its rations.

Annex 2.4 shows the WFP commodities list and their corresponding nutritional value.

Key Words

Basic food items	Basic food items include: cereals, oil, and a protein-rich food such as pulses (beans/peas etc.) and/or fish/meat in canned or dried form.
Blended food	Blended foods are a pre-cooked, fortified mixture of cereals, pulses, oilseeds and other ingredients (e.g., wheat soy blend, corn soy blend, UNMIX, FAMIX).
Infant formula	Any food being marketed or otherwise represented as a partial or total replacement for breast milk, whether or not suitable for that purpose. Infant formula should be produced in accordance with the Codex Alimentarius standard, though its use is not sanctioned in WFP projects.
Ready to Eat Meals	Emergency rations that are usually nutritionally balanced, ready-to-eat complete foods. They are often compressed, vacuum packed bars or biscuits made from a range of ingredients (e.g., whole milk, sugar, dried milk products, soya flour, malt extract, fish powder, vitamins and minerals)
Extraction rate	The extraction rate is the proportion of the whole cereal grain available as final product (rice, flour) after the milling process. This varies according to the type of cereal and the milling process and effects the level of micronutrients present in the final product.
Parboiled rice, bulgar wheat	The process of *parboiling* involves soaking, steaming and drying the grain; in the case of rice, it preserves a higher proportion of nutrients in the grain compared with polished or highly refined rice; bulgar is gelatinized wheat grits which during cooking retain their granular consistency; they can be substituted for rice.

Key Readings

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3 FORTIFICATION OF FOOD AND BLENDED FOODS

The purpose of this chapter is to enable WFP staff to understand fortified foods and why their usefulness in a general ration.

Summary

WFP provides blended foods or other fortified commodities in order to prevent or correct micronutrient deficiencies and in situations where beneficiaries are totally dependent on food aid. There are a number of common fortified food aid items, including: iodized salt, vitamin A fortified oil, blended food, and cereals. Issues to consider in relation to utilising local versus imported fortified foods are reviewed, with particular focus on cereals and blended food.

Learning objectives

After reading this Chapter WFP staff should be able to:

- Understand the rationale for using fortified foods as a strategy for combating micro-nutrient deficiency diseases.
- Describe the range of fortified commodities commonly used by WFP in general rations, and list their main fortificants
- Assess the need for including fortified foods in a general ration
- Understand the advantages and disadvantages of fortifying foods locally

What is Food Fortification?

Food fortification is the process whereby one or more nutrients (vitamins or minerals) are added to foods during processing. This increases the nutritional value of the food without greatly increasing the cost or adversely affecting its taste or general acceptability. A food may be fortified to increase the level of specific nutrient(s) in a food or to restore nutrients lost during food processing (e.g., fortification of cereal flour and dried skimmed milk powder).

Why fortify foods?

WFP is committed to providing appropriately fortified food commodities in order to increase the intake of micronutrients, thereby improving micronutrient status and preventing damage caused by deficiency (see chapters 1 and 4). For populations entirely dependent on food aid, WFP policy calls for a basic general ration to provide appropriately fortified food commodities in order to ensure adequate essential micronutrients. In the past, the absence of fortified commodities has resulted in a number of epidemics of micronutrient deficiencies amongst food aid dependent populations (e.g., niacin in Mozambique and Angola; vitamin C in Somalia; riboflavin in Nepal).

Fortification is one of the least costly and most effective means of combating micronutrient deficiencies. A good example is the iodization of salt, which has been well established in many developed and developing countries. Where fortified foods are manufactured locally on a commercial basis, fortification has often proven to be economically sustainable.

Although fortification is well suited to increasing levels of micronutrients in the diet of the poor or emergency affected populations, it is not advisable to rely on a single food vehicle to eradicate deficiencies of all micronutrients. A range of food commodities should be fortified with different types and levels of micronutrients. Furthermore, while fortification represents an important tool to combat micronutrient deficiencies and improve micronutrient status, other tools are sometimes required or desirable.

Are fortified foods needed in the ration?

Where people are dependent on a general ration as their only source of food, it is likely to be deficient in certain micronutrients, particularly if it contains no fresh foods. The type of staple cereal included in the ration greatly influences the types of deficiency disease to which populations may be at risk.

These risks are likely to vary depending on the different nutritional requirements of the food aid population – for example, the very young, pregnant and lactating women and adult men all have different requirements.

Annex 3.1 shows the impact on deficiency risks of adding a range of fortified food to rations based on different staples.

It is possible, without undertaking a lengthy and detailed analysis, to make certain generalisations about expected micronutrient shortfalls in micronutrients based on the ration composition (see Table 3.1). But be aware that levels of micronutrients are subject to considerable variation, firstly as a result of possible lack of uniform mixing during production, and secondly as a result of losses during transport and storage. Fortified food products will be most effective in combating micronutrient deficiencies if they are tailored for the needs of particular groups. This includes ensuring foods are palatable, especially when they are for infants and young children.

Which foods are fortified?

Foods may be fortified with single nutrients (salt with iodine, vegetable oil with vitamin A) or with several vitamins and minerals (fortified cereal flour, blended food).

Levels of fortification are set on the basis that the vitamin or mineral added will make a significant contribution to nutritional requirements, but not lead to a micronutrient intake above the safe upper limit. In addition, fortification must not alter the taste, smell, look, texture, physical structure or shelf life of the food.

WFP policy calls for the provision of vegetable oil fortified with vitamin A and iodized salt when these items are included in the food basket. All DSM intended for direct utilisation by beneficiaries must be fortified with vitamin A; only DSM for dairy projects need not be fortified as this can be done during the processing. For all international purchases of cereal flours, WFP includes fortification with B-complex vitamins, folate and iron as a requirement of the tender. Annex 3.2 shows WFP fortification specifications for all commodities. All blended foods distributed by WFP are fortified with a pre-mix that provides essential micronutrients. In addition, WFP has recently devised specifications for the vitamin and mineral fortification of High Energy Biscuits.

Where the population is entirely dependent on food aid or is at risk of micronutrient deficiencies, blended food should be included in the general ration – except in cases when a suitable fortified cereal is provided. The use of fortified cereal flour reduces the dependence on blended food in the general ration, although blended foods are also provided in order to provide a suitable food for small children.

Table 3.1 Risks of Micronutrient Deficiency from General Rations and the Need for Fortified Foods

Risk	Possible food sources to be included in the ration; naturally occurring or fortified (f)
All food rations are likely to be deficient in *vitamin C* unless there is access to fresh fruit and vegetables, or fortified foods.	Fresh fruits and vegetables, blended food (f); 48 mg/100g
The bioavailability of *iron* is generally low (of the order of 5%) in all food rations composed largely of cereals and legumes. This may be improved if vitamin C rich foods are eaten simultaneously.	Blended food (f), green vegetables 0.7 – 2 mg/100g, lentils 7 mg/100g, rice 0.4 mg/100g
Situations where *iodine* deficiency disorders are endemic and most households (>90%) do not have access to iodized salt	Iodized salt (f)
All food rations are likely to be deficient in *vitamin A* unless fortified foods are included in the ration.	Vitamin A fortified oil (f). Blended food (f)
Where the staple is maize or sorghum, additional sources of *niacin* are required.	Groundnuts or pulses, offal, blended food (f), high energy biscuits (f), dried fish.
Where the staple is polished rice additional sources of *thiamine* are required.	Include parboiled rather than polished rice. Pulses, nuts, vegetables, eggs etc. Brewers yeast is a good source, so where cereals are fermented to make beer this may be a good source
Limited exposure to sunlight increases the risk of *vitamin D d*eficiency (rickets and osteomalacia), e.g. among women in purdah, or infants and children kept covered or indoors. Also found to occur among emergency affected populations previously dependent on milk as a major food source.	Sunlight on the skin. Fatty fish, canned fish, eggs, milk, margarine or oil (f), blended food (f)

Fortification of blended food

Blended foods are produced in many developing countries for local consumption as a complementary food for infants and young children. WFP often purchases locally produced blended food (e.g., *UNILITO* in Nepal, *Famix* in Ethiopia, *Likuni Phala* in Malawi, UNIMIX in Kenya, INDIAMIX in India). Blended food should be produced in accordance with the "Guidelines on Formulated Supplementary Foods for Older Infants and Young Children" of the Codex Alimentarius (see Readings). Processing instructions and product specifications for precooked fortified blended food are shown in Annex 2.1.

In practice, blended foods are procured from a range of sources. The nutritional compositions may vary (see Annex 3.3); however, energy, protein, fat and fortification levels must all meet the minimum standard. As such, all blended foods are interchangeable. Also, the final concentration of each vitamin and mineral in the fortified product depends on the naturally occurring level of micronutrients in the food after processing.

Because of the lack of international guidelines for the enrichment and fortification of food aid commodities, WFP, UNHCR and UNICEF have jointly agreed on specifications for the micronutrient levels in UNIMIX and other blended foods supplied by WFP. Annex 3.4 gives the levels of fortification in various blended foods, including those required by WFP.

The quality of locally produced blended foods has sometimes been cause for concern; hence, quality control measures are vital to ensure optimum product quality and levels of fortification. Quality problems have included infestation, coarsely milled products and flavour taints. The insistence of WFP that vitamin mineral premixes are purchased from reputable suppliers is one means of ensuring adherence to appropriate fortification levels.[1]

WFP policy requires that its local producers of blended foods and flours purchase the micronutrient premix from Roche, BASF or other reputable suppliers of vitamin/mineral pre-mixes. Producers must be able to show receipts or other proof of purchase. This ensures adherence to the WFP-recommended specification for fortification. Quality control measures to monitor and control the fortification process must be built in to the production procedures to ensure that fortification levels are adequate and uniform.

Local fortification of cereals

Cereal flour can be either fortified in the country of origin or the whole grain cereal may be transported, milled and fortified regionally or locally. At present, large-scale well established commercial flour millers in most developing countries either have the technology and experience to fortify cereal flours or can easily adapt their equipment for fortification of cereals. When required, WFP either brings in whole cereal grain to be milled and fortified centrally (the case in Bolivia) or, alternatively, fortified flour is purchased from existing regional sources (as from South Africa).

Table 3.2 The Advantages and Disadvantages of the Local Fortification of Cereals

Advantages of local fortification	Disadvantages
Cereals may be transported as whole grains to the local site of fortification, a benefit because: whole grains have a longer shelf life; bulk cereals are easier to handle than bagged flour, bulk cereals are less expensive to transport. (Milled flours are expensive to package, transport and handle, which explains their higher costs compared with the bulk handling of cereal grains.)	Additional resources are needed to cover the extra storage, transport and handling costs in country (bagging of bulk cereals at point of disembarkation, de-bagging for milling and fortification, re-bagging for onward transport and distribution).
Levels of fortificants may be more easily tailored to the needs of the population	The fortification technology may need to be brought in, which is costly and time consuming.
The closer the point of fortification and milling is to the site of use, the more easily it may be to match supply to demand.	The shelf-life of cereal flours with a high extraction rate is limited. Flours are sensitive to adequate packaging and storage. The capacity to mill and fortify locally may be insufficient to meet WFP's needs. The food aid pipeline to the point of fortification must be assured and reliable Additional management capacity is required to ensure logistical efficiency and quality control of the milling and fortification process.

1 This form of control is necessary as it is prohibitively expensive to analyse the micronutrient composition of foods post-production (it costs approximately $4,000 to have a full vitamin/mineral analysis). By insisting on a reputable/ known supplier of appropriate micronutrient compounds only the amounts of a single vitamin or mineral in the blended food need to be tested.

The technology to fortify cereals at the point of milling has yet to be developed at the community level, although research to develop this capacity is underway. In addition, a pilot project is being prepared by WFP to test milling and fortification of maize - with a mobile self-contained milling/ mixing unit - at distribution points of refugee and emergency operations.

Micronutrient Stability, Packaging and Shelf-Life

The stability of added vitamins in a food depends on, amongst other things: the storage temperature, the moisture content of the food, and the presence or absence of light. The product's packaging determines the last three conditions. To minimize micronutrient losses during storage and transportation, fortified food must be properly packaged.

Dried products like cereal flour, salt, blended food and milk powder easily become damp when improperly packaged under humid conditions. This causes deterioration. To prevent this, they should be packed in plastic lined, airtight bags or containers. Conditions of storage – adequate ventilation, separation from floors and walls, etc. – are probably equally important to maximizing shelf-life. Packaging such as jute, that allows the product to absorb moisture, partly accounts for the much shorter shelf-life of milled products in developing countries.

Packaging that excludes oxygen (vacuum packaging, packaging in tins etc.) ensures a longer shelf life. However, this is very expensive and is usually limited to specialised commodities like therapeutic milk and long shelf-life biscuits.

Fortification itself may also reduce the expected shelf-life of the product because of the instability created by added vitamins. Foods fortified with vitamin A - such as oil or blended food - have a shelf-life of six months after which time the potency of vitamin A decreases. This might mean the food does not comply with its original specification, although it may still be edible or fit for human consumption. Added minerals tend to be more stable than vitamins, as they are less sensitive to heat, light and other kinds of chemical stress.

The limited shelf-life of fortified foods means greater care must be taken to maintain the integrity of their packaging and to use these foods in a timely way, usually within six months of their production.

Key words

Bioavailability	Proportion of the ingested nutrient that is absorbed and available for use by the body.
Blended food	Blended foods are a pre-cooked, fortified mixture of cereals, pulses, oilseeds and other ingredients (e.g., wheat soy blend, corn soy blend, UNAMIX, FAMIX).
Enrichment	A food item is enriched where those micronutrients lost or removed during processing are added back or restored in the final product (e.g., wheat flour is enriched with vitamin B1, niacin and iron).
Food vehicle	The food to which fortificants are added.
Fortificant	The micronutrient compound that is added to a food either singly, or as part of a vitamin mineral premix.
Fortification	Fortification is the addition of micronutrients during or after processing to a food, bringing the micronutrients to levels over and above the amounts in the original food product.

Key readings

Guidelines on Formulated Supplementary Foods for Older Children and Young Infants CAC/GL 08-1991

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4 MALNUTRITION

The purpose of this chapter is to enable WFP staff to attain a common understanding of types of malnutrition and their underlying causes.

Summary

This chapter describes Protein Energy Malnutrition (PEM), the most common form of malnutrition among infants and young children and the most important vitamin and mineral deficiency disorders. The second part of the chapter presents a conceptual framework for analysing the causes of malnutrition. The immediate causes of malnutrition relate to food intake and infectious disease, while the underlying causes include: household food security, access to health services and the health environment, and factors related to the social and care environment.

Learning objectives

After reading this Chapter WFP staff should be able to:

- Describe briefly the two extreme manifestations of protein energy malnutrition, marasmus and kwashiorkor, and their main identifying characteristics.
- Identify the three micronutrient deficiency diseases of greatest public health importance worldwide as well as and three others which have occurred in populations dependent on food aid.
- Describe the immediate and underlying causes of malnutrition by employing a conceptual framework.

What is Malnutrition?

Malnutrition is a broad range of clinical conditions in children and adults that result from deficiencies in one or a number of nutrients. Malnutrition has been defined as,

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

In children, malnutrition is usually indicated by growth failure. Malnourished children are shorter and lighter than they should be for their age. Though many people still refer to growth failure as "Protein-Energy Malnutrition", or PEM, it is now recognized that growth may fail as a result of deficiencies of various micronutrients, not just the macronutrients energy and protein. There are two types of growth failure associated with malnutrition: wasting (acute malnutrition) and stunting (chronic malnutrition). These can be measured and classified by anthropometry, or using body measurements to assess nutritional well-being (see Chapter 5).

Protein-Energy Malnutrition is the most common form of malnutrition occurring among infants and young children. Mild PEM manifests itself mainly as poor physical growth, whereas individuals with severe PEM have high case fatality rates.

Marasmus and kwashiorkor are the two forms of protein-energy malnutrition. Both conditions may be distinguished by their own particular clinical characteristics.

Box 4.1: Types of growth failure

Wasting	Wasted children are extremely thin. Wasting is the result of recent rapid weight loss or a failure to gain weight. Wasting is readily reversible once conditions improve. Wasting is evidence of acute protein energy malnutrition. Wasting is measured by the weight-for-height index. Adults can become severely wasted
Stunting	Stunted children are short for their age. Stunted children may have normal body proportions but look younger than their actual age. Stunting develops over a long period as a result of inadequate nutrition or repeated infections or both. Unlike wasting, the development of stunting is a slow cumulative process and it may not be evident for some years, at which time the child's nutrition may have improved. By two years of age, height deficits may be irreversible. Stunting is measured by the height-for-age index.

The main distinguishing characteristics of kwashiorkor is oedema, or fluid accumulation in the body as a result of severe nutritional deficiencies. Oedema may be detected by pressing the thumb just above the ankle for three seconds; this will leave a definite pit. Loss of appetite is another common feature. Mental changes are also common, resulting in a child who is apathetic and irritable.

Malnourished Children
Note the oedema on the childs hands and feet, this is the key sign of kwashiokor a very serious form of malnutrition.

In addition, the child's hair becomes thinner and may change colour from black to light brown or red. His or her cheeks may seem to be swollen, giving a characteristic moonfaced appearance. Any child with kwashiokor is considered extremely malnourished and has a high risk of dying.

Marasmus is identifiable by severe weight loss or wasting. The ribs are very prominent, the limbs emaciated, and the muscles extremely wasted. In contrast, the belly appears protuberant. Marasmic children often have a good appetite and are quite alert. If treated correctly, a child suffering from marasmus has a good prognosis.

Some children present a mixed form of both marasmus and kwashiorkor, known as marasmic kwashiorkor.

Micronutrient malnutrition

Micronutrient deficiencies are widespread in developing countries. The most common deficiencies in the world are due to lack of iron (anaemia), vitamin A (xerophthalmia) and iodine (goitre and cretinism). Outbreaks of other types of deficiency disorders, although rare, have occurred, most notably in emergencies among populations entirely dependent on food aid. These include deficiencies of vitamin C (scurvy), niacin (pellagra) and thiamin (beriberi). Chapter 1 provides an overview of

Table 4.1 Micronutrient Deficiency Disease and Dietary Source from Food Aid Commodities.

Micronutrient	Deficiency disease	Source in food aid commodities
Iron	Anaemia can be caused by lack of iron, folate or vitamin B12. It is difficult to diagnose accurately from clinical signs, which include pallor, tiredness, headaches and breathlessness.	Cereals, pulses, fortified blended food
Vitamin A	Night blindness: inability to see well in the dark or in a darkened room. An early sign of vitamin A deficiency.	Fortified vegetable oil, blended food.
	Xeropthalmia, including Bitot's spots and corneal ulceration and night blindness. Vitamin A deficiency also weakens the immune system and hence increases the severity, complications and risk of death from measles, maternal mortality, etc	
Iodine	Cretinism: severe mental and physical disability which occurs in the offspring of women with severe iodine deficiency in the first trimester of pregnancy.	Iodised salt, CSB.
	Goitre: swelling of the thyroid gland in the neck caused by iodine deficiency.	
Niacin	Pellagra is caused by niacin deficiency which affects the skin, gastro-intestinal tract and nervous systems and is sometimes called the 3Ds: dermatitis, diarrhoea and dementia.	Cereals, pulses, nuts, fortified blended food
Thiamine	Beriberi[1] is caused by thiamin deficiency. There are many clinically recognisable syndromes including wet beriberi, dry beriberi and infantile beriberi.	Cereals, pulses, fortified blended food
Vitamin C	Scurvy is caused by Vitamin C deficiency. Typical signs include painful joints, swollen and bleeding gums, and slow healing or re-opening of old wounds.	Fortified blended food

1 Wet Beriberi: the main feature is pitting oedema, which may result in circulatory failure and death; Dry Beriberi: the patient is thin and wasted and has difficulty walking; untreated, the patient becomes bedridden; Infantile Beriberi occurs in breastfed infants under six months of age as a result of inadequate thiamine in the breastmilk. In its acute form, the infant dies of cardiac failure.

A malnourished man, note the skin lesions on his arm caused by niacin deficiency.

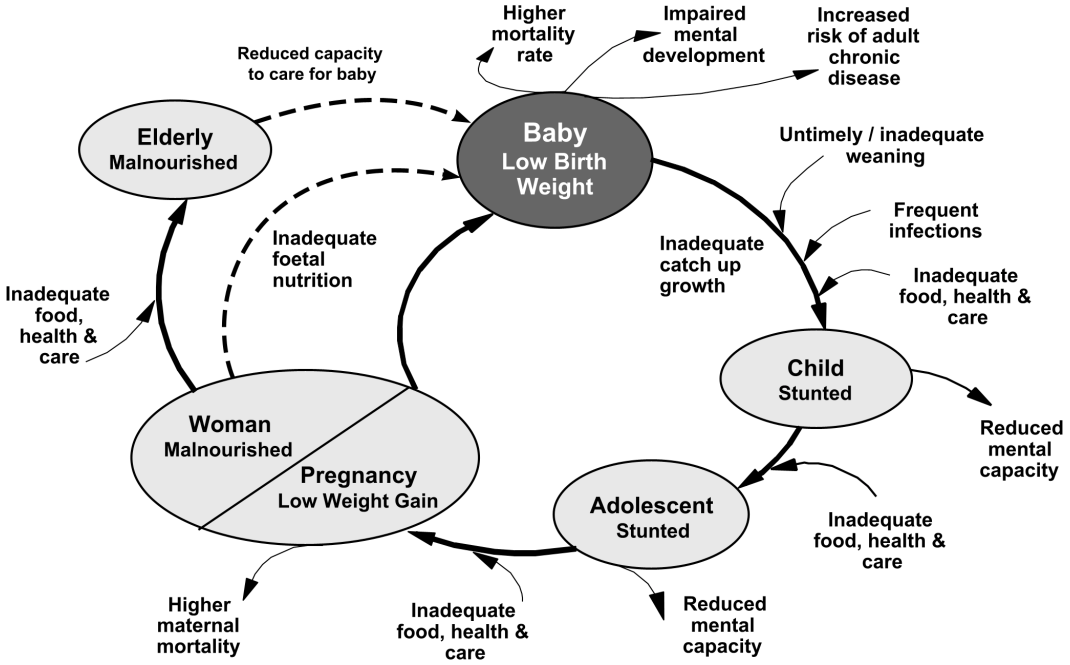
the main micronutrient deficiencies, while Annex 1.1 and 1.4 includes a more detailed picture of deficiency signs, indicators, and 'at risk' groups. Micronutrient requirements are given in Annex 1.2 and Annex 1.3. Table 4.1 lists some key micronutrients, the deficiency diseases that can result from insufficient quantities of these micronutrients, and key sources of the micronutrients in food aid commodities

Who is Most Vulnerable to Malnutrition?

Malnutrition, or the risk of becoming malnourished, may be transmitted from one generation to another. Small women give birth to small babies who, in turn, are more likely to become small children, small adolescents and, ultimately, small adults (Figure 4.1). While smallness may be genetically inherited, the vast majority of small individuals in most poor countries are small because they have suffered, or are currently suffering, from malnutrition. When considering approaches to combating malnutrition, it is important in the long-term to adopt a life-cycle approach.

A low birth weight (LBW) baby is effectively born malnourished and is at higher risk of dying in early life. By age five, s/he is more likely to be stunted (i.e. low height-for-age), a condition that will probably persist through adolescence and adulthood. The stunted child is likely to become a stunted adolescent and, later, a stunted adult. Stunted pregnant women are more likely to give birth to low birth weight babies. And so the cycle turns (Figure 4.1). This inter-generational cycle of malnutrition, maintained by poor and malnourished women (often unwittingly or against their will), underlines the importance of WFP's Commitments For Women which stress the importance of protecting and fulfilling women's rights to adequate nutrition. These commitments are described in Box 7.2 in Chapter 7.

Figure 4.1: Inter-generational Cycle of Malnutrition



Nutrition throughout the life cycle

Source: Commission on the Nutrition Challenges of the 21st Century (1999). Ending Malnutrition by 2020: An agenda for Change in the Millennium. Final Report to the ACC/SCN.

A child has food, health and care needs that must all be fulfilled if s/he is to grow well. Most growth faltering occurs between the ages of 6-24 months, when the child is no longer protected by exclusive breastfeeding. At this time, the child is more exposed to disease and infection through contaminated food or water and is dependent on the mother or caregiver for frequent complementary feeding. Unfortunately, even a child adequately nourished after age 2 is unlikely to recover growth "lost" in the first two years as a result of malnutrition.

The priority should be to prevent malnutrition from occurring among these 6-24 month old children because:

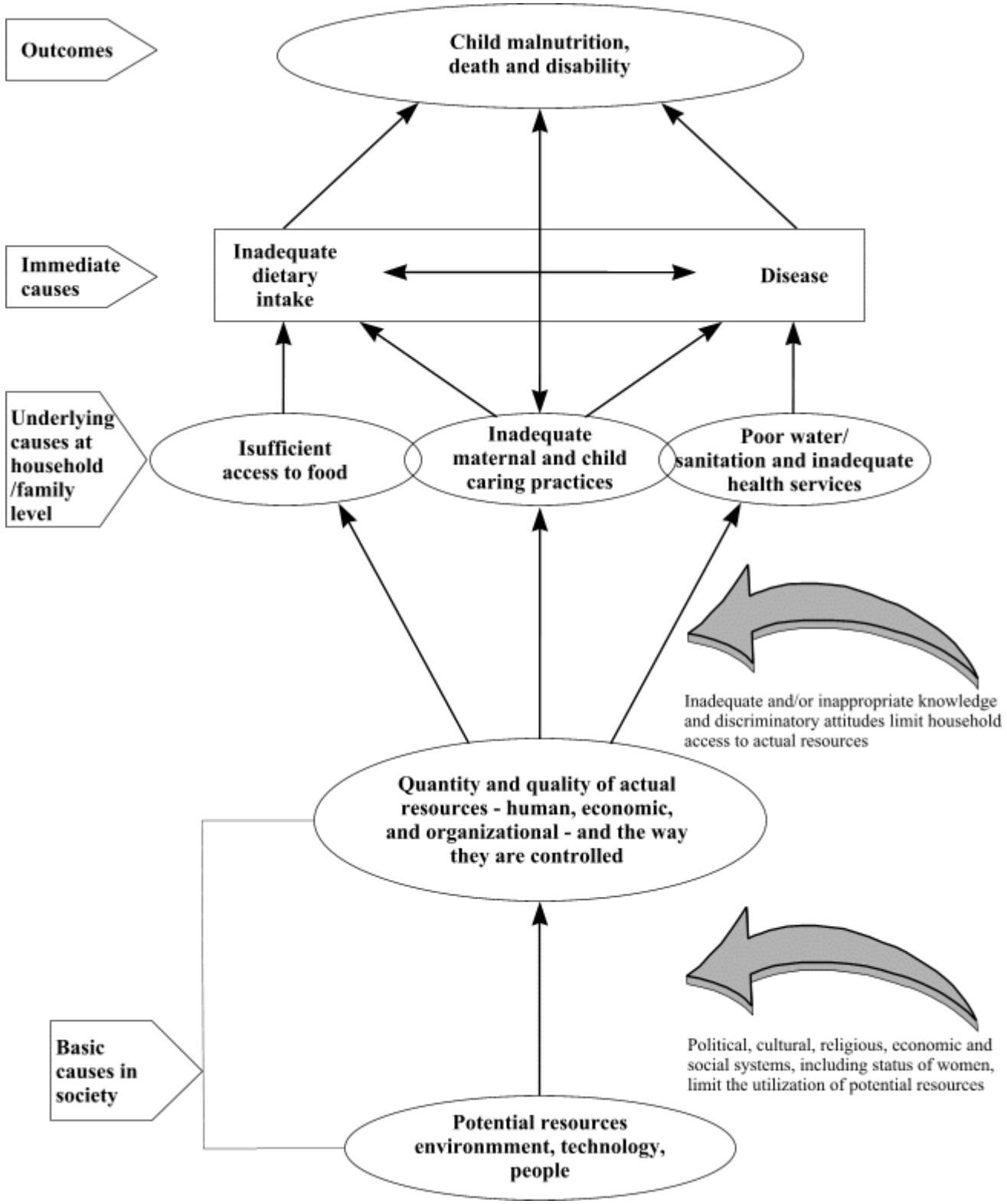
- growth failure cannot be significantly corrected later, and
- the consequences of malnutrition are most serious at this age

Causes of Malnutrition

Malnutrition is not synonymous with a lack of food. In an individual, malnutrition is the result of inadequate dietary intake, or infection, or a combination of both. These in turn derive from a combination of food, health, and care related causes at the household and community level. Figure 4.2 provides a conceptual framework for analysing malnutrition and its causes at different levels in society. It is relevant both to a development and an emergency context.

As reflected in Figure 4.2, health and nutrition are closely linked: disease contributes to malnutrition, and malnutrition makes an individual more susceptible to disease. Severe malnutrition especially increases the incidence, duration, and severity of infectious disease. The most common types of disease suffered by young children in both stable and emergency situations are: diarrhoea, acute respiratory infections, measles, and malaria. All of these conditions may contribute to malnutrition through loss of appetite, mal-absorption of nutrients, loss of nutrients through diarrhoea or vomiting, or through altered metabolism (which increases the body's need for nutrients).

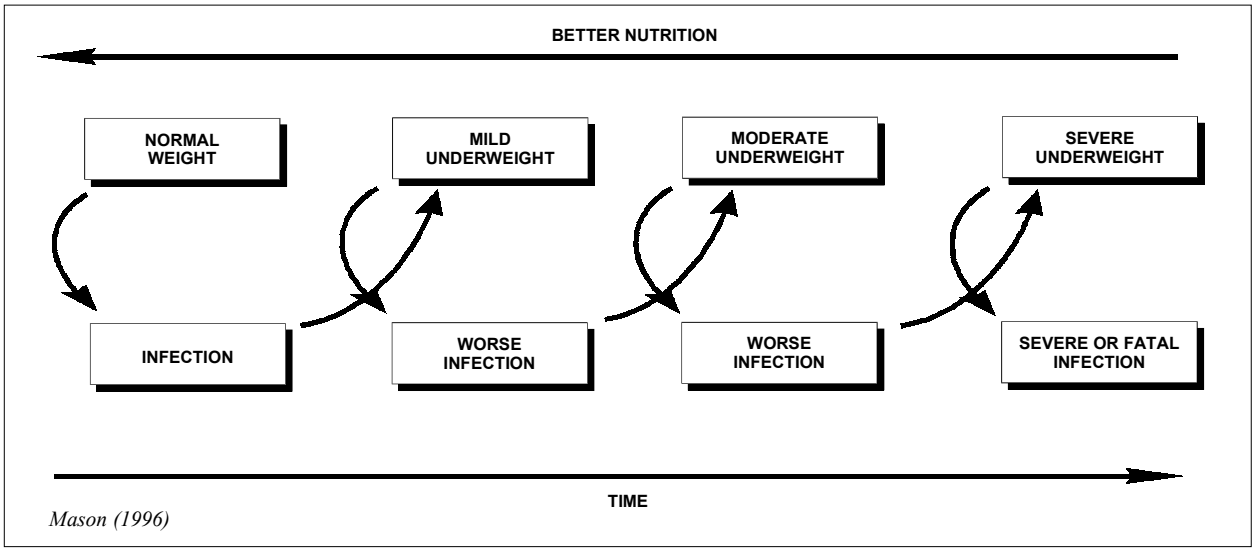
Figure 4.2 A Conceptual Model of the Causes of Malnutrition



Source: UNICEF, 1997

Adapted from the UNICEF Framework of Underlying Causes of Malnutrition and Mortality

Figure 4.3 Malnutrition-infection Complex



Mason (1996)

This vicious cycle, in which disease and malnutrition exacerbate one another, is known as "the malnutrition-infection complex" (see Figure 4.3, below).

Adequacy of food intake relates to:

- The quantity of food consumed,
- The quality of the overall diet with respect to various macro and micronutrients,
- Its form of the food, including palatability, energy density, bulk, and
- How frequently the food is actually consumed.

Information about the underlying causes of inadequate dietary intake and the prevalence of certain diseases is essential for planning and prioritising action.

Three Underlying Preconditions to Adequate Nutrition

The framework in Figure 4.2, a modified version of the framework employed by UNICEF, describes three main underlying preconditions to adequate nutrition:

Food ..... Health ..... Care

Food.... The food-related underlying cause is inadequate household food security (access to food).

Health.... The health-related underlying cause refers to household access to adequate health services and the adequacy of environmental health conditions.

Care.... Care relates to the social and care environment within the household and local community and its impact upon nutrition, particularly with regard to women and children.

For an individual to be adequately nourished, all three of these preconditions need to coexist. In any assessment of the causes of malnutrition, the relative roles of food, health and care must be examined. These three underlying causes are not discrete but instead interact in important ways, as depicted by the overlapping circles in the framework. Likewise, a successful strategy to treat malnutrition is

almost never based solely on a food security intervention. If food based approaches are linked to interventions aimed at the health and care-related factors, then the overall effectiveness of the combined actions is likely to be significantly enhanced.

Precondition 1: household food security

In simple terms, food security is concerned with people's access to food. It can be defined as:

Access by all people at all times to the food needed for an active and healthy life.

For a household this means the ability to secure adequate food to meet the dietary needs of all members, either through their own food production or food purchases. Food production depends on a wide range of factors, including access to fertile land, availability of labour, appropriate seeds and tools, and climatic conditions. Factors affecting food purchases include household income and assets as well as food availability and price in local markets. In emergencies, other factors - such as physical security and mobility in war-affected regions, the integrity of markets, etc. - may come into play.

Precondition 2: health and environment

An individual or household's degree of access to good quality health services, safe water supplies, adequate sanitation and good housing are preconditions for adequate nutrition. The health environment influences exposure to, and therefore incidence of, infectious disease,.

Important health issues are: the existing primary health infrastructure, the types of services performed at these facilities, their accessibility and affordability to vulnerable populations and, of course, the quality of these services. Inadequate or delayed treatment of disease places a child at increased risk by prolonging the disease and possibly increasing its severity.

Key environmental issues include the degree of access to adequate quantities of safe drinking water, adequate sanitation systems, and adequate housing.

Precondition 3: the social and care environment

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

Appropriate childcare, which includes sound feeding practices, is an essential element of good nutrition and health.

The major childcare activities and behaviours that influence nutrition are:

- Feeding behaviours, including breastfeeding and complementary feeding.
- Hygiene behaviours related to food, individuals, and home.
- Psychosocial behaviours, including responsiveness, warmth, involvement and opportunities for learning.
- Health behaviours, such as service utilisation, oral rehydration therapy and home care.

Cultural factors and resources - like income, time and knowledge - condition caring practices. The values of the society strongly influence the priority given to the care of children, women and the elderly. Attitudes to modern health services, water supplies and sanitation also affect caring practices. Finally, the care of children is particularly linked with the status, roles and responsibilities of women.

Among poor households there are likely to be severe constraints on caring behaviours. Some of these constraints may be the poor health and psychological state of the mother and other family members, the absence of key family members, or the break-up of the family. Others may be self-imposed, as when people decide to switch to a cheaper but less nutritious food.

In emergencies, displacement or forced migration is likely to cause severe social disruption and upheaval which may break links with extended family and wider social networks that would normally support the family in the care of its children and elderly. New social networks or groups - such as local NGO's or church relief groups - may then evolve to replace these structures. Another factor during emergencies which may diminish physical capacity, reduce energy intake and undermine caring capacity is the extra work demands on caregivers to secure food (e.g., foraging for wild food and poorly paid income-earning activities).

Critical to the design of programmes is an analysis of the care and social environment that:

- Takes into account the role and position of women in society in order to ensure that their particular needs are met in the most appropriate manner.
- Identifies the roles of caregivers and the demands placed upon them to ensure supportive interventions.
- Understands local attitudes to the most 'at-risk' groups in order to consider the feasibility of targeting resources at those most in need.
- Identifies viable leadership structures and community networks in order to ensure community participation and accountability.

Obviously, the success of a Programme hinges not only on resources given, but also on the ability to reach those most in need and to give caregivers the support they need to use resources effectively in the care of their families. It is also important to identify which caring practices are essential to a meaningful nutritional intervention - particularly in emergencies - and to ensure that appropriate steps are taken to support these caring practices. For example, the elderly may need assistance in getting to food distribution sites during an emergency, while staff for therapeutic feeding programmes may require training in order to provide appropriate psycho-social support for malnourished children.

Feeding practices - Optimal infant and young child feeding

Breastfeeding is the most important nutritional act in ensuring the adequate growth and development of the newborn child. It simultaneously addresses her/his food, health and care requirements. Breastfeeding should be exclusive for about the first six months of a child's life, after which time semi-solids should be progressively introduced to the diet to complement the continued breastfeeding. If a child less than six months old is not being breastfed, it is important to understand the reasons - and possible constraints - behind this.

Complementary feeding needs to be initiated at around six months of age in addition to sustained breastfeeding. By this age, the nutritional needs of the infant cannot be met by breast milk alone. Complementary foods should no longer be to as "weaning foods" as this incorrectly implies the cessation of breastfeeding. The quantity, quality and form of complementary foods are important as well as the frequency of their use. Complementary food should be safe, palatable, energy-dense, and micronutrient-rich.

The elements of care most critical for women during pregnancy and lactation are: extra quantities of good-quality food, release from onerous labour, adequate rest, and skilled, sensitive pre- and post-natal health care from trained practitioners.

Resources and Malnutrition

The basic determinants behind insufficient food, health or care are the quantity and quality of resources available, who controls them, and who uses them. This is true from the household to the national level. There are three main types of resources:

- *human* resources - the knowledge, beliefs, skills, physical health and nutritional status, etc. of the population;
- *economic* resources - income, assets, food, time etc.; and,
- *organizational* resources - at a community level these may include alternate caregivers or community support for care (e.g., crèches); at the national level, the health infrastructure is an organizational resource; formal and non-formal institutions at all levels are organizational resources.

Such resources may be combined in the form of projects or programmes aimed at improving nutrition.

Political, legal and cultural factors at national and regional levels may either promote or hinder the efforts of communities, households and individuals to be well-nourished. The basic causes of malnutrition thus relate to the political economy of nutrition, in other words to the influences on nutrition of economics, political and social institutions and ideas, and the perceptions, values and priorities of decision-makers. The political economy determines how nutrition outcomes are perceived, the degree to which problems trigger remedial action, and the nature and extent of such action.

Culture is also important. For example, malnutrition is likely to be more widespread in societies where women suffer social and economic discrimination.

Finally, war and insecurity are often characterised by a rapidly changing social and political arena, leading, for example, to the marginalisation or oppression of particular social or ethnic groups and an increase in their nutritional vulnerability. In addition, as war disrupts state institutions and civil society, there is usually a deeply negative impact on health and nutrition.

Effects of Malnutrition

Malnutrition represents a massive drain on human and societal resources. A malnourished child is more prone to illness and more likely to die than a well-nourished child. Malnutrition adversely affects cognitive development and thus educational achievement, and it reduces an individual's ability to work effectively. Finally, recent studies have linked childhood malnutrition with increased chances for diabetes, heart disease and cancer in an individual's middle-aged years.

Key Words

Anaemia	Anaemia can be caused by lack of iron, folate or vitamin B12. It is difficult to diagnose accurately from clinical signs which include pallor, tiredness, headaches and breathlessness.
Artificial feeding	Feeding of young infants with breast milk substitute
Beriberi	Beriberi is caused by thiamin deficiency. There are many clinically recognisable syndromes including wet beriberi, dry beriberi and infantile beriberi.
Bitot's spots	Dryness accompanied by foamy accumulations on the conjunctiva that often appears near the outer edge of the iris, and caused by vitamin A deficiency.
Complementary infant feeding	Period during which other foods or liquids are provided along with breast milk
Cretinism	Severe mental and physical disability which occurs in the offspring of women with severe iodine deficiency in the first trimester of pregnancy.
Goitre	Swelling of the thyroid gland in the neck caused by iodine deficiency.
Iodine Deficiency Disorders (IDD)	IDDs cover a range of abnormalities including goitre and cretinism.
Kwashiorkor	A form of extreme protein-energy malnutrition, characterized by oedema, loss of appetite and apathy; the child's hair thins and may change colour from black to light brown or red; immediate and intense care is required.
Marasmus	A form of protein-energy malnutrition identifiable by severe weight loss or wasting; marasmic children often have a good appetite and are alert; the prognosis for a marasmic child is good if treated correctly.
Night blindness	Inability to see well in the dark or in a darkened room. An early sign of vitamin A deficiency.
Oedema	Fluid retention; a distinguishing characteristic of kwashiokor; Oedema results from the excessive accumulation of extracellular fluid in the body.
Pellagra	Pellagra is caused by niacin deficiency which affects the skin, gastro-intestinal tract and nervous systems and is sometimes called the 3Ds: dermatitis, diarrhoea and dementia.
Protein Energy Malnutrition (PEM)	Growth failure as a result of energy and protein deficiencies; the most common form of malnutrition among infants and young children; it is now recognized that growth failure can also occur as a result of various micronutrient deficiencies.
Rickets	Rickets is caused by Vitamin D deficiency and adversely affects bone development resulting in pelvis malformation when severe.
Scurvy	Scurvy is caused by Vitamin C deficiency. Typical signs include swollen and bleeding gums, and slow healing or re-opening of old wounds.
Stunting (chronic malnutrition)	Growth failure in a child that occurs over a slow cumulative process as a result of inadequate nutrition and/or repeated infections; stunted children are short for their age and may look younger than their actual age; measured by the height-for-age index; it is not possible to reverse stunting.
Wasting (acute malnutrition)	Growth failure as a result of recent rapid weight loss or failure to gain weight; wasted children are extremely thin; wasting is measured by the weight-for-height index; readily reversible once conditions improve.
Xerophthalmia	Xeropthalmia is caused by Vitamin A deficiency and refers to a range of eye signs including night blindness, Bitot's spots and corneal ulceration.

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5 MEASURING MALNUTRITION AND NUTRITION SURVEYS

The purpose of this chapter is to enable WFP staff to understand how nutritional status is measured, to judge the of reliability nutrition surveys, and to aid interpretation of the results.

Summary

The chapter describes the use of body measurements to calculate an individual's nutritional or anthropometric status. Growth monitoring of children is a principle activity in Mother Child Health Programmes throughout the world. An assessment of the nutritional status of a population through nutrition surveys or surveillance should involve analysis of the extent and severity of acute malnutrition, identification of those most affected, and changes over time. Practical tips and guidelines exist on how to review and interpret the anthropometric results of nutrition surveys.

Learning objectives

After reading this chapter WFP staff should be able to:

- Understand the process of calculating an individuals nutritional status using the weight for height index.
- Understand how to classify the nutritional status of an individual according to cut-off points.
- Understand how to check the reliability of a nutrition survey

Anthropometry

Anthropometry is the use of body measurements (usually weight, height and age) to assess nutritional well being. In children, anthropometry is usually used to track growth or failure to grow. An individual's *anthropometric status* is sometimes referred to as his/her nutritional status. There are two types of growth failure associated with malnutrition: *wasting* (acute malnutrition), and *stunting* (chronic malnutrition). Both may be measured and classified by anthropometry (see Box 4.1, Chapter 4).

There are two types of anthropometric assessment:

1. Individual assessment for:

- individual *growth monitoring*, as part of a Mother Child Health Programme or for monitoring of progress in supplementary or therapeutic feeding programmes.
- *nutritional screening* in order to refer individuals for further check-ups or to other services such as supplementary or therapeutic feeding.

2. Population assessment:

- as part of emergency activities to monitor changes in nutritional status over time (e.g., *nutritional surveillance* for *famine early warning systems*).
- as a 'one-off', or cross-sectional survey, during an emergency needs assessment in order to assess the extent and severity of malnutrition, or to estimate numbers of children who might require supplementary and therapeutic feeding.

Measuring Malnutrition

Measuring malnutrition always involves assessment of the anthropometric status of individuals. Usually the focus is on children from 6 months to five years of age, as they are the most vulnerable to nutritional deficiency. Adults are also sometimes included in anthropometric surveys in order to assess the severity and extent of malnutrition throughout the population.

Body measurements and nutritional indices

The recommended body measurements for assessing nutritional status are weight, height and sometimes mid-upper arm circumference (MUAC). If a child is too young or sick to stand, length rather than height is measured (usually height is measured for children 85 cm and above and length for children under 85cm).

The weight and height measurements of children obviously vary according to the children's age and sex. In order to take age and sex differences into account, a child's measurements are transformed into *nutritional indices* (e.g., weight-for-height) that describe his/her nutritional or anthropometric status in relation to the statistical norms of a reference population group.

Guidelines for measuring height, length, weight and arm circumference are found in the forthcoming WHO Manual on The Management of Nutrition in Major Emergencies. Other measures sometimes used are skinfold thickness, head circumference and low birthweight.

Low Birthweight

The birth weight of a baby is an important anthropometric indicator, reflecting both the duration of gestation and the rate of foetal growth. It is an indicator of the child's future health and nutritional status as well as an indicator of the mother's nutritional and health status. As such, birthweight is a pivotal indicator in programmes aimed at pregnant and lactating women and young children. Children born with weights below 2.5 kg are defined as "low birth weight". Reliable birth weight data are often scarce. Data collected at hospitals may be skewed towards better-nourished mothers who are more likely to give birth in such institutions. Nevertheless, attempts need to be made in community-based programmes to track birth weights.

Determining nutritional status: nutritional indices and reference values for children

A nutritional index compares a child's body measurement with the expected value of a child of the same height or age from a *reference population*. Since the reference standards for boys and girls differ substantially, sex specific references are used where possible.

The World Health Organization recommends the use of a single reference standard based on data from the US National Center for Health Statistics (NCHS) (WHO, 1986). In this way, any child's anthropometric status can be compared against a common international reference to determine his/her nutritional status.

The international reference standards are available in various forms:

- Complete reference tables showing sex-specific values (WHO, 1997 The Management of Nutrition in Major Emergencies).
- Plasticized cards for use in field surveys.

- The 'thinness' wall chart (Nabarro chart) used to classify a child's nutritional status (weight-for-height).
- Computer software programmes for processing anthropometric data (e.g., EPI-INFO, available from WHO).

Despite some technical drawbacks, the NCHS/WHO reference remains the best for worldwide use. Since the major effect on growth is environmental and not genetic, there is no need for local references; though some countries (India, for example) have produced their own internal reference values which may be used.

Different nutritional indices measure different aspects of growth failure (wasting and stunting) and thus have different uses. *Oedema (fluid retention) in children, the key clinical sign of kwashiorkor, is not measured by a nutritional index. Where oedema is detected, the child is* ***always*** *diagnosed as severely malnourished and his/her weight need not be recorded.* The main nutritional indices, all found in the NCHS/WHO reference, are shown in Box 5.1

Box 5.1: Nutritional Indices

Nutritional Index	Description	Use
Weight-for-height or length (WFH)	WFH reflects recent weight loss or gain and so is the best indicator to determine wasting and an individual's recent nutrition. WFH is also useful when age is unknown.	WFH is usually the preferred indicator for nutrition surveys in emergencies. WFH is used as the selection criteria for selective feeding programmes
Height-for-age (HFA)	HFA reflects skeletal growth.	HFA is the best indicator of stunting.
Weight-for-age (WFA)	WFA is a composite index as it reflects a combination of both wasting and stunting. It is used generally as a measure of 'underweight'.	WFA growth charts are used to monitor the weight gain of children in Mother and Child Health programmes ('Growth Monitoring' on 'Road-to-Health' cards).
QUAC	The QUAC stick is a simple tool for measuring arm circumference and relating it to height.	The QUAC stick is particularly favoured by the International Committee of the Red Cross for nutrition surveys
Mid-Upper-Arm Circumference-for-age, or length/height (MUAC-for-age/ or height)	The World Health Organization recommends using reference values to transform arm circumference measurements into MUAC-for-age/ or height. This is now considered preferable to unadjusted arm circumference measurements.	MUAC for age or for length/height can be used as a quick, simple but less accurate method of initial screening, when scales are not available.

How to convert body measurements into nutritional indices

The two main methods for comparing a child's measurements with the reference values are by calculating either their *percent of the reference median* or by calculating their standard deviation (*SD* or Z scores) from expected values.

"Percent of the median" expresses the child's measurements as a percentage of the expected value for the reference population.

Standard deviation scores (or SD scores) are a measure of the distance between the child's value and the expected value of the reference population. Ninety-five percent of the reference population have anthropometric SD scores between -2 and +2 – that is, within the normal range. If a child's SD score falls outside the normal range, this signals a deviation from the norm in his/her nutritional status.

"Percent of the median" is more widely used in the field than SD scores. This is partly practical since percentages are easier to understand and tables of reference values are readily available. Calculating SD scores, on the other hand, requires appropriate computer software. Annex 4.1 shows how to calculate percent of the median and SD scores.

Use of cut-off points to classify nutritional status

Cut-off points on the nutritional index are used for two main purposes:

1. Children are classified as malnourished if their nutritional status falls below an agreed *cut-off point*. The cut-off points followed by the Reports on the Nutrition Situation of Refugees and Displaced Populations (RNIS) and endorsed by the World Health Organization are shown in Table 5.1.
2. As a guide for action; individual children whose anthropometric status falls below the cut-off point are referred for treatment or further action (e.g., admission into a supplementary feeding programme).

Note that a child may display several symptoms of malnutrition simultaneously (e.g., severe wasting together with oedematous malnutrition, or severe wasting and severe stunting, etc.)

Table 5.1: Classification of Malnutrition: Use of Cut-off Points and or Presence/Absence of Oedema

	Well-nourished	Mild Malnutrition	Moderate malnutrition	Severe malnutrition
Oedema	No	No	No	Yes (Oedematous malnutrition)
Weight-for-height	90 to 120% (+2 to -1 SD)	80 to 89% (-1 to –2 SD)	70 to 79% (-2 to -3 SD)	<70% (<-3 SD) (Severe wasting)
Height-for-age	95 to 110% (+2 to-1 SD)	90 to 94% (-1 to -2 SD)	85 to 89% (-2 to -3 SD)	<85% (-3SD) (Severe stunting)
Weight-for-age			60 – 80% (-2 to -3 SD)	<60% (-3 SD) (Severe underweight)
Arm circumference[1] for age or height/length				<-3 SD
Arm circumference[2]	>13.5 cm	12.5 - 13.5 cm	12.0 – 12.5 cm	11.5 - 12.0 cm
Body Mass Index		Mild thinness: 17 - <18.5	Moderate thinness:16 - <17	Severe thinness: <16

Notes on use of terms:

Total or global malnutrition is the percentage of children with moderate or severe malnutrition i.e. below < -2 SD's or <80% Weight For Height + children with Oedema

Wasting = moderate and severe malnutrition = % < -2 SD'S (<80% WFH)

[1] Cut-off points for MUAC for age or height/length have yet to be tested in practice.
[2] BMI= weight (kg) /height $(m)^2$; these cut-off points apply to adults over 18 years of age.

Arm circumference

Measuring mid upper arm circumference (MUAC) is a rapid means of screening large numbers of children to find the most malnourished. The cut-off points for classifying malnutrition according to MUAC are shown in Table (5.1).

Rather than using unadjusted MUAC measurements, the World Health Organization now recommends that MUAC-for height or MUAC-for-age reference values be used to transform MUAC measurements into nutritional indices. This allows a better comparison of arm circumference across age groups, but it requires that two measurements be taken, a more time consuming and complicated process. MUAC does not produce results that are directly comparable with the results of the weight-for-height index. Using both MUAC and weight-for-height (percent or SD) for nutrition surveys causes confusion and therefore weight-for-height is the recommended nutritional index to measure wasting (acute malnutrition) in nutrition surveys.

The *QUAC stick is* a simple tool for measuring height, marked with arm circumference cut-offs (-2 SD and –3 SD). In other words, a child's height is measured and that height should correspond in a nutritionally healthy child to a minimum arm circumference. The QUAC stick is used for nutrition surveys by the International Committee of the Red Cross. A difficulty with this procedure is that it is only practical to measure the height of children 2 years and older.

Malnourished boy

Note that adolescents can also become malnourished.

Measuring Malnutrition in Adults and Others

Increasing attention is being paid to assessing malnutrition in older children, adults and the elderly. Women, especially during pregnancy and lactation, have long been considered a nutritionally vulnerable group (a MUAC measurement of less than 22cm is a simple indicator of malnutrition among pregnant and nursing mothers). And in some emergencies, high rates of malnutrition among adults and the elderly have been noted.

The most useful measure of malnutrition in adults is *body mass index* (BMI), an indicator of weight deficit in relation to height. BMI is also used to define grades of obesity. The cut-off points for classifying BMI among adults are shown in Table 5.1. Average BMI in most adult groups in developing countries falls in the range from 19 to 21 BMI. Two groups who are known to have BMI below average are the Kenyan Samburu (17.6) and the Dinke from South Sudan (17.6). Both groups are unusually tall.

Calculation of Body mass index (BMI) = Weight (kg) / Height (m)^2

Adolescents

Adolescence, which occurs from around 10 to 18 years of age, is a period of rapid growth. Hence, the anthropometric indices to assess wasting, which are used for slower growing age groups, are not applicable. WHO recommends that adolescent wasting be assessed by calculating body mass index for age (weight/height ^{2} for age). BMI for age scores are compared to reference data for American children and a cut-off point below the 5th percentile indicates malnutrition. To assess stunting, height for age is used in the same way as for younger children; the same cut-off points apply.

The elderly

The elderly are a difficult group to define and a particularly difficult group to assess anthropometrically. In developing countries, a person may be considered elderly from the age of 45 years onwards, whereas in developed countries, old age is considered to start at around 60 years.

As the elderly are more likely to be disabled, bedridden, or unable to stand straight, accurately measuring height and hence BMI is difficult. Furthermore, height decline occurs with age at a rate of 1 – 2 cm per decade and even more rapidly in older age. Research suggests that measures such as armspan, halfspan, demispan and knee length can be used to estimate height in the elderly. However, no standard methods of estimating height from these proxy measures has been established. Therefore, at present, BMI based on actual height can only be assessed accurately in the non-stooping elderly.

Growth Monitoring

Growth monitoring is a principle activity in Mother Child Health Programmes throughout the developing and developed world. Growth monitoring involves following changes in a child's physical development by taking monthly (or at least every three months) measurements of weight and sometimes length. The child's weight is plotted on a 'Road to Health' growth chart. This card, usually kept by the mother, also records appointments at the MCH clinic, the child's and parents name, date of birth, address, siblings and immunization status.

Target growth rates are based on the WHO/NCHS reference values. A child's growth is compared with two reference curves on the weight-for-age chart: an upper curve, which is the median growth curve for boys; and a lower reference curve for girls. The child's pattern of growth should fall along the same curve as age increases. Growth faltering is detected when there is no change or an actual

decrease between successive measurements. The growth chart is useful for the early detection of health and nutrition problems and can be used as a basis to stimulate discussion between health workers and mothers about child health, nutrition and the possible causes for any noted growth faltering.

In practice, poor attendance and difficulties understanding growth charts (on the part of both health workers and mothers) often hobble the effectiveness of growth monitoring programmes. In addition, interpretation of changes in weight can vary considerably. Finally, the effectiveness of growth monitoring ultimately depends on the effectiveness of the interventions that it can trigger.

Nutrition Surveys and Surveillance

Nutritional surveys and surveillance provide information for the purposes of policy making, planning and programme management. Surveillance is a regular activity, whereas surveys may be either 'cross-sectional' (one-off) or longitudinal (continuous monitoring of the same sample). A cross-sectional survey may be repeated at intervals in order to monitor changes

A survey must have a well-defined purpose and objectives, reflecting how the information is to be used. A common objective in an emergency nutrition survey is to estimate the prevalence of wasting (acute malnutrition) among small children (6 to 59 months; or, alternatively, 60 to 115cm in height). Depending on the survey objectives, some adult groups, particularly women, may be included in the survey. The survey objectives determine the choice of nutrition indicator, the population to be sampled (age, sex, area etc.), and the sampling method. Anthropometric data is usually just one type of information collected during the survey or surveillance activities.

Sampling

Anthropometric surveys should be based on a *representative sample* of the population, meaning that all members of the population have a known chance of being included in the sample. Procedures for sampling are outlined in the WHO Manual on the Management of Nutrition in Major Emergencies.

The most common method for selecting a representative sample for a nutrition survey is a two-stage *cluster sample*, in which 30 clusters of 30 children are selected. This approach is more convenient than simple random sampling, as the numbers of sites that must be visited are considerably reduced. Also, cluster sampling does not require a complete list of all sampling units (children, family's etc.) in the population (known as a sampling frame).

Systematic (interval) sampling or simple random sampling are also sometimes used. Where the population is made up of groups of particular interest, the sample may be stratified (i.e., divided between those groups).

The malnutrition rate, or prevalence calculated in the sample, is used to estimate the overall rate of malnutrition among the population. The reliability or 'precision' of the estimate is measured by a statistical term known as the *confidence interval (CI)*. This reflects the error introduced by the sampling method and the sample size. Confidence intervals are usually associated with a probability of 95%, meaning there is a one in twenty chance that the population rate falls outside the confidence interval. The size of the sample influences the size of the confidence interval (the precision of the estimate).

Analysis of anthropometric data

Statistical analysis of anthropometric data derived from nutritional indices may include:

- Prevalence rate (the percent of children falling into the various categories of malnutrition) and associated confidence intervals;

- Mean[3] (or average) nutritional status and associated confidence intervals;
- Frequency distributions: a graph illustrating the spread of measurements around the mean. This is a visual representation of the results and may be useful in revealing abnormalities in comparison with the reference population distribution curve.

Review of survey findings

WFP staff must frequently review anthropometric survey results. Apart from considering the actual findings, the reliability and trustworthiness of the results should be questioned. A small amount of error is usually unavoidable, as when the same person carrying out measurements records slightly different results each time. This is acceptable and accounted for by statistical procedures such as confidence limits. There are nonetheless certain points that a statistical layperson should review (or for which he/she should seek the advice of an expert) when determining the reliability of a survey report (see Table 5.2).

Table 5.2: Reliability Checks for Survey Results

Points to check	What you need to know
Were the nutritional indices appropriate for the objectives of the survey?	The recommended indicator of wasting (acute malnutrition) is WFH
If a sample was taken, was an appropriate random sampling method used?	Cluster sampling: how many clusters and how many children in each cluster? 30 clusters of 30 children is standard. Simple random sampling & interval sampling: was the coverage of the sampling frame complete? Did all children in the population have an equal chance of being selected?
Was the sample size adequate?	For a simple random sample about 450 subjects should be enough. The size of the confidence interval reflects the sample size. If the confidence interval is very wide the sample size may have been too small.
How many clusters are enough?	For a cluster sample, there should be at least 24 clusters, preferably 30, and the same number of children should be selected in each cluster.
In what ways might the sample be biased?	Systematic measurement error caused by faulty measuring equipment or faulty techniques. Incomplete coverage of the population caused by non-compliance, or absenteeism (migration, working outside the home etc.). Interviewer bias. Non-standardisation of methods
What measures were taken to reduce bias?	Training, following standard procedures and good practice guidelines
Were staff employed for the survey already competent or given appropriate training?	Duration & type of training. Competence of trainers.

[3] Body mass index is not normally distributed, in which case it is more appropriate to quote median rather than mean values.

Interpretation of anthropometric data

Interpretation of anthropometric results is not as straightforward as it would first appear. Simple benchmarks and definitions are available to classify the severity of the situation.

The ACC/SCN of the United Nations regularly publishes Reports on the Nutrition Situation of Refugees and Displaced People (RNIS). The information, obtained from a wide range of collaborating agencies, both UN and NGO, is mainly about nutrition, health, and survival in refugee and displaced populations (home based emergency affected populations are not included). The RNIS provides definitions and benchmarks for a number of indicators, including nutritional indices, as shown in Box 5.2

Box 5.2: RNIS Definitions and Benchmarks for Interpreting Nutritional Data

Indicator	Definition	Benchmark for guidance in interpretation
Wasting	Less than -2 SD's, or sometimes 80% WFH, usually in children 6-59 months.	5-10% usual in African populations in non-drought periods >20% 'undoubtedly high and indicating a serious situation' >40% 'a severe crisis'
Oedema	Clinical sign of kwashiorkor	'any prevalence detected is cause for concern'
Crude mortality rate	The number of deaths per 10,000 of the population within a specific time period.	1/10,000/day 'serious situation' >2/10,000/day 'emergency out of control'
Under five mortality rate	The number of deaths among children under five years of age within a specific time period	2/10,000/day 'serious situation' 4/10,000/day 'emergency out of control'

These benchmarks are useful in stressing the degree of urgency for emergency assistance, but they do not indicate what actions or interventions might be most appropriate to save lives and prevent further health and nutritional deterioration in the population.

Nutritional status among adults

Fewer data are available on the nutritional status of adults compared to those available on children. Data from Congo, Ghana, Mali, Morocco and Tanzania identified a range of between 0.3 and 2.8% of adults falling below the cut-off of 16 BMI (Bailey and Ferro-Luzzi, 1995). These data sets were presumably from stable non-emergency populations.

In an emergency context, much higher proportions of malnourished adults are to be expected. In Somalia in 1992-93, the relief agency Concern found that most adults had a BMI of less than 16.0 and consequently used a cut-off of 13.5 as one of the admission criteria to their adult therapeutic feeding programmes.

Useful interpretation of nutrition survey results must also consider the determinants or causes of malnutrition, the mortality risks associated with malnutrition in particular emergency situations, and the various influences that may bias or confound the results. Ultimately, this interpretation will determine the choice of programme and affect the number of lives saved. Aspects of the situation that must be considered when interpreting results of anthropometric surveys are listed in Box 5.3.

Box 5.3: Specific Issues Related to the Interpretation of Anthropometric Findings

Issues to consider when interpreting nutrition survey results	What to look for
Have the results been corroborated by other sources of information?	What secondary sources are quoted – are they reliable? What important sources have been omitted?
Is there a reasonable explanation of the causes of malnutrition? In particular, have food related, health related and care related causes been considered?	Is the information given based on hard or anecdotal evidence? Have all three groups of underlying causes of malnutrition been considered: Household food security; The care and social environment; Access to health services and the health environment.
What is the age range of the sample? And the age distribution of the results?	Where possible the survey results should be segregated by age group since children under five years of age are not a homogenous group and their nutritional status is influenced by their age. Infants and younger children are usually more susceptible to acute malnutrition, although older children and even adults also become susceptible during a serious nutritional emergency.
Have population movements or migration had an impact on the results?	Migration of the population will affect the survey results when the nutrition status of those who leave is different to those who remain behind.
How has seasonal variation in anthropometric status affected the results, or how would it be expected to affect the results?	Anthropometric status often fluctuates according to the time of year. For example, agricultural communities often suffer a 'hungry season' just before the harvest. This may coincide with an increase in the prevalence rate of malnutrition due to temporary food shortages, higher prices, and seasonal increases in diseases such as diarrhoea or malaria associated with the rains. Following the harvest, most children experience 'catch-up' growth.
What are the health risks of wasting (acute malnutrition)?	Obviously, severely malnourished children are at much greater risk of dying than their well nourished counterparts. The size of this risk, though, varies, multiplying when several risk factors are present (inadequate water and sanitation, poor shelter leading to exposure or overcrowding, highly malarial areas, limited immunization etc.). This is why the conditions common in acute emergencies are so hazardous.

Key Words

Anthropometry	Body measurements used as a measure of an individual's growth and nutritional (anthropometric) status.
Anthropometric status	The growth status of an individual usually in relation to reference values.
Cluster sample	A representative sample where the sampling unit, children or adults, are selected in groups (clusters) rather than individually.
Cut-off points	The point on a nutritional index used to classify or screen individuals anthropometric status.
Famine early warning systems	An information system designed to monitor aspects of the food situation in a region and thereby predict or forewarn of impending food shortages or famine.
Frequency distribution	A complete summary of the frequencies of the values of a measurement of a sample. This may be in the form of a table, histogram or frequency distribution curve.
Total malnutrition	The sum of moderate and severe malnutrition, which includes the percent of all children < -2 SD's (<80%) WFH + oedematous malnutrition
Growth monitoring	To assess an individual child's growth over time and determine if interventions are required. The results are plotted on the child's Road to Health chart.
Nutritional index	A nutritional index is derived by relating a child's measurement with the expected value of a child of the same height (or age) from a reference population. Weight-for-height is the nutritional index commonly used to reflect wasting (acute malnutrition) in emergency nutritional assessments.
Nutritional screening	To identify and select malnourished children in the population
Nutritional status	The growth status of an individual, usually based on body measurements in relation to a reference population.
Nutritional surveillance	The regular collection of nutrition information that is used for making decisions about actions or policies that will affect nutrition
QUAC	The QUAC stick is a simple measuring tool used (in particular by the International Committee of the Red Cross) for adjusting arm circumference measurements for height.
Percentage of the reference median	The anthropometric status of an individual expressed as a percentage of the expected value (or median) for the reference population.
Prevalence rate	The percentage of the population with a specific characteristic at a given point in time.
Reference population (reference standards or values)	The WHO/NCHS/CDC reference values are based on two large surveys of healthy children, whose measurements represent an international reference for deriving an individual's anthropometric status.
SD score (Standard deviation or Z score)	This is a measure of the distance between the individual's measurement and the expected value (or median) of the reference population. The distance is expressed in multiples of the reference standard deviation.
Stunting (chronic malnutrition)	Growth failure in a child that occurs over a slow cumulative process as a result of inadequate nutrition and/or repeated infections; stunted children are short for their age and may look younger than their actual age; measured by the height-for-age index; it is not possible to reverse stunting.
Wasting (acute malnutrition)	Growth failure as a result of recent rapid weight loss or failure to gain weight; wasted children are extremely thin; wasting is measured by the weight-for-height index; readily reversible once conditions improve

Key Readings

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6 FOOD AND NUTRITION ASSESSMENTS

This chapter aims to provide WFP staff with an overview of the objectives, methods of data collection, analysis and interpretation involved in food and nutrition assessments. More detailed information can be obtained from the "Guidelines in Emergency Needs Assessment" (WFP, September 1999).

Summary

A range of food security and nutritional assessments, including initial needs assessments of major new emergency situations, and in-depth food and nutrition assessments of more stabilized emergencies, are relevant to WFP. Assessments of malnutrition, described in the previous chapter, are usually one important aspect of these wider assessments.

Assessment methodologies consist of a combination of quantitative and qualitative methods or techniques. Nutritional surveys, for example, are quantitative, while rapid assessments are qualitative. A key organizing principle of WFP's approach to assessment and analysis is vulnerability analysis and mapping. In this context, vulnerability relates to household food security, in particular to the ability of a household to cope with risks such as drought, market failure, conflict etc.

The last section in this chapter reviews the assessment of micronutrient deficiency disorders and considers how WFP staff might assess the risk of micronutrient deficiency disorders occurring in an emergency context.

Learning objectives

After reading this Chapter WFP staff should be able to:

- Recognize the importance of 'sound' information and analysis as the basis for decision-making.
- Understand the level of knowledge, skills and experience needed to apply different methods of assessment.
- Describe a range of qualitative or rapid appraisal techniques, and give examples of their practical application.
- Assess the risk of micronutrient deficiency disorders occurring among an emergency affected population

Meeting Information Needs of Decision-Makers

Assessment is the first step towards more informed decision-making and thereby improved practice. Decisions about the need for food aid and the quantity, type and recipient must be based on sound information and critical analysis.

WFP undertakes and participates in a range of food security and nutritional assessments, for example:

- Initial needs assessments of major new emergency situations
- In-depth food and nutrition assessments in stabilised emergencies
- Joint UNHCR/WFP Food Assessment Missions (JFAM)
- Joint FAO/WFP Crop and Food Supply Assessment Missions

Assessments are a problem solving process. By figuring out the causes of malnutrition and the resources available, a team can decide on appropriate action to address nutritional problems. This

process of problem *assessment* and resource *analysis*, followed by appropriate *action,* is one which individuals and communities undertake in their daily lives for many different reasons. It forms the basis of WFP's programme or project cycle. And the more participatory the project or programme cycle, the more likely the choice of action and the outcome will be correct. Finally, monitoring and evaluation of the active project or programme are simply ongoing re-assessment.

WFP and Vulnerability Assessment and Mapping

Food security and vulnerability to food insecurity are the underlying principles of WFP's approach to assessment and analysis, its design of programmes and its targeting strategies. By developing an understanding of vulnerability and the location of vulnerable groups, an effective response strategy can be devised. Knowing the needs of the population concerned is just one step towards a full analysis of the factors shaping their vulnerability.

Vulnerability can be viewed as follows: *Vulnerability = exposure to risk + inability to cope*

The risks to which households are exposed include, for example, drought, market failure, conflict, etc. All of these seriously undermine a household's productive activities, limit access to non-farm sources of income and disrupt the functioning of markets. When the risk of such an event is high, vulnerability tends to be greater. Some households may be able to protect themselves from these risks, or cope to a limited extent with the effects of crisis, through a range of coping strategies. Their ability to cope, by means of household stocks and assets, transfers from family abroad, local support networks, government safety net programmes, etc., influences their overall vulnerability.

Assessment Methodologies and Methods

There are a range of assessment approaches that vary in terms of types of information needed and methods of data collection and analysis. Assessment methodologies consist of a combination of methods or techniques for collecting information - quantitative data (numbers and statistics) and/or qualitative information (descriptions, views, opinions). The methodology may also specify the process of analysis and interpretation.

There is no single correct assessment method or approach. The choice and selection of methods depends on:

- The assessment's aims and objectives; why do the assessment?
- The types of information required; what information is needed?
- Practical constraints that affect the methodology, for example: available resources to undertake the assessment; time available for field work; access to the area and individuals present; the skills and experience of assessment team members; availability of trusted translators.

In practice, it is often the practical constraints that determine how an assessment will be carried out. In the early stages of an emergency, for example, decisions must be made almost immediately with little time to collect detailed and accurate information.

All assessments use a combination of *secondary data*, i.e. information that already exists, and new or *primary data*, collected through surveys and field assessments.

Secondary sources may be in the form of databases, statistics and reports. The knowledge, views and opinions of agency representatives, academics, technical experts, journalists, etc. are other important sources. A desk study of existing information (early warning system reports, government statistics, maps, project documents, newspapers, journals, other databases and consultations with experts) is essential for all assessments. Much of the quantitative data or figures quoted in rapid assessment reports originates from secondary rather than primary sources. All sources of secondary

information quoted in an assessment report must be fully referenced in order for the reader to consider the validity and reliability of the source. The methods, techniques and procedures commonly used in assessments undertaken or considered by WFP are briefly described in Table 6.1.

The correct application of all these techniques requires specific training and experience.

Table 6.1 Assessment Methods and Techniques

Method	Description
Secondary sources of information	
Consultation with experts	Consultations with technical or regional/local experts.
Desk study or review	Published and unpublished statistics, reports, articles, maps, etc.
Primary sources of information	
Anthropometric surveys (quantitative data)	The nutritional (anthropometric) status of a sample of children (or adults) is measured in order to calculate their nutritional status and estimate the prevalence and distribution of malnutrition in the population.
Household surveys (quantitative data)	A random sample of households is selected and the relevant household member is interviewed using a pre-formulated household questionnaire. Interviewers are trained to undertake interviews in a standardized way. Results are analysed statistically, at a central point once all interviews have been conducted.
Rapid assessment procedures (qualitative information)	Rapid appraisal procedures form the basis of qualitative methodologies. Information is collected and analysed as the assessment progresses (iteratively). Information gathering is decentralised. The focus is frequently on learning about differences rather than estimating averages. Relative values are more important than absolute values. Flexibility is a basic principle of rapid appraisal. The data needs and collection techniques may change as the assessment proceeds.
Direct observation	Personal observation of the physical condition of the local surroundings, condition of crops, livestock, the physical appearance of people and their living conditions, the interactions between people etc.
Transect walks	A walk through the area, specifically seeking out areas of interest: agricultural areas, water points, schools, the market, health centres or hospitals, areas where new arrivals are settled, etc.
Semi-structured Interviewing	An informal approach to interviewing key informants who are purposefully selected individuals. A mental or written checklist of key areas or open-ended questions is prepared in advance as part of the assessment team's orientation and training. Points of interest raised in the discussion with the key informant may be followed up.
Focus group discussions	Managed discussions with selected small groups of individuals on a particular topic. In an emergency setting this is often more difficult to organize and manage because of the vested interests represented within a group.

Initial Needs Assessments of Major New Emergency Situations

Initial rapid assessments (see Table 6.2) based on rapid appraisal techniques provide a preliminary understanding of the situation, allowing decisions on short-term responses.

Table 6.2 Objectives, information needs, and methods for initial assessments of emergency situations

Aims / objectives	Information needed	Methods / techniques
To decide if immediate food assistance is needed and if so, determine the number of beneficiaries and the most urgent food needs *(*quantities to be distributed immediately)	Estimate beneficiary numbers; the number of persons present and the rate (daily/weekly/monthly) at which people are arriving, in order to establish a planning figure for the number of persons to be assisted.	Census and other counting techniques
	Estimate per capita nutritional requirements. Use an initial planning figure of 2,100kcal per person per day. Adjust according to the populations actual nutritional requirement.(see Chapter 8)	Where possible adjust the initial planning figure according to: The expected demographic profile in that country, Health, nutritional and physiological status (malnutrition, morbidity and mortality) The climate (ambient temperature) Expected physical activity levels
	A rough estimate of the population's ability to obtain food for themselves (their access to food) – is it roughly 100%, 50%, 25% etc.	Consider: Food availability; food production, market prices and availability Access to food; own food production, waged labour and other sources of income, trade, loans & gifts, aid or charity.
	Also consider: Which social or ethnic groups appear worse affected and why? Local food habits and preferences Availability and access to a diverse range of foods Availability and access to milling facilities Extent to which people can prepare food for themselves and for young children (availability and access to cooking fuel and other essential non-food items)	Rapid appraisal procedures (e.g.,observation at key sites, key informant interviews, semi-structured interviewing)

In an initial assessment, a broad estimate of the need for food aid is acceptable. It may be justified on the basis of either:

- Evidence of deterioration in nutritional status as a result of a lack of food, bearing in mind what is expected for the time of year.
- Evidence of an absolute lack of food and deduction that certain groups will not access enough food for their needs
- Evidence of severely restricted access to food for certain groups in the population.

Justification for food aid and estimates of the amounts needed are usually made on the basis of several assessment techniques. The techniques commonly employed by Joint FAO/WFP Crop and Food Supply Assessment Missions and WFP/UNHCR Joint Food Assessment Missions are good examples.

Joint FAO/WFP Crop and Food Supply Assessment Missions

In the case of crop failure affecting large numbers of people, food and crop assessment missions are organised jointly by WFP and FAO. The FAO/WFP assessment missions calculate overall food aid needs, commonly on the basis of a national food balance sheet:

National needs = per capita consumption x population figure
Import needs = national needs – production – carry-over stocks + losses/other uses
Food Aid Needs = import needs – commercial imports

Food aid needs cannot be determined only by a simple arithmetic exercise comparing consumption needs with production. A number of visible and invisible economic assets also have to be considered to construct a food balance sheet:

- National production
- Total population
- Post harvest losses, use for seeds, animal feed
- Per capita consumption
- Commercial imports/ exports
- Number of people affected by a crisis
- Production shortfall/needs of the affected population.

Since, in many countries, there is often a severe lack of existing or reliable information, only very arbitrary judgments can be made. For example, substantial quantities of the national production may flow out of the country unregistered; or, conversely, higher purchasing power in relation to a neighbouring country may attract formal or non-formal imports.

WFP and UNHCR Joint Food Assessment Missions (JFAM)

WFP and UNHCR undertake joint food assessment missions for all new refugee operations as well as periodically for on-going operations. These missions make recommendations on:

- Number of beneficiaries
- Modalities of assistance
- Composition of the food basket
- Ration size
- Duration of assistance
- Logistical arrangements

UNHCR will normally provide the JFAM with a nutritionist and, if applicable, other specialist staff to help assess levels of economic self-reliance. The information and analysis needs on which JFAM recommendations are based are similar to those sought out during in-depth food and nutrition assessments.

For more details of these types of assessments please refer to "Guidelines in Emergency Needs Assessment" WFP September 1999, the Memorandum of Understanding signed between WFP and UNHCR , WFP and UNICEF and Food Aid in Emergencies, Book B, WFP 1993.

If a response is planned, follow-up investigation should be incorporated as part of the programme activities (e.g., establishing food or nutrition information monitoring activities or planning more in-depth assessments).

In-Depth Food and Nutrition Assessments in Stabilised Emergencies

Once an emergency has stabilised sufficiently, a more in-depth assessment may be undertaken for a wide range of purposes. Examples of the differing objectives of food and nutrition assessments and their importance in relation to programming are shown below. The type of information needed to address these objectives and methods of data collection are also suggested.

In WFP/UNHCR joint operations, UNHCR is responsible for organizing regular nutrition surveys and maintaining, in consultation with WFP, an effective system for monitoring the nutritional status of emergency affected refugees, returnees or other persons of interest to the agency.

When WFP has agreed to work with UNICEF as partners in emergency and/or rehabilitation activities, the framework for co-operation is described in a Memorandum of Understanding (Box 10.3). In the initial assessment, re-assessment and routine monitoring, WFP takes the lead in assessing overall food needs and logistics. UNICEF takes the lead in assessing prevalence of malnutrition, the special needs of young children and women (including the need for care and facilities for food preparation), as well as the needs for water, sanitation, health care, education and other social services.

Examples of objectives, information needs and choice of methods for food and nutrition assessments

Objective 1 – Estimate or determine the extent, severity and distribution of acute malnutrition

Important in relation to establishing the need for:

- A general ration
- A broader range of strategies to support food security
- Supplementary and therapeutic feeding.

Information needed and analysis

Estimate:

- The prevalence, mean and distribution of wasting (acute malnutrition) among children under five years old (see Chapters 4 and 5).
- The nutritional status of adults with particular attention to women of reproductive age.

Methods/ techniques

Random survey (e.g., two stage cluster survey of anthropometric status);
The weight-for-height/length of children under five years
The body mass index of women, or other adults

Objective 2 – Estimate indicators of morbidity, mortality and public health

Important in relation to determining the priority interventions in terms of reducing excess mortality, morbidity and malnutrition.

Information needed and analysis

Consider:

- Crude mortality rate & under five mortality rate (the number of total or under five deaths per 10,000 population within a specific period, usually one day)
- Evidence of epidemics of communicable disease, particularly diarrhoeal disease, acute respiratory infections, measles and malaria.
- Access to adequate shelter, sufficient blankets and clothing.
- Access to adequate supplies of clean water, and sanitation.
- Access to health services, in particular: measles immunization, oral rehydration therapy for diarrhoea, access to essential drugs.

Methods/techniques

Mortality: grave watching/counting; case fatalities in health/feeding programmes; or household survey
Morbidity: rapid assessment procedures; household survey

Objective 3 – Investigate local food habits, preferences, and food processing and preparation practices

Important as it influences the choice and amount of different food items to be included in the food basket (Chapter 6), including the degree of milling or other types of food processing.

Information needed and analysis

- Select ration items and amounts according to:
- Nutritional considerations: risk of micronutrient deficiencies, vulnerable groups
- People's food preferences and acceptability of available food commodities
- Ease of use (milling/preparation/ cooking)
- Fuel economy and other non-food requirements
- Security factors (e.g., risk of looting)
- Logistical factors (e.g., storage facilities)

Methods/ techniques

Review existing data/ information
Rapid assessment procedures

Objective 4 – Assess the ability of people to meet their own food needs (access to food)

Important in relation to planning rations and planning a broader range of strategies to support household food security.

Information and analysis

Identify risks, and consider the impact on their livelihoods of, for example:

- Crop failure or loss of livestock
- Loss of jobs, fall in wages
- Collapse in terms of trade, limited availability of goods
- Collapse in social networks, or political oppression, including violence

Consider people's ability to cope with these risks:

- Types of coping strategies and stage of coping
- Permanence of people's response (how reversible is the situation - temporary coping strategies versus permanent adaptive strategies)
- What proportion of people are engaged in marginal activities?
- Also consider: gender differences and relationships; the seasonal effects on access to food

Methods/techniques

Secondary sources, particularly early warning systems or food information systems.

Primary sources:

Interviews with key informants; interviews with focus groups; household visits, semi-structured interviewing with occupants; transect walks/ direct observation; proportional piling; time trends, mapping; activity profiles

Objective 5 – Assess the actual nutritional requirements of the population

Important in relation to planning rations (Chapter 9).

Information needed and analysis

Adjust the initial planning figure of 2,100 kcal per person/per day (pppd) according to the population's actual nutritional requirement, based on:

- The known demographic profile of the population
- Health, nutritional and physiological status (malnutrition, morbidity and mortality)
- The climate (ambient temperature)
- Expected physical activity levels

Methods/techniques

Review existing information: national and local statistics, agency reports, etc.

Objective 6 – Assess caring capacity of household members

Important in the design of systems for the distribution and targeting of relief commodities and for ensuring that the needs of women and children in particular are met.

Information and analysis

- Availability of income, and women's access to resources
- Maternal time for child care
- Availability of alternative care providers
- Community child care facilities
- Maternity benefits, etc.
- Indicators of care provision may include: coverage of vulnerable groups during emergency general feeding, training of therapeutic feeding programme staff in psychosocial stimulation for children, etc.
- Proportion of women headed households with limited family or community support.

Methods/ techniques

Review existing data/ information
Rapid assessment procedures

Assessment of Malnutrition

Because malnutrition is one of the most significant outcomes of food related emergencies, underdevelopment and poverty in general, the assessment of the nature, extent, severity and distribution of malnutrition in populations is of critical importance. Different methods are required for assessing different types of malnutrition (see Chapter 4, which considers types of malnutrition). Growth failure is usually measured by means of anthropometric surveys, which are commonly employed to assess rates of malnutrition. Anthropometric surveys are considered in detail in Chapter 5. The prevalence of particular micronutrient deficiencies is more difficult to assess accurately (see the following section), and often all that can be achieved is an assessment of the risk of micronutrient deficiencies.

Assessment of Micronutrient Deficiency Disorders

Micronutrient deficiencies are extremely difficult to identify accurately since clinical signs are frequently general and apply to a number of other diseases. A high level of skill is required to make an accurate diagnosis. For example, beriberi was diagnosed in West Africa during 1997 based on the presence of oedema (swelling). In fact, the swelling was 'famine oedema', or adult kwashiorkor, due to protein-energy malnutrition.

Clinical deficiency signs for each micronutrient are shown in Annex 3.1. These are included for guidance and it is emphasised that *the diagnosis of clinical micronutrient deficiencies should only be made by highly skilled, experienced professionals.*

Micronutrient deficiencies can be assessed using clinical and biochemical indicators. Clinical measures include visible signs of the deficiency, e.g., *Bitot's spots* (vitamin A deficiency) or *goitre* (iodine deficiency). Biochemical measures, which can indicate sub-clinical deficiency (i.e. deficiency with no visible clinical signs), include serum retinol (vitamin A status), haemoglobin (iron status) and

urinary iodine. Biochemical assessment requires body fluid samples such as blood or urine. These samples normally have to be analysed in a laboratory. This may not be feasible or appropriate in field situations and emergencies. The recognition of clinical signs therefore remains the primary means of identifying deficiencies.

There is, however, a basic flaw with relying on clinical signs to identify deficiencies: *deterioration in micronutrient status prior to the development of clinical signs will be missed, and with it, the opportunity to take preventive action.* Table 6.3 shows the steps which WFP staff can take to determine the risk of a particular micronutrient deficiency disease outbreak in a population.

Table 6.3: Assessment of Potential Micronutrient Deficiency

Steps	Source of information
Establish which micronutrients are lacking in the ration.	WFP nutrition department for analysis of ration content
Assess the availability and accessibility of local foods which may be consumed to supplement the ration and establish whether they are rich sources of particular micronutrients (e.g., which fruits and vegetables are commonly consumed and in which seasons they are available?).	Local or international nutrition expertise
Determine whether items of the ration are being exchanged or sold and establish how this will alter the micronutrient content of the diet (e.g., is a fortified food item in the ration like blended food being exchanged for a food item lacking in particular micronutrients?)	WFP food monitors and local or international nutrition expertise
Establish what existing micronutrient deficiencies were common in the beneficiary population before the emergency, the major cause of the deficiency (i.e., lack of food source or infection), and which population groups were most at risk.	Local or international nutrition and health expertise
Assess whether there are existing fortification or supplementation programmes (e.g., health centres frequently provide iron and folate tablets to pregnant women and vitamin A and D tablets to young children, while agencies such as UNICEF may support routine vitamin A supplementation, or local salt iodization)	Local or international health expertise and programmes of other agencies

Key Words

Food aid requirement	The estimated amount of food aid needed by an emergency affected population.
Food deficit or shortfall	The difference between the mean energy requirement of a population and the ability of people to obtain food on their own (N.B. not necessarily the same as the food aid requirement)
Initial planning figure or initial reference value for energy requirements	The World Health Organization has estimated that the average estimated per capita energy requirement in an emergency is 2,100 kilocalories.
Mean per capita energy requirement of a population	This is the mean per capita energy requirement of a population and depends on the populations demographic profile, their activity levels, the ambient temperature in which they live, and their health and nutritional status.
Nutritional requirements	The amount of energy, protein, fat and micronutrients needed for an individual to sustain a healthy life

Key Readings

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7 TYPES OF NUTRITION INTERVENTIONS

The purpose of this chapter is to describe the different types of nutrition related interventions WFP supports, to clarify their objectives, to give examples of different target groups, and to provide an overview of appropriate monitoring and evaluation activities.

Summary

WFP nutrition related interventions include general food distribution, supplementary and therapeutic feeding, school feeding and vulnerable group feeding. WFP is also involved in strategies within wider programmes to prevent micronutrient deficiencies. The objectives of these programmes are to save lives and support the vulnerable at critical periods in their lives.

The identification of target groups depends on an assessment and analysis of vulnerability. Food aid can be targeted at specific geographical areas, population groups, households, or individuals. The final section of this chapter gives an overview of monitoring and evaluation of food aid interventions.

Learning objectives

After reading this chapter, WFP staff should be able to:

- Describe the main types of WFP's nutrition related interventions.
- Give examples of the objectives of different types of interventions
- Understand the need for targeting and the basis for identifying different target groups.
- Identify appropriate indicators and methods for monitoring.

Two of WFP's major priorities are:

- *to save the lives of people caught up in humanitarian crises, through Food-For-LIFE*
- *to support the most vulnerable people at the most critical times of their lives, through Food-For-GROWTH*

These goals are achieved by programmes and projects that have a direct impact on the nutrition of the most vulnerable sectors of society, including women, children and the elderly. These nutrition related programmes are the focus of this handbook and include:

- General food distribution in emergencies (also see Chapter 8 Planning Food Rations, & Chapter 10 General Food Distribution),
- Supplementary and therapeutic feeding (also see Chapter 9 Selective Feeding Programmes),
- School-feeding,
- Vulnerable group feeding through Mother and Child Health programmes (MCH).

In emergencies, there are two mechanisms through which food may be provided: general food distribution and selective feeding programmes.[1]

1 Emergency Operations (EMOPs) are limited to meeting emergency food aid needs for a maximum period up to two years. Protracted Relief and Recovery Operations (PRROs) include works that are 'semi-developmental', and will cover a period up to three years. PRROs aim to provide emergency relief to the most vulnerable, but also promote longer-term food security, for example, by supporting production and education. The PRRO proposal should include an 'exit strategy' for either the phasing out of relief, or it's evolution into development projects.

School-feeding and vulnerable group feeding through MCH programmes, on the other hand, usually fall under the category of *Development Projects.* These projects are implemented in stable situations in which population groups remain vulnerable to food insecurity either because of poverty or because they face regular periods of food stress.

WFP has developed policies on a range of issues affecting its programmes, two of which - Ending the Inheritance of Hunger (Box 7.1), and WFP's Commitments to Women (Box 7.2) – are described below.

Box 7.1 Ending the Inheritance of Hunger

Hunger leaves scars. The visible kind may be born by survivors of famine. Less visible, but all the more damaging, is the long term effects of hunger that run through families through succeeding generations. Malnourished women give birth to babies whose start in life is already compromised by their small size. The nutritional welfare of women and infants is vital to the food security of entire families. Hunger passed from mother to child represents a ruinous inheritance. It marks a cycle of hunger that transcends generations, unless the cycle is broken. Food aid provided at crucial times in the lives of women and infants represents an investment in future health and productivity.

Box 7.2: WFP's commitments to women

Commitment	Action
1. Provide direct access to appropriate and adequate food	- Assess the proportion of female headed households without family support and the burdens faced by women. - Distribution to women as heads of households. - Encourage women's participation in the distribution and monitoring process. - Address women's vulnerability to particular micronutrient deficiencies
2. Take measures to ensure women's equal access to, and full participation in, power structures and decision making.	- Create women's committees, reinforce women's groups, or increase women's representation in community structures.
3. Take positive action to facilitate women's equal access to resources, employment, markets, and trade.	- In addition to distribution directly to women: Encourage women's participation in FFW; Improve women's health through support for MCH; Improve education through school feeding or food for training (FFT). - By screening school feeding programmes on gender equality, target 50% of education resources within a country to girls.
4. Generate and disseminate gender data.	- Include gender segregated data in monitoring and evaluation systems. - Improve accountability through community advocacy and WFP institutional mechanisms such as the country office gender task force, gender focal points, etc.

WFP fully recognises the key role of women as household food managers. Hence, the Programme is committed to giving women direct access to, and control over, food aid. WFP believes that targeting women is key to ensuring that food reaches them and their families. Women are also encouraged to take active decision-making roles in designing, implementing, and monitoring food distributions. This is often difficult to operationalise as in many societies women's role in decision making outside the household is limited. WFP's commitments to women, and the actions required, are summarised in Box 7.2.

Nutrition Related Interventions in Emergencies

The aim of emergency food aid is to save lives by preventing or alleviating malnutrition . A summary description of emergency food aid interventions and primary objectives is given in Box 7.3.

Supplementary feeding programmes aim to prevent or alleviate malnutrition in the nutritionally vulnerable. Therapeutic feeding aims to rehabilitate the severely malnourished by providing special 'therapeutic' foods together with medical treatment. Box 7.3 shows the three types of emergency food aid interventions and objectives.

Box 7.3: Types of food Aid Interventions and Objectives in Emergencies

Intervention	Description	Objectives
General distribution	Free distribution of a combination of food commodities to the affected population as a whole. If the population is cut off from its food supply, or suffers abnormally high rates of malnutrition, food rations should meet nutritional needs	1. Meet immediate food needs of populations cut off from their normal sources of food. 2. Famine prevention or livelihood protection; preventing the adoption of damaging coping strategies 3. Livelihood recovery; supporting agricultural activities or livestock recovery.
Supplementary feeding	The provision of food aid - additional to the general distribution - to nutritionally vulnerable groups (e.g., children under 5, the malnourished, pregnant and lactating women) and to those excluded from social networks (e.g., unaccompanied minors) or unable to look after themselves (e.g., the disabled and elderly).	1. Nutritional support for moderately malnourished to save lives, where exposure to disease is high. 2. Prevent severe malnutrition. 3. Prevent malnutrition in those with high requirements. 4. Prevent malnutrition in under fives.
Therapeutic feeding	The rehabilitation of severely malnourished children by providing special foods that meets their entire nutritional requirements combined with medical treatment.	1. Medical and nutritional support to save lives.

Feeding Programme Strategy

General food distributions are justified for populations suffering unusually severe food insecurity and/or malnutrition. The decision to carry out a general food distribution is also influenced by existing infrastructure and services, capacity and availability of implementing partners, security and access. WFP only responds where the government or local authorities are unable or unwilling to respond.

The need for supplementary and therapeutic feeding programmes is determined by the prevalence of acute malnutrition, access to food, the prevalence or exposure to disease, and mortality rates. Proposed interventions based on these indicators are given in Chapter 8 and 9.

In emergencies, WFP needs to ensure that the risk of micronutrient deficiencies is minimised, bearing in mind that emergency affected populations are usually extremely resourceful and employ a variety of strategies to obtain foods to complement the general ration. WFP can assist populations to maximise their intake of micronutrients by following WFP and UNHCR guidelines (WFP and UNHCR, 1997), which recommend the following strategies in order of priority:

- *Promoting the production of vegetables and fruits*. The distribution of seeds, tools and other agricultural inputs allows populations to grow vegetables and fruits for home consumption or for sale. Access to land is likely to be a major constraint, particularly in refugee camps or in areas that are heavily land-mined.

- *Providing fresh food items in the general ration*. Fresh food items, which are micronutrient rich, can be purchased locally and distributed as part of the general ration. The difficulties of transporting and storing fresh foods are, however, a major constraint.

- *Adding to the ration a food which is rich in vitamins and minerals* (e.g., blended foods). Where there is a risk of a particular micronutrient deficiency, a micronutrient rich food source can be added or exchanged for another food commodity in the ration.

- *Providing fortified foods.* Fortified commodities, such as vitamin A fortified oil and iodised salt, have long been provided routinely in WFP rations. Fortified blended foods are increasingly included in general rations. Cereals such as wheat flour can also be fortified with calcium, iron, thiamine and niacin. (see Chapter 3, Fortification of Food and Blended Foods)

- *Distributing micronutrient supplements.* Distribution of the following micronutrient supplements is frequently desirable:

    1. Vitamin A every 6 months to infants and young children in emergency situations.
    2. Iron and folate to pregnant women through MCH programmes and, possibly, through emergency supplementary feeding programmes.
    3. Multi-vitamins to severely malnourished individuals in therapeutic feeding programmes.

The distribution of micronutrient supplements other than in the above circumstances is highly problematic. Apart from the problems of distributing actual pills, it is extremely difficult to ensure correct compliance, as most vitamin pills need to be consumed on a daily basis. However, in emergencies where there have been outbreaks of specific deficiency disorders, vitamin C supplements and also niacin supplements have been distributed as an emergency measure to contain the outbreak.

Economic transfer value of food aid

In general food distribution programmes, the economic transfer value of food aid may, quite correctly, gain increasing importance over time. Free food aid releases family income that would otherwise be spent on food. As food aid is often the only humanitarian resource that emergency affected populations receive, some of it may be sold to buy other essential needs or even more appropriate foods. However, the observation of large-scale sales by the beneficiaries most likely indicates problems with targeting, ration size or ration composition.

Nutrition Related Interventions with a Developmental Focus

School feeding and vulnerable group feeding through MCH clinics may appear similar to supplementary feeding in emergencies, but the aims differ considerably. In stable situations, the aim is to promote growth and improve nutrition in the longer term and thereby strengthen '*human capital'*, rather than serve as an immediate life-saving measure. Examples of the possible objectives of these programmes are summarised in Box 7.4. For more in-depth information on these interventions, refer to: "Supplementary Feeding for Mothers and Children: Operational Guidelines", WFP 1998: "Operational Guidelines for WFP Assistance to Education", WFP 1999; "School Feeding Handbook", WFP/UNESCO/WHO, 1999.

Box 7.4: Description and Objectives of Developmental Programmes

Intervention	Description	Objectives
School feeding	The distribution at school of breakfast, lunch or snacks, prepared on or off-site. Ration composition is based on the age range of the target group, their nutrient requirements, as well as acceptability and cost. The percentage of requirements to be met depends on the type of school. Day schools should provide 60-75% of requirements, and boarding schools should provide 100%.	- Contribute to improved scholastic performance - Reduce short-term hunger and/or micronutrient deficiencies - Improve attendance and enrolment - Improve concentration - Income transfer to poor families
Vulnerable group feeding	Provision of food aid to nutritionally vulnerable groups through, for example, MCH clinics. Nutritionally vulnerable groups could include children whose growth falters (or children under 3) and pregnant and lactating women. The ration is a supplement to household food supply. This is most effective when accompanied by nutrition education, which is why distribution through MCH centres is preferred.	- Promote growth in children under 5, or under 3. - Prevent malnutrition. - Provide a food supplement to those with higher nutritional requirements. - Improve health by improving MCH attendance. - Income support, safety net for poor families.

Who Needs Food? Identifying and Reaching Target Groups

The purpose of targeting is to identify those most in need and ensure they are covered by an intervention. Other reasons for targeting include maximising the impact of limited resources, reducing the risk of dependency, and limiting damage to the local economy. Restricting the number of beneficiaries will reduce the quantity of food needed, but targeting requires more in-depth assessment and, therefore, higher administrative costs.

Who is targeted largely depends on the objective of the intervention and on who is considered vulnerable. This, in turn, depends on the type of assessment conducted:

- A nutritional assessment will identify the nutritionally vulnerable.
- A food economy assessment will identify food economy areas and groups that are vulnerable to food insecurity; usually, within this, the most destitute groups are indicated.
- Famine early warning systems identify areas, and possibly population groups, experiencing deterioration in food security or nutritional status.

Ideally, a combination of information is used to identify who is most vulnerable in terms of nutrition, food security and risks to particular livelihoods.

Assistance may be targeted at individuals, households, population groups, geographical areas or administrative divisions. Types of targeting are indicated in Box 7.5 below.

Box 7.5: Types of Targeting

Geographical	Food aid targeted within a particular geographical area on the basis of nutritional surveys, food security assessments (food economy areas) or deterioration in food security indicators.
Population groups	Food aid targeted at groups with particularly vulnerable livelihood systems or at defined population groups who have lost their access to food (e.g., displaced or refugees)
Households	Food aid targeted at vulnerable households within a population (e.g., economically or socially vulnerable, or households with malnourished individuals.
Individuals	Food aid targeted at physiologically vulnerable individuals, usually in selective or vulnerable group feeding programmes.

The nutritionally vulnerable can be identified by measuring anthropometric status and through nutritional surveys (see Chapters 5). Other nutritionally vulnerable groups may include pregnant and lactating women, the elderly, and the sick. Criteria for the socially vulnerable also exist but it can be difficult for outsiders to identify these groups or determine their nutritional status. Socially vulnerable groups may include female-headed households, unaccompanied minors, and the disabled. It should be noted, however, that female-headed households are only considered particularly vulnerable if they cannot access family support.

Targeting poor households within communities is extremely difficult. The identification of the poorest households is most effectively done by community representatives and therefore depends on WFP's ability to locate knowledgeable community representatives who are committed to targeting the poor. Even then, political, social and cultural factors may combine to frustrate efforts to target the most needy households.

In emergency and development situations, targeting the poor through self-selection is sometimes achieved with Food for Work programmes, the theory being that only the poorest and most needy will accept the kind of work offered as well as food in lieu of wages.

Monitoring and Evaluation of Food Aid Interventions

Monitoring and evaluation activities assess the appropriateness, efficiency, effectiveness and impact of an intervention. Monitoring is a continuous and systematic assessment of the progress of a particular intervention over time. It is an integral part of day-to-day management and should enable WFP managers to detect, and act on, problems at any level of food aid programming.

Evaluation is a one-off exercise that may be done when the project is completed or after an extended period of time in a protracted operation. Evaluations should provide information to improve future interventions.

In general, programme performance indicators should include measures of the timeliness of the intervention, the degree to which resources were utilised as planned and the degree to which the recommended quantities of food aid reached the intended beneficiaries. Performance monitoring should also include measures of the extent to which beneficiaries (particularly women) are involved in the programme. How programme implementation is monitored depends on the type of food aid

intervention (see monitoring guidelines for general distribution and selective feeding in chapters 9 and 10; monitoring in WFP school feeding and MCH programmes is described in their respective operational guidelines).

Programme impact monitoring establishes whether the objectives of the intervention are being achieved and, therefore, depends on clearly defined programme objectives. For each objective, a set of indicators and the means to collect the necessary information need to be defined.

Monitoring impact on nutrition

The most obvious methods for measuring impact on nutrition is through nutritional surveys (Chapter 5) and data collection from supplementary feeding programmes in emergencies. When the aim of the intervention is to promote growth, growth monitoring data from MCH clinics may be compiled and analysed. In interpreting the results of nutritional surveys, it must be recognized that improvements in nutritional status can also be the result of improvements in health.

In some situations, nutritional surveys may not be possible either because of poor road conditions, widely dispersed populations or - in the case of conflict - because of insecurity or denial of access by the warring parties. In these cases, information on nutrition has to be obtained indirectly, either through estimating the impact of overall food aid on alleviating food insecurity or through using a variety of Participatory Rapid Appraisal (PRA) techniques or "Beneficiary Contact Monitoring".

PRA techniques to monitor impact include:

- Asking selected groups of beneficiaries to list the main uses of food aid, indicating the relative importance of each use (proportional piling). This might include consumption, sale of certain commodities, sharing with others, etc.
- Asking beneficiaries about the main benefits and drawbacks of food aid and asking them to rank these. The most important benefit, for example, might be improved health, followed by reduced loss of livestock, followed by providing a cash income, etc.

Chapter 6 discusses methods for PRA including household interviews, key informant interviews and focus groups.

The positive and negative impacts of the intervention must be considered. For example, food aid may be targeted at those most in need, but its provision may be dividing communities or fuelling conflict. Distribution sites may increase the risk of attack or facilitate military recruitment. Distribution at the wrong time of the year may have a disincentive effect on food production.

If programme objectives are not being achieved, this may be because (of):

- Incorrect situation analysis and project design;
- The assumptions underlying the successful achievement of objectives were incorrect;
- The necessary conditions for successful implementation did not exist, or conditions changed during implementation;
- Problems in implementation (e.g., food did not reach the intended beneficiaries in recommended quantities at the right time).

The appropriateness of the intervention is analysed by assessing how programme objectives and design relate to the situation analysis. If the situation was incorrectly analysed, or programme objectives do not follow from the situation analysis, programme objectives are unlikely to be achieved. Every project proposal should also include a *risk assessment*, which outlines the key assumptions made and essential conditions required for the successful achievement of objectives. For example, if the objective is to improve nutritional status, a key assumption may be that public health will be addressed by another agency. Essential conditions may include security, access, government support, etc.

Key Words

Appropriateness	The relevance of programme objectives and design in relation to the situation analysis.
Blanket supplementary feeding	A food/micronutrient supplement for all members of a group (children under 3 or 5, pregnant and nursing mothers, etc.) in order to prevent widespread malnutrition and to reduce excess mortality.
Effectiveness	The extent to which the intervention reached the intended beneficiaries, according to assessed needs.
Efficiency	Timeliness and appropriate use of resources in programme implementation.
Evaluation	One off assessment of the appropriateness, efficiency, effectiveness and impact of an intervention.
Food for work	Food given as payment for work performed (in the context of a supervised public works programme) to address acute food insecurity and create community capital.
General food distribution	Free distribution of a combination of food commodities, usually based on nutritional needs, to an emergency affected population.
Impact	The effect of the intervention.
Monitoring	The systematic and continuous assessment of the progress of an intervention over time.
School feeding	Provision of meals or snacks to school children to improve nutrition and promote education.
Supplementary feeding	The provision of food aid to the nutritionally or socially vulnerable (in addition to a general distribution) to save lives and/or to prevent malnutrition.
Targeting	Restricting the coverage of the intervention to those identified as the most vulnerable.
Therapeutic feeding	Feeding and medical treatment to rehabilitate severely malnourished children.
Vulnerable group feeding	Provision of food to nutritionally vulnerable groups, preferably at MCH clinics, to promote growth and health.

Key Reading

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8 PLANNING FOOD RATIONS

The purpose of this chapter is to enable WFP staff understand the process of planning adequate and appropriate general food rations in emergencies. Rations for supplementary feeding, school feeding and vulnerable group feeding can be found in their respective operational guidelines.

Summary

For convenience, the process of planning rations can be broken down into two stages. First, the population's nutritional requirements are estimated in terms of average per capita requirements. In the early stages of an emergency, an initial planning figure of 2,100 kilocalories per person per day is used for average energy requirements. This figure is later adjusted to suit local conditions, taking into account the population's actual nutritional requirements and its ability to access food. Their requirements for micronutrients are also considered.

The second stage is the selection of the types and quantities of different ration items. This takes into account factors such as nutritional considerations, food preferences, the acceptability of available food commodities, ease of use, fuel availability, milling, and the cost and potential resale value of items. Once the composition of the food basket has been agreed, the total food aid requirements may be calculated.

Learning objectives

After reading this Chapter WFP staff should:

- Be aware of the two stages of planning a general ration;
- Know the nutritional requirements of an adequate ration in terms of the initial planning figure for energy and the percent of energy to be provided by fat and protein;
- Be familiar with the range of food aid commodities usually included in a nutritionally balanced ration; and be familiar with a range of typical rations;
- Understand the basis for adjusting the initial planning figure for energy;
- Understand the various considerations (apart from nutritional composition) that must be taken into account when selecting foods for a ration;
- Be able to give examples of a range of fuel-saving strategies;
- Understand the issues around milling, particularly the need for providing flour in the early stages of an emergency and the need for adequate milling capacity where whole grain cereals are provided;
- Be aware of common commodity substitutions, which are necessary when certain items are unavailable.

It is strongly recommended that readers also consult the WFP/UNHCR Guidelines for Estimating Food and Nutritional Needs in Emergencies. Also, see Chapter 10 of this manual, General Food Distribution.

Emergency food aid saves lives and restores or maintains nutritional health. Although its main function is to feed people, food assistance can also contribute to the process of building up assets and promoting the self-reliance of poor people and communities. The ration or food basket is the type and amount of food that is provided daily to each beneficiary through general food distribution programmes (Chapter 10). The composition of the ration is critical throughout the stages of an emergency and

will vary considerably according to the local situation. Consequently, there is no such thing as a standard WFP ration – each ration must be planned for a specific purpose and context.

Planning the composition of the food basket is an on-going task, beginning at the initial stages of an emergency and continuing throughout the relief and rehabilitation phases. As a minimum requirement, the food and nutritional needs of an emergency affected population must be reviewed annually. This often leads to changes in the ration. Some changes may be temporary. For example, if certain food aid items fail to arrive, other foods must be substituted if the ration level is not to be reduced.

The food basket or ration usually consists of a variety of *basic food item*s (cereals, oil and pulses) and, possibly, additional foods known as *complementary food items* (meat or fish, vegetables and fruit, fortified cereal blends, sugar, condiments) which enhance nutritional adequacy and palatability. An *adequate ration* is described in box 8.1.

Box 8.1: An Adequate Ration

An adequate ration should (be):

- Meet the population's minimum nutritional requirements for light activity;
- Diversified, including a range of commodities;
- Acceptable and broadly familiar;
- Fit for human consumption (free of contamination, within shelf-life);
- Easily digestible for children and other vulnerable groups;
- Maximise the use of available resources;
- Economic in terms of fuel requirement, preparation time and waste.

Stages of Planning Rations

The two main stages involved in planning rations are:

- Estimating the population's nutritional requirements.
- Selecting the types and quantities of commodities

Each stage involves a number of steps that should be followed either for planning a ration or for evaluating an existing ration.

Stage 1: Estimating the population's nutritional requirements

Using an initial planning figure for mean energy requirement

To facilitate planning, rations are based on average energy requirements, also known as the population's *mean per capita energy requirement.* This varies according to:

- The age and sex structure of the population, or its demographic characteristics.
- Health, nutritional and physiological status.
- Physical activity level (PAL).
- Environmental temperature.

This information is rarely available in the early stages of an emergency and so *an initial planning figure of 2,100 kilocalories is used to calculate energy requirements for populations.* This reference value has been estimated by the World Health Organization as the *mean per capita energy requirement* in emergency situations globally. It supersedes the previous planning figure of 1,900 kilocalories.

This initial planning figure is based on the average energy needs of a "typical" emergency population, assuming standard population distribution, body size, a warm climate, pre-emergency nutritional status, and light physical activity. The figure is not specific to any age/sex group and should not be used to assess requirements of individuals.

Adjusting average energy requirements to suit local circumstances

In time, the energy level of the ration may be adjusted upward or downwards once more is known about:

- *The age and sex structure of the population, or its demographic characteristics.* Annex 8.1 gives the energy requirements for emergency situations based on a reference demographic profile. When the demographic distribution is substantially different from normal (e.g., when adult males constitute more than 50% of the total) this will influence the average requirements[1] . For example, a population composed exclusively of women and children requires about 6 percent less energy than a standard population.

- *Health, nutritional and physiological status.* If, for example, the population is already severely malnourished, or showing signs of micronutrient deficiency diseases, it is vital that the ration addresses and compensates for these deficiencies. There is, however, no clear theory or guidelines on how the ration should be adjusted in these circumstances. Therefore, in practice, ration modification often relies on 'guess-work' and is influenced by resource availability.

- *Physical activity level (PAL).* When the workload of adults exceeds light activity, the daily ration should be increased - by 100 kilocalories for moderate activity, 150 kilocalories for moderate/heavy activity, and by 250 kilocalories for heavy activity. Differences in workloads by gender must also be considered.

- *Environmental temperature.* The reference temperature used to calculate the initial planning figure of 2,100 kilocalories is 20°C (i.e., a warm climate). For every 5°C drop in temperature below 20°C, an additional 100 kilocalories energy per day should be provided (or 1% for every 1°C fall). (Annex 8.2)

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Adjusting the planning figure according to people's access to food

An understanding of the different ways people are able to obtain food through their own activities permits a better estimation of the amount of food a population can obtain on its own.

In theory, the ration size may be reduced according to people's ability to obtain food on their own. In practice, this must be done with extreme caution. Most estimates of the ability of people to feed themselves are fairly crude. Even when estimates are reasonably accurate, there are likely to be certain groups whose food security is well below the average household food security. Reducing the ration across the board may mean that a significant proportion of the population receives insufficient food to meet its needs.

In emergencies, people obtain food through a wide range of strategies and mechanisms, such as: loans or gifts through social networks, credit schemes, illegal means (e.g., theft, prostitution, sale of illicit goods, and even violence). These illegal strategies are difficult, if not impossible, to assess; and although they may constitute a significant source of food for some people, their existence should not automatically influence ration planning one way or the other. In other words, if a strategy is considered damaging to the individual, family or community, additional rations provision may help discourage the activity.

1 In practice in emergencies, it is usually better to stick with 2,100 kcal as the initial planning figure, as when there is a significant population displacement there is almost certainly a shift from the normal age and sex distribution for that country.

Requirements for micronutrients

The recommended nutritional requirements for emergency affected populations for nutrients other than energy are shown in Table 8.1. These figures are the average daily per capita recommended intakes to cover the needs of a typical (whole) population requiring emergency food aid in a developing country (WHO, 1995). They are for reference only - they define safe levels of intake for a population group and are not the recommended intake for a particular individual. In addition, whole population estimates are only available for a limited number of vitamins and minerals.

Table 8.1: Recommended Mean Daily Per Capita Nutrient Intakes (for a typical population requiring emergency food aid in a developing country)

Nutrient	Recommended daily intake
Protein	Between 10 – 12 percent of the energy provided by the ration, but less than 15% (52 – 63g)
Fat	At least 17 percent of the energy provided by the ration (40g)
Vitamin A	500 µg retinol equivalents (1666 IU)
Vitamin D	3.2 - 3.8 µg calciferol
Thiamin (B1)**	0.9 mg (or 0.4 mg per 1,000 kcal intake)
Riboflavin (B2)**	1.4 mg (or 0.6 mg per 1,000 kcal intake)
Niacin equivalents (B3)**	12.0 mg (or 6.6 mg per 1,000 kcal intake)
Folic acid	160 µg
Vitamin B12	0.9 µg
Vitamin C (Ascorbic acid)	28 – 30 mg
Iodine	150 µg
Iron	20.4 mg*

* From a diet whose iron is of low bioavailability

** B-vitamin requirements are proportional to energy intake, as shown in brackets.

Stage 2: Selecting the types and quantities of commodities

A range of food commodities must be selected for the food basket. Common food aid commodities in emergencies are listed in Box 8.2

Box 8.2: Types of Food Aid Commodities

- Cereals (includes whole cereal grains, processed grains and soy-fortified cereals)
- Oil and fats
- Pulses (peas, beans and lentils) and occasionally other protein-rich sources of food (canned meat, fish or cheese)
- Blended foods (corn soy blend, wheat soy blend, or locally produced blended foods)
- Sugar
- Salt, spices or condiments (in refugee or returnee situations, iodized salt is provided by WFP while UNHCR is responsible for condiments like pepper, tomato paste, magi cubes)

Fresh or dried vegetables and dried fruit (e.g., dried dates) are much less common food aid commodities handled by WFP. Other agencies may provide them in order to supplement the general ration.

The selection of foods from the particular groups or types of food depends on a number of considerations:

- Nutritional and dietary considerations;
- Local food habits, preferences and the acceptability of particular food items;
- Storage, quality control and specifications;
- Ease of use (milling/ preparation/cooking);
- Availability and substitution of food items;
- Need for fortified foods, e.g. blended food (refer to Chapter 3);
- The cost of the ration and its potential resale value.

Nutritional and dietary considerations

Cereals, as the staple food, provide the main source of energy, a large proportion of the protein in the diet, and a range of micronutrients. Pulses (beans and lentils) are needed to supply additional protein and micronutrients. A source of fat or vegetable oil is essential to improve palatability and increase the energy density of the diet. Protein and fat sources should contribute 10-12% and 17% respectively of the energy content of the ration. The combination of cereals, pulses and oil provides the major part of people's nutritional requirements. Other commodities, though, must be added to make up nutritional shortfalls - particularly in micronutrients - and to improve the palatability of an otherwise extremely monotonous diet.

In emergency situations where people have no other source of food, the prime concern is often to provide sufficient food to meet their energy requirements.

When people only have the food basket for survival, they are particularly prone to micronutrient deficiencies because of the limited variety of foods and the lack of fresh foods. Even where foods fortified with certain micronutrients are included in the ration - such as blended food, oil and salt - the rations are often still below the recommended requirements for many micronutrients (see Annex 3.1).

Where people are securing some food for themselves and are receiving only partial rations, the foods included in the partial ration must nutritionally complement the foods people obtain for themselves.

Examples of a range of adequate full rations proposed by WFP and UNHCR are shown in Table 8.2

Note that for rations 1,2,3 & 5, the cereal used for the calculation is maize meal. When this is substituted by another cereal, the nutritional composition will change; in particular, it is likely the fat content will drop slightly.

Local food habits and the acceptability of particular food items

Local food habits must be taken into account when deciding on rations. Wherever possible, the staple food should be the same as the locally preferred staple, or at least familiar to the beneficiaries. Also, the balance of commodities and relative amounts of each in the food basket should reflect the population's preference.

People's established tastes and preferences are usually based on the wide range of foods that were available prior to the emergency. These preferences usually persist through an emergency but may be modified by cost and availability constraints. So, when asking people about their food preferences, it is important to distinguish between their established preferences and their current preferences. A variety of foods obviously increases acceptability. But the range available in an emergency ration is

Table 8.2 Examples of Adequate Full Rations for a Population Entirely Reliant on Food Assistance

ITEMS	RATIONS (quantity in g)				
	Type 1*	Type 2*	Type 3*	Type 4**	Type 5*
Cereal flour/rice/bulgur	400	420	350	420	450
Pulses	60	50	100	60	50
Oil (vit. A fortified)	25	25	25	30	25
Canned fish/meat	-	20	-	30	-
Fortified blended foods	50	40	50	-	-
Sugar	15	-	20	20	20
Iodized salt	5	5	5	5	5
Fresh veg./fruits	-	-	-	-	100
Spices	-	-	-	-	5
Energy: kilocalories	2 113	2 106	2 087	2 092	2 116
Protein (in g and in % kcal)	58g; 11%	60g; 11%	72g; 14%	45g; 9%	51g; 10%
Fat (in g and in % kcal)*	43g; 18%	47g; 20%	43g; 18%	38g; 16%	41g; 17%

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often restricted as a result of practical constraints (e.g., if food is distributed by air drop or air lift).

A final consideration is that the acceptability of food commodities is directly influenced by its quality, a factor that can be at least partially controlled by quality control during storage, transport and handling.

Storage, Quality Control and Specifications

The quality of food commodities must be maintained as much as possible throughout transport, handling, storage and distribution. A system of quality control for all commodities must be implemented to ensure that food distributed to beneficiaries is of good quality, safe for human consumption and that it meets the required specification. Specifications for vitamin and mineral fortification of blended food, based on the Codex Alimentarius, are established by WFP/UNICEF/UNHCR.

Food Processing and Preparation

Food commodities should be easy to prepare with the minimum use of fuel. The ease of preparation is especially important in the early stages of an acute emergency.

Adequate supplies of essential non-food items must be ensured to allow the proper preparation and consumption of items in the food basket. Every household should have access to at least one cooking pot, enough fuel for food preparation, water containers, and soap. Other basic non food needs are cooking stoves, family cooking sets, emergency shelter, tarpaulin material, plastic sheeting, and

blankets. Storage containers, plastic bags etc., may need to be distributed where people receive milled cereals or blended food, which, once contaminated, cannot be cleaned (unlike whole grain cereals). The type of food in the ration and the availability of essential non-food items have a significant impact on the demand for cooking fuels (see Box 8.3 and Annex 8.3). Cooking fuel should be considered a basic need during an emergency and provided in the emergency phase if not otherwise available.

Improved (fuel-efficient) stoves
Improved stoves rely on (a) enclosing and insulating the fire and/or (b) controlling the airflow. Simply by shielding a wood fire from draughts 30 – 40 percent fuel savings can be achieved. Improved stoves are usually made with mud, metal, clay, ceramic or a combination.

Energy-saving cooking practices:
The use of tightly fitting lids and the correct choice of pot. Removal of excess soot build-up. Cutting foods up small. Pre-soaking of beans. Putting fires out promptly etc. Grinding of beans and hard grains, such as maize.

Collective cooking arrangements, in which the numbers served from the same pot are increased to maximise efficiency.

The use of alternative biomass fuels (alternatives to firewood), for example: peat, charcoal, grass. Typical consumption levels of firewood range between 1 – 2 kg per person per day.

Use of non-biomass fuels (solar cookers and kerosene stoves). Solar cookers can only be used where there is high enough exposure to the sun's rays. Fireless cookers, or haybasket cookers, are usually made with a basket or box insulated with cloth, newspaper or wood shavings and with a tightly-fitting insulated lid.

The use of kerosene for cooking in an emergency requires special stoves and fuel storage containers. Fire risk is considerable at all stages of distribution. People may be unaware how to operate the stoves, which increases already significant fire risk. For these reasons, the use of these stoves is discouraged at household level but may be used communally where there is less fire risk and less chance of the sale of fuel and hardware.

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Box 8. 3 Fuel-saving Strategies

If unfamiliar food items must be distributed or unfamiliar cooking methods promoted, beneficiaries should be fully informed about their value and use (see Chapter 11). For example, parboiled rice, blended food, yellow maize meal and improved stoves have all been well accepted in emergencies when the benefits were fully understood.

Milling cereals

Cereals are usually milled into flour or meal (coarse flour) prior to cooking. This makes them more versatile in terms of the dishes that may be prepared, more palatable, and it also reduces the fuel requirements for cooking.

A needs assessment should determine whether cereals are to be provided in whole grain or as flour (in the case of refugee and returnee situations, a joint WFP/UNHCR mission carries out the assessment; see Chapter 6). *For practical, nutritional and environmental reasons, WFP and UNHCR are committed to providing milled grain, rather than whole grain, especially in the early stages of an emergency.* The provision of milled cereals may be difficult to sustain in protracted operations.

(Please refer to WFP's Environment Guidelines)

If whole grain is provided, local milling capacity must be available. As milling by the beneficiaries reduces the volume of the cereals in the ration by up to 20%, the ration should include compensation for this loss as well as for milling costs. This compensation is normally 15 percent in East Africa and 20 percent in Francophone Africa. It is usually provided 'in kind', not in cash. WFP is responsible for mobilizing the necessary resources for milling and will provide milling facilities for the beneficiaries where feasible.

In general, it is easier to store cereals as whole grains for subsequent local milling rather than to mill prior to dispatch. Flours has much poorer keeping qualities than whole grains.

Availability and Substitution of Food Items

The selection of food items in the food basket and the amounts given may be partly determined by availability. When certain ration items are unavailable they can be replaced by other available food items in order to maintain as far as possible the nutritional levels of the food basket. This substitution should only be temporary and beneficiaries must be fully informed of the change in food basket composition through the public information system (see Chapter 10). The rate of substitution depends on the commodities that are being substituted for one another. Some common examples are shown below:

Blended food and beans	1 to 1
Sugar and oil	2 to 1
Cereal and beans	2 to 1
Cereal for oil (not oil for cereal*)	3 to 1

If, for example, no oil is available for inclusion in the ration, either 100g sugar or 150g cereals could substitute for 50g oil.

Box 8.4: Examples of food commodity substitutions

When there is insufficient food aid available to meet the agreed basket of food items for the whole population, the following options are available:

- Postpone distribution until a full ration for the total population is available;
- Distribute an equal share of available commodities to all of the population (i.e., reduce rations);
- Give a larger or full ration to vulnerable groups in the population and a smaller (or no) ration to the general population.

Whichever option is adopted, beneficiaries must be kept fully informed of any changes to the distribution schedule or amounts and the reason for the change. This information is vital, not least because beneficiaries must plan their consumption during periods of shortage.

When full distribution of the agreed ration has not been possible, the shortfall in the ration is not automatically distributed when food aid eventually does arrive (*retrospective or retroactive distribution)*. In the case of refugees or returnees, the decision on any retroactive distribution is made jointly by WFP and UNHCR, taking into account:

- The nutritional status of the beneficiaries;
- Measures taken by beneficiaries to make up shortfalls and any liabilities or costs incurred in coping with the shortfall;

- Its economic impact;
- The future availability of resources.

The Cost of the Ration and its Resale Value

As described in the previous sections, the most cost-effective ration is based on a combination of cereals, pulses and oil. Some food aid commodities (such as canned meat, fish, and biscuits) are relatively more expensive, so that their routine inclusion in the ration is not cost-effective. Not all nutritional improvements to the ration are costly. For example, including vegetable oil fortified with vitamin A or iodized salt incurs marginal additional costs (Chapter 3).

A limited degree of food commodity trading at the household level is acceptable provided there is no large-scale diversion of assistance or detrimental effects on the health/nutritional status of the community. Certain commodities may have a potentially high resale value (e.g., sugar and oil). The resale of these commodities may allow beneficiaries to purchase other essential food items - such as fruits and vegetables - that are not otherwise available in the diet.

Calculating Food Aid Requirements

Once the size and composition of the ration has been agreed upon, food aid requirements can be calculated.

Food aid requirements (per month)

Ration item (pppd) x Beneficiaries x Planning period x Transport loss adjustment

Ration item:	Individual amount of each ration item per person per day
Pppd	Per person per day
Beneficiaries:	The projected average number of beneficiaries for the project
Planning period:	The duration of the feeding operation in days.
Transport loss adjustment	Add on percentage for losses during transport, storage and handling: Country with port +5%; Landlocked country +10%

This formula for the calculation of food aid requirements is misleadingly simple. In practice, the accuracy of estimates depends on the reliability of the information provided. *At each stage of planning rations, every effort must be made to obtain accurate and reliable data. No figure is more crucial than the estimation of numbers of beneficiaries, which likewise can change as the emergency situation unfolds.*

Key Words

Basic food items	Basic food items include: cereals, oil, and a protein-rich food such as pulses (beans/peas etc.) and/or fish/meat in canned or dried form.
Blended food	Blended foods are a pre-cooked fortified mixture of cereals, pulses and other ingredients (e.g., wheat soy blend, corn soy blend, 'faffa').
Complementary food items	Complementary food items include fresh meat/fish, vegetables/fruit, fortified cereal blends, sugar, condiments, salt and spices.
Extraction rate	The extraction rate is the proportion of the whole cereal grain remaining after the milling process. This varies according to the type of cereal and the milling process.
Food aid requirement	The estimated amount of food aid needed by an emergency affected population.
Food deficit or shortfall	The difference between the mean energy requirement of a population and the ability of people to obtain food on their own (N.B. not necessarily the same as the food aid requirement).
Initial planning figure or initial reference value for energy requirements	The World Health Organization has estimated that the average estimated per capita energy requirement in an emergency is 2,100 kilocalories.
Mean per capita energy requirement of a population	Depends on the population's demographic profile, activity levels, the ambient temperature, and its health and nutritional status.
Milling	To mill whole grain cereals, either by machine or hand grinding, to flour or meal.
Nutritional requirements	The amount of energy, protein, fat, and micronutrients needed for an individual to sustain a healthy life.
Reference Temperature	The reference temperature used to calculate the mean per capita energy requirement of a population is 20'C. For every 5^0 C drop in temperature below the reference, an additional 100 kcal should be added to the requirement.
Parboiling	The process of *parboiling* involves soaking, steaming and drying the grain (e.g., rice or wheat/bulgar). In the case of rice, for example, it preserves a higher proportion of nutrients in the grain compared with polished or highly refined types.

Key Readings

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9 SELECTIVE FEEDING PROGRAMMES

The purpose of this chapter is to help WFP staff make decisions about the need for different types of selective feeding programmes in emergency situations.

Summary

There are two forms of selective feeding programmes: therapeutic feeding programmes (TFPs) and supplementary feeding programmes (SFPs). The objective of TFPs is to reduce mortality in severely malnourished individuals while the objective of SFPs is to prevent the moderately malnourished becoming severely malnourished. Information is provided in this chapter on:
target groups for different types of programmes, criteria for establishing programmes, important principles of programmes, feeding regime and rations for different types of programme, admission and discharge criteria, assessment of impact.

Learning objectives:

After reading this chapter, WFP staff should be able to:

- Assess the need for therapeutic and supplementary feeding programmes
- Understand the objectives of both type of programme
- Understand the basis of establishing selection and discharge criteria and the use of nutritional index cut-off points in adhering to these criteria
- Understand the relative advantages of 'wet' versus 'dry' supplementary feeding programmes
- Describe the stages and components of therapeutic feeding
- Identify key indicators used to monitor and evaluate selective feeding programmes
- Estimate the food requirements of a selective feeding programme

Types and Objectives of Selective Feeding Programmes

There are two forms of selective feeding programmes:

- Therapeutic feeding programmes.
- Supplementary feeding programmes.

Therapeutic feeding programmes

Therapeutic feeding programmes (TFPs) are targeted at the severely malnourished (wasted individuals). The main aim is to reduce mortality. In most emergency situations, the majority of those with severe wasting are young children. There have, however, been cases where large numbers of adolescents, adults and the elderly have become wasted (e.g., Somalia during the height of the civil war in 1992). In these situations, separate TFP facilities may be established for older age groups.

Supplementary feeding programmes (SFPs)

There are two types of SFPs:

·*Targeted SFPs:* The main aim of targeted supplementary feeding programmes is to prevent the moderately malnourished becoming severely malnourished. These types of programmes usually provide a food supplement to the general ration for mild and moderately malnourished individuals and for selected pregnant and lactating women and other nutritionally vulnerable groups.

·*Blanket SFPs:* The main aim of a blanket SFP is to prevent widespread malnutrition and related mortality in nutritionally vulnerable groups by providing a supplementary ration for all members of the group (e.g., children under five, pregnant and lactating women, etc.).

Target groups for supplementary feeding programmes

As set out in the most recent UNHCR/WFP Guidelines on Selective Feeding Programmes, the primary target group for targeted SFPs are:

- Mild or moderately malnourished children under five years of age.

Other groups, which may be covered, are:

- Children discharged from TFPs;
- Clinically malnourished individuals over 5 years of age;
- Pregnant and lactating women who are nutritionally vulnerable for medical or social reasons.

The target groups in blanket SFPs are:

- Children under 5 years (or 3 years if resources are scarce);
- Pregnant women from the third month of pregnancy;
- Lactating mothers up to six months;
- Adults showing signs of malnutrition;
- The elderly and sick.

The priority given to these different target groups will depend on several factors, among them: agency resources, the size of population groups, and how the emergency and resulting interventions are affecting the food security of different groups.

These target groups are not set in stone and there must be flexibility in defining and prioritising groups for each situation. Nutritional vulnerability varies between emergencies and among different population groups. Consequently, there should always be some attempt to identify nutritionally vulnerable groups in any emergency situation.

Criteria for Establishing Selective Feeding Programmes

Therapeutic Feeding Programmes (TFPs)

The main criteria for establishing TFPs is an excess of severe wasting cases that cannot be adequately treated by existing health care facilities.

Targeted Supplementary Feeding Programmes (SFPs)

The criteria for establishing targeted SFPs are based on the need to rehabilitate:

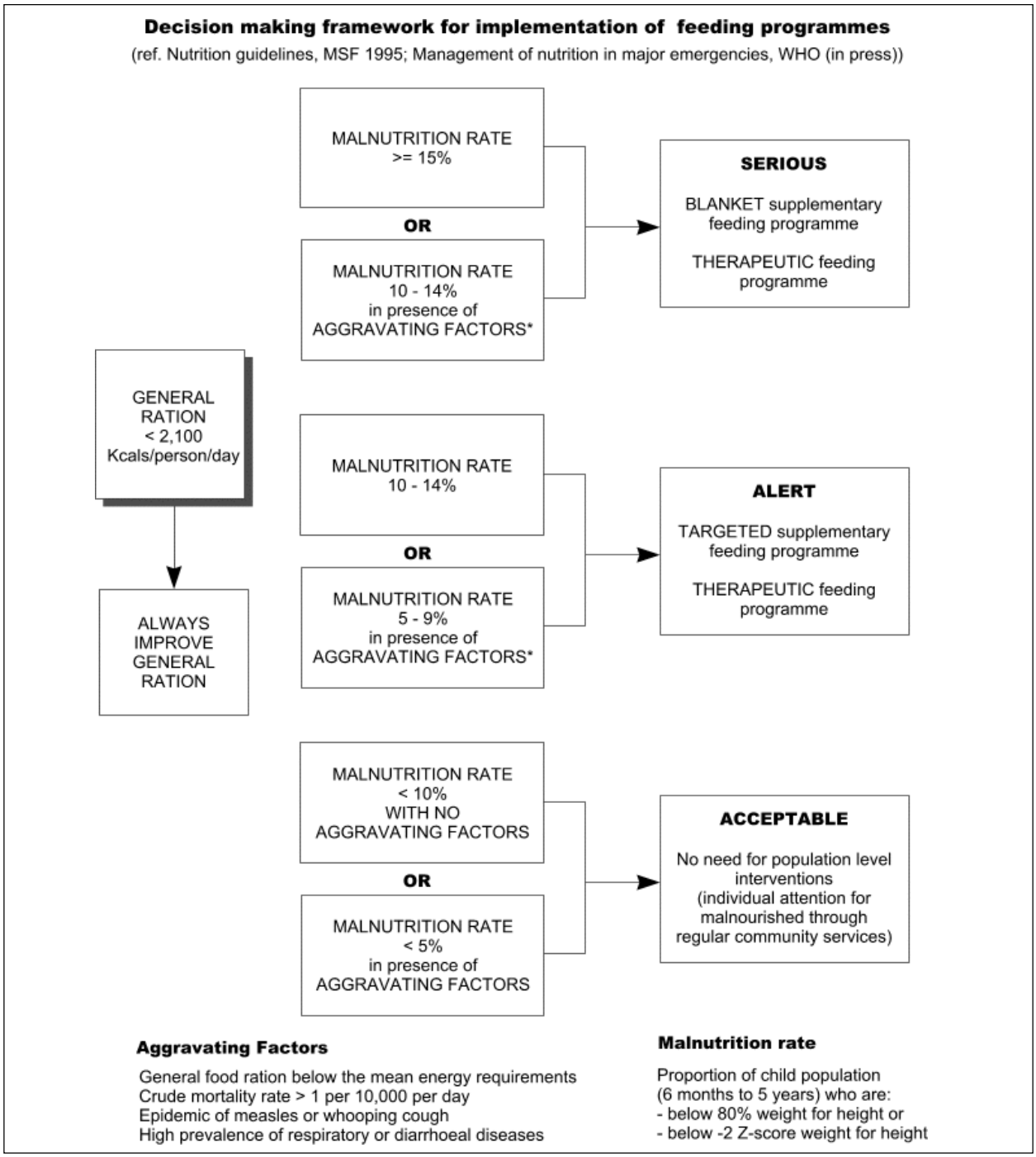
- Large numbers of mild or moderately malnourished individuals (prevalence of 10-15% wasting in the population);

- Large numbers of children who will likely become mild or moderately malnourished due to factors like poor food security, high levels of disease (prevalence of wasting between 5-9% plus aggravating factors);
- Those children discharged from existing therapeutic feeding programmes.

Blanket Supplementary Feeding Programmes

Blanket SFPs - which are primarily preventive in nature - are normally set up when the general ration is inadequate. This may occur in the early stages of an emergency programme before a reliable food pipeline can be established (as was the case in the Ngara refugees camps for Rwandan refugees in Tanzania in 1994) or if there are problems with the general ration distribution system (as was the case for IDPs in Rwanda during 1994 when, in some camps, food was distributed via commune

Box 9.1 Decision-making Framework for Implementation of SFPs



UNHCR/WFP Guidelines on Selective Feeding Programme

leaders with the result that many beneficiaries did not receive their fair entitlement). Blanket SFPs may also be established:

- If there are high levels of wasting or if wasting is between 10-19% with aggravating factors;
- If there is an anticipated increase in malnutrition due to seasonal epidemics;
- In order to target micronutrient rich foods to vulnerable group on the basis of evidence of micronutrient malnutrition.

Box 9.1 shows the decision making framework for the implementation of SFPs

Important Principles of Selective Feeding Programmes

Targeted SFPs

Targeted SFPs aim to provide a supplement to the general ration. It is therefore assumed that the general ration provides for all nutritional needs of the population except particular groups. Groups which might require SFPs are: the malnourished, who have additional nutritional requirements for catch up growth; the medically ill, who have additional nutritional requirements for tissue repair; and certain socio-economic groups who have restricted access to the general ration. Therefore, to be effective, the planned general ration distribution must be fully and efficiently implemented so that the supplementary ration *is additional to, and not a substitute for,* the general ration. If this is not the case, the SFP is unlikely to restore nutritional status in those who have additional nutritional requirements or prevent nutritional deterioration in those whose access to the general ration is already restricted.

Nevertheless, in many emergency situations, targeted SFPs are often implemented in the absence of an adequate general ration. Food aid agencies justify this for a number of reasons:

- SFPs act as a temporary measure to minimize loss of life amongst the most nutritionally vulnerable, until the general ration can be improved;
- The implementing agency is already present in the emergency location due to some other activity and staff feel that they must 'do something'; but, given their small size and limited access to resources, it only has the capacity to run a small-scale SFP.

When there are such rationales, these should be explicitly stated so that programme performance can be evaluated on the basis of these modified objectives. It must also be recognised at the outset that the impact of this type of programme will be limited and that within a short period of time the programme may be overwhelmed as the numbers of malnourished increase (re-admissions and new cases).

When possible, agency efforts should be expended in improving the general ration provision rather than in establishing SFPs as a counterbalance to an insufficient general ration.

Every emergency has individual features that lead to situation-specific objectives and approaches for selective feeding programmes. Guidelines cannot cover the wide range of situations faced by field staff. There is, therefore, a need to take pragmatic decisions that, at times, may conflict with current guidelines. Some examples of SFPs with atypical designs or objectives are presented in Box 9.2.

Box 9.2: Case-studies

- An on-site supplementary feeding programme for the Rohinga refugees in Myanmar has been established which provides a full ration for women and children. This unusual type of programme was justified on the grounds that the general ration was often taken and sold by men and that this was contributing to the high levels of wasting found in the camp.
- A form of prison supplementary feeding programme was established by a number of agencies in Rwanda during 1997. Many of the detainees in the prisons were awaiting trial and were dependent on families or friends visiting with food. An objective of these SFPs was to reduce the demands on these families who were voluntarily assisting the prisoners and thereby improve their food security
- At the height of the civil war in Liberia, many of those affected by the conflict asked humanitarian agencies to provide food in the form of a supplementary feeding programme rather than as a general ration. Their rationale was that a general ration distribution would place them at too great a security risk as such large quantities of food would probably be looted. This was less likely to be the case with a supplementary feeding programme. This programme therefore became a means of getting food out into the general population.

An important rule of thumb is to always seek beneficiary advice about the appropriateness and design of selective feeding programmes. Women in particular should always be involved in decision-making.

Feeding Regimes and Rations for Different Types of Selective Feeding Programmes

The two phases of therapeutic feeding programmes (TFP) for children

Phase 1

All newly admitted severely malnourished children start in 24 hour care where they receive (i) medical treatment to reduce mortality risk and (ii) a carefully introduced sustenance level diet that prevents nutritional deterioration and allows normalisation of metabolic function.

It takes time for the clinical abnormalities of the severely malnourished to be corrected. Until their condition is stabilised, it is important not to overload their system, particularly with too much salt (sodium) and protein, as this can cause heart failure and sudden death. For this reason, low sodium, low protein milk feeds are given. If the child is dehydrated, a modified oral rehydration solution (ReSoMal) is used in place of the usual WHO formula for ORS. Children normally stay in phase one for up to one week.

The total amount of food should be given through many small feeds - every 2-3 hours. If frequent feeds are not possible (e.g., insecurity prevents keeping the TFP open during the night), an absolute minimum is 6 feeds per day with at least one at night. Therapeutic milk, in the form of WHO F75 starter formula, is considered to be the most effective diet for Phase 1 of treatment. This formula may be available in pre-prepared sachets or prepared locally from dried skimmed milk (DSM), oil, sugar and a special salt/mineral solution.

Once medical complications like infection are under control, the child can be transferred to phase 2. Recovery of appetite and change of attitude/expression are good guides for when this transition has been made.

Phase 2

Children in phase 2 can tolerate much higher intakes of energy and nutrients –necessary to promote rapid growth and nutritional rehabilitation. The high energy milk formula for Phase 2 is known as F100 catch-up formula (100 kcal and 2.9g protein/ 100ml). Children should be fed on demand. Milk feeds can be alternated with porridge feeds, which are based on blended foods. A porridge should provide 150 kcals per 100 ml; oil and sugar should be added. High Energy biscuits are also sometimes used as an easy meal or for night feeds. Good weight gains have also been achieved using local diets.

Breast feeding should be promoted and continued during the whole treatment for infants. It should be stimulated by sufficient feeding and liquid intake of the mother. Artificial formula feeds should only be used in rare cases when breast feeding is not possible.

TFP for others: treatment of severe wasting and famine oedema in adolescents and adults

There are four phases of feeding as follows:

Phase 1

Electrolyte (sodium and potassium) imbalances and infection should be corrected. Use the same formula as for children in phase one.

Phase 2

After a few days, the subject usually develops good appetite. Gradually introduce solid food (usually cereal-based thick porridge). Appropriate local vegetables/fruits and, if possible, some meat, milk or fish should be added to regular meals to make these varied and appetising.

Phase 3

A full diet should be given and the patient discharged when oedema free and gaining weight regularly. The BMI (body mass index, Chapter 5) should also have increased by 2.0 kg/m^2 above the BMI registered at the point when oedema was first observed and weight was at its lowest point. Recovery to this point usually takes about 3 months.

Phase 4

After discharge, active supervision and regular provision of food supplements should continue for at least 3 months until the home situation is stabilised.

On-site and take-home supplementary feeding programmes

SFPs can be implemented as dry take-home feeding or on-site feeding. Take-home programmes normally provide a dry ration on a weekly or fortnightly basis while on site feeding takes place each day. It is generally accepted that take-home feeding should always be considered first as such programmes are less resource intensive and there is no evidence that either on-site or take home SFPs are more effective. There are several other advantages of take home feeding (UNHCR/WFP Selective Feeding Programme Guidelines).

On-site feeding may be justified when:

- There are no other sources of food, so it is certain that the take home ration will be shared with other family members;

- Firewood and cooking utensils are in short supply, so that it is difficult to prepare meals in the household;
- Insecurity places beneficiaries at risk when returning home carrying weekly supplies of food;
- There are a large number of unaccompanied/orphaned children or young adults.

In some instances, it may be appropriate to offer both on-site and take home feeding and allow beneficiaries to select the type of programme in which they enroll. This approach is now advocated by a number of NGOs.

A supplementary feeding programme using a combination of food aid and local foods.

The SFP ration

The SFP ration should provide 500 kcals and 15 gm of protein per day for on-site feeding. In order to account for substitution and sharing with siblings at the center, it is considered appropriate to give a ration of 500-700 kcals and 15-25 protein; fat should supply 30% of the energy. Two meals are needed to provide this amount of energy and protein given the small stomach size of children. Food is also needed for caregivers. A larger ration of 1000-1200 kcals and 35-45 gms of protein is given for dry take-home rations in order to account for sharing at home; again, fat should supply 30% of the energy.

Rations for both on-site and take-home feeding are usually based on a pre-mix prepared from blended food or cereal flour and other ingredients. In general, it is best to avoid distributing separate ingredients for dry take-home rations, as some may be sold or taken by other family members. Ingredients in the pre-mix vary but should include a vegetable oil to increase energy density and, if cereal flour is used,

a source of additional protein. Sugar is often added to improve taste. This pre-mix is then used to prepare dishes such as porridge or thick drinks.

Internationally procured blended foods can be very useful to initiate a SFP when appropriate local foods are lacking. Alternatively, locally produced mixes of cereal flour, high protein sources (ground beans, lentils or DSM) and high energy sources (e.g., vegetable oil, butter oil and groundnuts) can be used.

High energy biscuits may be available from donors but their drawback is that they are very popular with other family members. They are, however, useful for on-site feeding and in situations when other commodities are not immediately available in the start up phase of an emergency or where cooking is problematic.

Dry rations can be distributed as either separate ingredients or as a premix. In general, avoid separate ingredients as some may be sold or taken by other family members. Milk powder can only be distributed in a premix due to the danger that milk powder may be diluted with un-boiled/contaminated water. The greatest danger is that the dried milk might be used to feed small babies. Dried milk products can only be used in on-site feeding situations and only under strictly supervised hygienic conditions. On-site feeding meals should always be timed so as not to clash with family meals. Women need an additional 350 kcals/day from the third month of pregnancy and 550 kcals/day for nursing.

Admission and Discharge Criteria for Selective Feeding Programmes

Children are normally admitted and discharged from selective feeding programmes on the basis of measurements of their nutritional status. Weight and height measurements are compared against international growth standards in reference tables (see Chapter 5).

Cut-off points for admission and discharge are associated with different degrees of malnutrition. However, these cut-off points need to be defined in agreement with national relief policies taking into consideration capacity and resources of the programme and possibilities. If a malnourished infant below 6 months is identified, he/she should be admitted as there is a need to rehabilitate the child through breast feeding. Depending on the situation and resources, malnourished older individuals may be admitted based on clinical assessment of nutritional status or measurements of BMI.

The quickest way to identify all eligible children in a population is by MUAC (mid-upper-arm circumference, see Chapter 5) screening using a cut-off point of 13.5cm or 14cm. This is a quick procedure and although lacking in precision can identify most malnourished children quickly. Once identified, children can be referred to feeding centers for accurate weight and height measurements.

The anthropometric criteria for admission and discharge for therapeutic and supplementary feeding programmes are as follows: 70% of median of weight for height or -3 Z scores for TFP and 70-80% for SFP or -3 to -2 Z scores for SFP. If individuals have oedema, no matter what weight they are, they should be admitted to the TFP. Children are discharged from TFP when they reach 80% weight-for-height over 2 consecutive weighings (weighings usually take place weekly). If there is no SFP to which they can be referred, discharge should be delayed until they have reached 85% or 1.5 Z score (if children live a long way from the feeding centre, discharge should be delayed until they reach 90%). Children are discharged from SFPs if they reach > 85% weight for height during two to four consecutive weeks.

Where the general ration is grossly inadequate and/or malnutrition prevalence is above 20%, it is preferable not to discharge from blanket or targeted programmes until food security improves.

Assessment of Effectiveness

Effectiveness of selective feeding programmes can be assessed in two ways. First, the impact of the programme on the nutritional status of the beneficiary population can be monitored by periodic nutrition surveys. One should not automatically infer that improvements in nutritional status are due to implementation of the selective feeding programme as other factors may have had a marked impact (e.g., improvements in overall food security and the health situation). That said, an effectively implemented SFP should reduce levels of malnutrition. There are also a number of programmatic indicators that need to be monitored in order to assess effectiveness. Staff at each feeding center should keep a monthly attendance report to record new admissions, attendance, discharge, death, default and transfer.

Evaluation indicators should be expressed as a proportion of the total number of children leaving the programme during the reporting month. Typical evaluation indicators to be monitored are: percentage of children recovered, percentage of deaths and percentage of defaulters. Attendance rate, programme coverage, mean length of stay on discharge, average weight gain, and case fatality rates should also be calculated. Other assessment information, compiled by some agencies, may include cost per meal and percentage of re-admissions.

Target levels for these indicators have been suggested in a number of recent guidelines (Table 9.1). However, there needs to be a great deal of flexibility in setting these targets and interpreting the results as programme performance can depend on many factors and should be assessed in the context of the whole situation.

While these indicators provide a clear marker of programme performance, they may not allow an analysis of whether all programme objectives are being met. Given the variation in programme objectives (See Table 9.1), an important rule of thumb is to clarify objectives at the beginning of each programme and ensure that appropriate data are collected to allow an assessment of whether the programme is meeting these objectives.

Table 9.1 Target Levels for Proportions of Exits for Selective Feeding Programmes

Proportion of exits	TFP Objectives	TFP Alarming	SFP Objectives	SFP Alarming
Recovered	>80%	<50%	>70%	<50%
Deaths	<5%	>25%	<3%	>10%
Defaulters	<10%	>25%	<15%	>30%

Closing Selective Feeding Programmes

Closure criteria should be defined at the start of a programme. It is usual practice to close down a programme when there are less than 20 patients in TFP and less than 30 patients in SFP. New cases should then be referred to health centres or hospitals. However, low numbers may not reflect an improved situation but poor accessibility or acceptability of the programme. Decisions about closure should therefore be made after a nutrition survey shows an improvement. The survey should demonstrate levels of wasting under 10%. The following conditions should also be met: the general ration should be adequate; effective public health and disease control measures should be in place; no seasonal deterioration in nutritional status should be anticipated; mortality rate should be low; and the health and nutritional status of the population should be stable.

Key Words

Attendance rate	Percent of those children enrolled who actually attend.
Case fatality rate	This rate expresses the risk of death for a child attending the programme.
Coverage	Percent of those children enrolled/ attending out of estimated number of the target group.
Dry rations	Distributed (usually weekly) to take home for preparation and consumption.
F75 starter milk	A form of high energy milk used in Phase 1 of therapeutic feeding programmes (provides 75 kcal and 0.9g protein per 100ml).
F100 catch-up milk	A form of high energy milk used in Phase 2 of therapeutic feeding programmes (provides 100kcal and 2.9g protein per 100ml).
Porridge premix	A mixture of ingredients, usually including blended food or cereal flour, oil, and possibly sugar and milk powder, used for take-home rations or as the basis for porridge for wet feeding.
Wet rations	Prepared/ cooked once or twice daily in the kitchen of a feeding centre and consumed on-site.
Weight gain	Mean weight gain g/kg body wt/ month.

Key Readings

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10 GENERAL FOOD DISTRIBUTION

The purpose of this chapter is to enable WFP staff to contribute towards the effective design of food distribution systems in emergency situations.

Summary

All distribution systems should be fair, accountable, transparent and gender sensitive. These principles and the common methods for applying them are generally accepted. There are different modalities of distribution, but the question of to whom food should be distributed should always be considered. Other aspects of designing a distribution system include: registration, beneficiary committees, ration cards, scooping, distribution interval, number of distribution points. Finally, varying levels - and different types - of monitoring are required.

Learning objectives

After reading this chapter, WFP staff should be able to:

- Understand the key principles of distribution.
- Describe the different modalities of distribution.
- Determine whether to distribute to individuals, households, committees, traditional leaders, or local government.
- Understand how to monitor distributions.

Principles of General Food Distribution

All food distribution systems should be fair, accountable, transparent, and gender sensitive. These principles can be defined as:

- *Fairness*: all emergency affected populations have an equitable right to receive the agreed food rations, determined by an objective assessment of their needs.
- *Accountability*: the effectiveness in providing the agreed quantities of food to the intended beneficiaries in a manner that can be monitored - or verified - by beneficiaries, implementing agency and donor.
- *Transparency*: awareness by all key actors of the system of distribution, food supply and rations, and the ability to witness or observe all aspects of distribution.
- *Gender sensitivity*: gender relations and roles are taken into account in planning distributions to make sure that food reaches the household (in particular women and children) and that food is used for its intended purpose.

The methods by which these principles are generally applied are summarised in Box 10.1.

The more transparent the system, the fewer the opportunities for abuse leading to unfair distribution practices. Informing refugees of their ration entitlements and the timing of distribution require a regular food pipeline and an efficient food delivery system. It also requires good and regular communication between WFP and its implementing partners.

Distribution to women is recommended for two main reasons: first, women often have the primary role in household food management; second, because women are more likely to use food aid for

nutritional purposes (as opposed to sale or exchange for other goods). In polygamous societies, women should be considered as the head of household to receive food.

Care must be taken that:

- Receipt of food aid is not associated with risk of attack or abuse;
- Special arrangements are made for pregnant women, women with small children, and the elderly;
- Distribution does not interfere with childcare or other domestic responsibilities;
- Women are able to transport the food home (i.e., short distances to distribution point, quantities of food that can be carried; or access of women to burden animals).

Box 10.1: Principles of Food Distribution

Principles	Method
Fairness	- Rations and food allocations are based on an objective assessment of need. - Monitor the receipt of agreed rations. - Distribution according to household size.
Accountability to beneficiaries	- Distribution system takes account of social, ethnic, political divisions within the affected population. - Establishment of beneficiary food committees to elicit their views on distribution and any complaints. - Assess and identify the socially and politically vulnerable and ensure they receive their entitlements. - Independent monitoring during and post distribution by WFP and/or NGO implementing partners.
Accountability to donors and within WFP	- Regular reporting and analysis of quantity of food distributed and number of beneficiaries. - Presence of WFP/NGO monitors during distribution and/or post-distribution monitoring.
Transparency	- Circulate information about food rations, method and timing of distribution. - Keep population informed of any problems in food supply, changes in rations, delays, etc. - Distribution in a public place.
Gender sensitivity	- Women collect food in recognition of their role in household food management. - Gender representation on food committees. - Ensure that distribution does not interfere with women's other domestic responsibilities and does not put them at unnecessary risk.

Methods of Distribution. To Whom and By Whom?

There are three broad modalities of distribution: by WFP directly, through an implementing agency, or through government. WFP, or it's implementing partner, may distribute directly to heads of households or individuals, or to beneficiary representatives or groups. For the majority of distribution systems, the basic unit for distribution is the family.

In stable situations, with recognised governments, WFP's first choice is to distribute through existing government structures. This is generally applied for developmental programmes, such as vulnerable group feeding through MCH clinics and school feeding. WFP also prefers working through

government for emergency interventions in response to natural disasters, unless there is clear evidence of lack of adequate infrastructure.

In emergency situations associated with conflict, to determine the appropriate distribution system, it is essential to know the extent of social coherence, as well as the social and political divisions within the affected population.

If communities are intact, and their leadership is known to be accountable, it may be appropriate to distribute food through existing leadership. Many emergencies, though, are associated with social disintegration or collapse.

Military leadership, whose aim might be to control food to further political or military aims, may replace traditional leadership. In this case, it would be inappropriate to distribute through "community" representatives or local leaders.

National and international NGOs may implement WFP food distributions. In such cases, formal agreements are established between WFP, the NGO and the government, defining the method of distribution to be adopted and the reporting and monitoring requirements. These agreements should specify:

- The method of distribution to be adopted, including the number of NGO monitors that this will require; the independence of these monitors should be specified;
- Reporting requirements;
- Requirements for monitoring both process and impact.

Important criteria for selection of an NGO implementing partner include:

- past experience of food distribution;
- past experience - and success - in the geographical area of operation;
- capacity and ability to mobilize qualified and experienced staff quickly;
- their neutrality and impartiality.

If more than one agency or NGO is responsible for distribution implementation, it is essential that WFP develop a common distribution strategy for all implementing agencies and that resources be allocated accordingly.

Choosing the type of food distribution system

Choosing a system involves answering two basic questions:

1. Can beneficiary representatives be given the responsibility for distribution to households?
2. How many resources are available to set up and run the system?

Box. 10.2 provides the advantages and disadvantages of each type of distribution system in terms of cost (staff, materials etc.), speed of implementation, knowledge required, and the risk of abuse.

Box 10.2 Choosing the Type of Food Distribution System

Recipient	Advantage	Disadvantage
Local government	- Quick and efficient if local infra-structure sufficient - Builds local capacity	- Government capacity may be limited - High cost if local infra-structure needs to be re-informed - Government may have financial or political motives for controlling food distribution
Traditional leaders	- Social and cultural values of population respected - Easy in initial stages of emergency and for dispersed populations - Low cost - Quick - No external registration or ration cards needed	- Knowledge of social structures and power relations essential - Only effective in small, intact communities - Risk of abuse if social structures have broken down or have been replaced by military leadership - Difficult to monitor
New groups or committees	- Relies on existing, if new, social structures - Lowers risk of abuse that may be associated with traditional groups - Some community participation, particularly women's representation. - Self-monitoring - Low cost	- External registration and ration cards needed in some cases - Appropriate in stable situations - Must make sure leaders are elected so they truly represent communities - Resentment from traditional leadership - Need for extensive information campaigns.
Households	- Efficient for large, unstructured populations - Initial control over beneficiary numbers - Avoids abusive power relations and leadership - Less risk of unequal distribution - Easy to monitor	- High cost (staff, materials, time). - Little beneficiary participation - Registration and ration cards necessary.
Individuals (the provision of cooked meals)	- No scope for manipulation or discrimination - Self- targeting - No registration or ration cards needed - Easy monitoring - Overcomes problems of limited fuel, utensils, water.	- Extremely high cost (staff, materials). - Time consuming - Only possible for small groups (1000 per kitchen). - No possibility for exchanging rations so all nutritional needs have to be met. - Risk creating population concentrations. - Health risks.

Distribution through government

In stable situations, with recognised governments, the first choice is to distribute through existing government infrastructure. Where civil administration functions well, governments can draw on

networks of information, administration, transport and storage, and is therefore both quicker and cheaper than establishing a separate distribution network.

Distribution through traditional leaders

Distribution to traditional leaders is only recommended in small communities where social structures are intact and where existing leadership is known to be accountable to the population they represent. In some emergencies with social disruption or abusive power relations, this can easily lead to diversion, unequal distribution, or the control of food distribution to further military or political aims. The system must be changed as soon as possible to one of those described below.

Distribution through newly created groups or committees

Distribution through newly elected (village) committees has the advantage that it retains community involvement in distribution. This system is increasingly adopted in refugee distributions once the situation has stabilised and registration has been done. The latter may involve groups elected on the basis of family size, or camp section. WFP recommends that women be represented on such committees[1] .

Distribution direct to households or individuals

Distribution direct to households or individuals is entirely agency managed. It may undermine existing social structures and is therefore only appropriate when these have broken down. Distribution of cooked food to individuals is increasingly used in conflict situations. It is also appropriate when beneficiaries do not have access to cooking equipment or fuel, or are too weak to cook for themselves. Requirements for staff and equipment are large and communal kitchens may create population concentrations, increasing the risk of disease epidemics or of attack.

Registration vs. estimation of beneficiary numbers

Any food distribution system requires an identification of the intended beneficiaries and an estimate of their numbers. Registration by communities themselves is appropriate where communities are small, intact, or if the operation is expected to be of short duration only. In conflict situations, an external registration should be carried out as soon as this is feasible. External registration needs careful planning among all interested parties; it is resource intensive in terms of time, staff, materials/ construction.

When a formal registration is not immediately possible, or when registration is thought to be inaccurate, the minimum requirement is to identify socially excluded or politically marginal groups. In this way, they can be prioritised during distribution, and/or their food receipt monitored.

Registrations need to be regularly updated. In the initial stages of an emergency, particularly in cases of displacement, beneficiary numbers may change on an almost daily basis. Once a registration has been done, there needs to be a system in place for periodically updating figures. Even when such a system is in place, it is likely that a registration exercise will have to be repeated if the operation becomes protracted. Beneficiary numbers may have become unreliable because of deaths, births, or population movements.

1 For more information on group distribution, and distribution direct to households, see the UNHCR Commodity Distribution Guidelines (June 1997). For more information on community bases distribution, see Oxfam. Registration and Distribution. Guide 9, in series on Working in Emergencies; Practical Guidance from the field.

Beneficiary distribution committees

The establishment of beneficiary committees is recommended in all situations, even if they do not carry out the distribution itself. The role of such committees may vary. Committees can provide a forum for discussion and a means for disseminating information on the distribution system. Alternatively, committees may decide who should receive food and how much; and they may carry out the actual distribution. In all circumstances, beneficiaries should be provided with basic information on the distribution and their views on distribution should be elicited. The community should elect such committees, preferably in a meeting at which everyone from the community, including women, is present.

Ration cards or beneficiary lists / beneficiary documents

Ration cards are issued to households in situations where an agency distributes directly to heads of households. The ration card has information on family size, address (village, camp sector), and usually numbers to indicate for which distribution period food has been received. When distribution is on a community basis, beneficiary lists may be sufficient and the names of beneficiaries are called out during distribution. In large camp situations, ration cards are necessary to speed up the distribution.

Scooping

Scooping of rations is the "traditional" way of distributing food in agency-managed distributions to heads of households. Measures are made for each of the commodities that correspond to the ration for each individual (or household) for the set distribution period. If beneficiaries are aware of how many scoops of a particular item they are entitled to, this provides an effective control mechanism on distribution. However, there is also scope for significant manipulation in distribution through under or over scooping. Scooping is also time consuming and/or staff intensive. It also assumes that there will be no changes in ration size over the period of the operation. Increasingly, agencies are moving away from scooping to bulk distribution to groups (where each household is informed of their entitlements and they distribute this amongst themselves).

Distribution cycle

Rations are usually distributed weekly, bi-weekly or monthly. The distribution cycle depends on the type of population served, the context and food resources available. For dispersed or mobile populations, it is usually most appropriate to distribute food on a monthly basis. When food supply is uncertain, distribution on a more frequent basis may provide greater flexibility. In refugee situations, or other easily accessible camp based populations, food is often distributed twice a month. In conflict situations, the risk associated with carrying or keeping large quantities of food needs to be taken into account - it may be more appropriate to distribute only small quantities of food at each distribution. The opportunity cost for beneficiaries should also be taken into account. For example, a weekly distribution would require beneficiaries to spend about 4 days a month queuing for food (if they live close to the distribution centre).

Once the distribution cycle has been determined, it is crucial to inform beneficiaries and maintain the schedule in order to keep the confidence of the beneficiary population. If irregularities are anticipated, the population must be informed so they can plan accordingly.

Number of distribution points

In general, distribution points should be located as close to beneficiaries as possible and the number of beneficiaries attending one distribution point at any one time should be minimised. Particularly if distributions are on a monthly basis, the rations received may be too heavy to carry over long distances. Malnourished populations may not be able to move at all and may need food transported to them. The more distribution points, the greater the cost in terms of staff requirements, transport, and equipment. UNHCR recommends at least one distribution site per 20,000 refugees. It furthermore recommends that the distance people have to travel should not be more than 5 to 10 km for dispersed populations.

Distribution staff

Staff profiles depends on the type of distribution system adopted. Obviously, a community based distribution system requires less salaried staff than an agency-managed system. The types of staff required include:

- Distribution monitors;
- Distribution supervisors; field co-ordinators; logistics officers;
- Distributors (in case of agency managed distributions);
- Cooks, cleaners, etc. in the case of cooked distributions;
- Storekeepers, guards.

Monitoring and Reporting on Distribution

The aim of monitoring is to assess on a regular basis whether the objectives of food distribution are being achieved. This includes the efficiency, effectiveness and timeliness of food delivery to its intended destination. Monitoring should ensure that food effectively reaches intended beneficiaries in the agreed quantities and measure its impact on food security and nutrition.

Process or systems monitoring

The aim of process monitoring is to ensure that losses are minimised and accounted for and that food is distributed to the intended beneficiaries. WFP should be able to identify at what level of the distribution process problems occur in order to address bottlenecks. Monitoring is not limited to information collection. The most important aspect of monitoring is analysing and acting on the information collected. Process monitoring includes monitoring of:

- Food supply and delivery;[2]
- Food storage and handling;
- Quantity of food distributed, and the number of actual vs. planned beneficiaries;
- Inequalities in distribution.

Level of monitoring

The level of monitoring required depends on the distribution system adopted, the quantity of food aid being distributed, the amount of diversion or manipulation of food aid, and donor requirements. WFP's implementing partners should carry out all forms of monitoring discussed below. In addition, some degree of monitoring is required by WFP itself in all situations. If WFP has many implementing partners operating in the same area, a greater level of WFP monitoring is required to ensure a co-

2 The EDP is the point closest to the beneficiaries, or to the distribution point, to which food is delivered by WFP. It is the point at which WFP hands over food to UNHCR or it's implementing partner.

ordinated approach. In situations of war or other politically charged situations, international WFP monitors are required to ensure independent monitoring, in part because NGO monitors are likely to be under pressure in such circumstances.

Who monitors?

There are arguments to be made for and against the employment of local monitors. Local monitors have the advantage of knowing the language and culture. Usually they also have freedom to travel. However, they are subject to a variety of pressures, particularly (but not exclusively) in situations of conflict. In all situations, monitors should not be from the area where they are monitoring the distributions. Whether local or international, monitors need:

- Agreed operational principles or ground rules between WFP, NGOs and ruling authorities;
- Encouragement to report on abuses (if necessary confidentially), knowing this will elicit a response at higher levels.

Distribution reporting

Distribution reports should be completed for each distribution cycle or other agreed period (e.g., monthly). The following minimum quantitative information is required: number of actual beneficiaries for the particular distribution period (checked against the number of registered beneficiaries), opening balance at the start of the distribution period, quantity of each commodity distributed, losses, damages and closing balance. This information should be analysed for over or under distributions and to determine basic information on whether the recommended rations were distributed.

Distribution site monitoring

This includes both the physical presence of food monitors at the distribution site and "food basket monitoring". Food basket monitoring involves the selection of a random number of families at the distribution site; their rations are weighed and the results are then compared with the planned ration and the family size on the beneficiary document (e.g., ration card). This can provide useful information on whether beneficiaries are receiving the planned rations. It cannot, however, highlight inequalities due to inaccuracies in registration. The family size indicated on the beneficiary document may be smaller or greater than the actual family size, or some families may be not be registered.

Household visits and post distribution (or end-use) monitoring

Household visits are necessary to determine whether there are some households that have been left out of the distribution altogether or whether some households or groups have been under or over registered. This could be done on a random sample. But with knowledge of social and political divisions within the beneficiary population, it should be possible – without a random sample - to identify vulnerable groups that are likely to have been left out of distribution.

Information should be collected on the quantity of food received, the use of food aid, acceptability and quality, and questions relating to the impact of food aid.

Impact monitoring

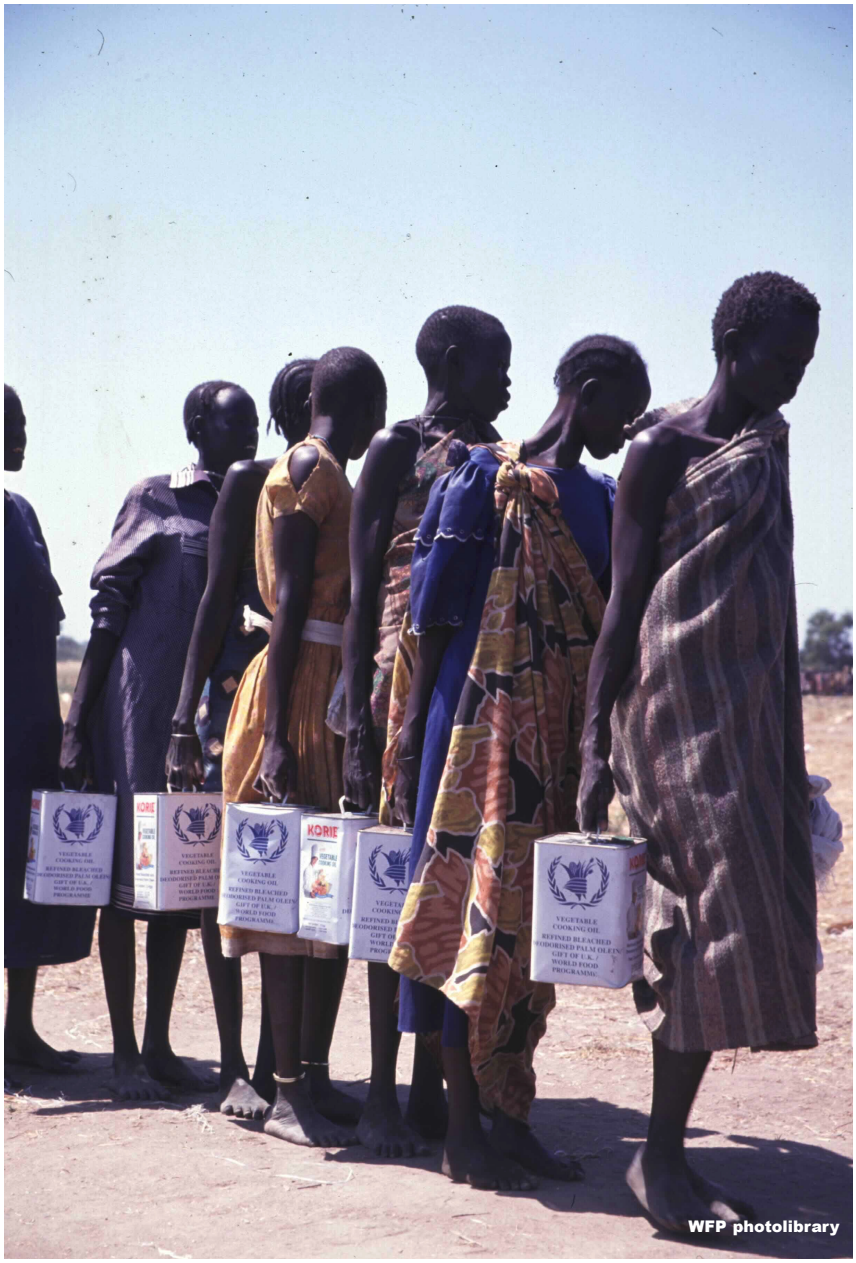
Monitoring impact depends on the objectives of the distribution. It is also important to monitor the social impact of the actual distribution system adopted. Beneficiary views should be elicited on

whether the system adopted was actually appropriate. For example, has distribution by an external agency undermined existing community structures?

If women are intended to be the recipients of food aid, the percentage of women amongst those coming to collect food should be monitored. If women are not attending the distribution, the reasons for this should be investigated. Women should be interviewed specifically about their views on the distribution system, how it impacts on food received in the household, and on their ability to care for children and perform their other domestic responsibilities.

Co-ordination and Management

Problems in implementing general food distributions often result from inadequate institutional and logistical capacity, and poor management. Distribution generally involves a range of actors: the government, UN agencies, NGOs, local partners and the beneficiaries of food aid. Good management requires:



Food distribution

Box 10.3 Key Points of the Joint Memorandum of Understanding Signed Between WFP and UNHCR, and also WFP and UNICEF in Relation to Food and Nutrition

Memorandum of Understanding (MOU) between WFP and UNHCR (March, 1997)
This MOU applies to situations where the number of beneficiaries of concern to UNHCR is more than 5,000 persons (refugees, returnees, displaced persons of concern).

Key points:

- WFP and UNHCR conduct joint needs assessment missions where needed, and jointly assess numbers eligible for food assistance.
- WFP normally has procedures for assessing the overall food situation in the country.
- WFP handles the procurement and distribution of *basic* food commodities (includes cereals, edible oils/fats, pulses and other sources of protein, blended foods, salt, sugar and high energy biscuits) for both general and selective feeding programmes. Where beneficiaries are totally dependent on food aid, WFP will ensure the provision of blended foods or other fortified commodities in order to prevent or correct micronutrient deficiencies.
- UNHCR is responsible for the procurement and distribution of other *complementary* commodities, including local fresh foods, spices, tea and dried and therapeutic milks.
- Where micronutrient requirements cannot be met through the ration, UNHCR will assume responsibility for the provision of the necessary micronutrients until the ration can be adjusted or fortified to meet these needs.
- WFP is responsible for mobilizing the necessary resources for milling and will provide milling facilities to the beneficiaries where feasible
- If the number of beneficiaries is less than 5,000, UNHCR - rather than WFP - is responsible for the entire process if it involves refugees/displaced persons/ returnees.

UNICEF/ WFP Memorandum of Understanding in Emergency and Rehabilitation Interventions (1998)
This MOU applies to both emergency and rehabilitation interventions.

Key points:

- WFP and UNICEF will collaborate in assessing the needs of the population affected by the emergency, identifying ways in which these needs can be best met, and in determining how the resources of the two organisations can best complement each other.
- Where appropriate, opportunities for the utilisation of WFP food resources in support of UNICEF-assisted actions in training and rehabilitation activities and in the re-establishment of health services, water supply, sanitation, education and other social services will be identified by UNICEF.
- UNICEF, in consultation with WFP, will identify requirements for strengthening caring capacity, access to water, sanitation, health services, education and other social services and resources needed in these areas.
- In the initial assessment, re-assessment and routine monitoring, WFP will take the lead in assessing overall food needs and logistics. UNICEF will take the lead in assessing prevalence of malnutrition, the special needs of young children and women including the need for care and facilities for food preparation, and the needs for water, sanitation, health care, education and other social services.
- When general food distributions are implemented, food baskets will be designed by WFP.
- Both organizations will seek to minimise the need for supplementary feeding by ensuring that the basic food ration is adequate.
- WFP and UNICEF will work together on advocacy with donor nations in favour of appropriately fortified foods. They will also work together to increase the capacity for local milling and fortification of donated cereal products.
- When the assessment indicates a significant risk of micronutrient deficiencies in a population, WFP will seek to address this through the inclusion of a fortified blended food or other fortified commodity in the general ration. UNICEF will be responsible for covering any unmet micronutrient needs through other measures (such as supplement distribution, or provision of vitamin/mineral mixes).
- UNICEF will ensure the availability of: *therapeutic milk* for use in therapeutic feeding of severely malnourished people, oral rehydration salts, generically labeled breast-milk substitutes and vitamin/ mineral preparations where the assessment indicates these are necessary.
- Both organizations will, to the extent possible, promote, protect and support breast-feeding in emergencies.
- WFP will be responsible to mobilise and provide all non-food items necessary for the transport, storage and distribution of all food commodities required for joint operations. UNICEF will be responsible to mobilise and provide other non-food items, related to food preparation and consumption, for other needs of the population, for nutrition and health monitoring, and for selective feeding operations.

Key Words

Beneficiary	Individual that ultimately receives and benefits from food aid.
Beneficiary committees	Elected committee to represent beneficiaries in food distribution
Distribution interval	The interval between distributions
Distribution point or site	The point at which distribution to beneficiaries takes place
Extended delivery point	Point closest to distribution point to which WFP is responsible for food delivery
On-site monitoring	Monitoring during distribution at the distribution site
Post-distribution monitoring	Monitoring after distribution to determine whether planned rations were received by intended beneficiaries, how they were used, and, possibly, their impact.
Ration card	Card which entitles a household to receive food aid, detailing family size, address, food receipt.
Recipient	Person or body to whom food is distributed, in some cases for on-distribution to beneficiaries.
Registration	Method of identifying the beneficiaries for food distribution
Scooping	Use of a standard measure to distribute food to households

Key Readings

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11 NUTRITION INFORMATION, EDUCATION AND COMMUNICATION

The purpose of this chapter is to enable WFP staff to identify situations when nutrition information, education and communication (nutrition IEC) will enhance the effectiveness of food aid, and to help WFP staff and implementing partners to design appropriate approaches to communicate nutrition information.

Summary

This chapter describes how the effectiveness of both emergency and development food aid programmes can be improved by linking them with nutrition IEC. Four main themes can be addressed through IEC approaches: promotion of new foods, enhancement of the diet, protection of existing beneficial food practices and avoidance of dangerous food practices.

The steps which should be followed to identify key nutrition messages and appropriate media for communication are: identification of the problem, identification of the target group, assessment of community views, and assessment of potential channels for communication. There are benefits and limitations to different channels of communication: face-to-face, communication, and mass media.

Learning objectives

After reading this chapter, WFP staff should be able to:

- Understand the benefits of linking food aid programmes with nutrition IEC
- Identify different kinds of situations where nutrition IEC activities should be implemented
- Describe the steps which should be taken to identify key nutrition messages and appropriate media for communication
- Give examples of different modes of communication which can be adopted to relay nutrition messages

The effectiveness of food aid is greatly increased when combined with the communication of appropriate nutrition information. Indeed, food aid programmes offer a unique opportunity for WFP and its implementing partners to communicate nutrition related information. This applies both to emergency and development programmes. The process is commonly described as nutrition information, education and communication (nutrition IEC).

Nutrition *information* refers to new knowledge, such as information about new foods that are being introduced. Nutrition *education* refers to training or orientation for a particular purpose (e.g., support for breastfeeding). Nutrition c*ommunication* refers to the method by which information is imparted (i.e., the medium of communication adopted). Nutrition IEC provides people with an informed base for making choices.

Nutrition IEC is not about telling people how to behave or what to eat. Rather it is about empowering populations to maximise the use of available food and health resources, and to adapt to a changing environment. This is equally relevant in the context of development and emergencies.

Successful Approaches to Nutrition IEC

It is well recognised that IEC approaches that are didactic and which aim to persuade target groups to change food related behaviours without their involvement or an understanding of the causes of their problems, are not successful. People remember 20% of what they are told, 40% of what they are told and read, and 80% of what they find out for themselves. Changing behaviour depends on many factors and successful IEC approaches often have the following characteristics:

- They take into account the motivations of particular population groups and work with communities and community leaders;
- They recognise that people have strong and varied beliefs about food and that approaches should not be based on the assumption that nutrition information or education is being applied to a 'clean slate' on which new ideas can simply be written;
- They are based on a participatory assessment of the nutrition problem, analysis of its causes and a carefully thought out plan of action which includes evaluation (note that the Triple A model presented in chapter 6 can also be used in the design of IEC approaches);
- They are based on observed behavioural practices and not on anecdotal evidence ;
- They are targeted at a specific group and communicate a clear message;
- They provide information to allow a reasoned choice.

Important Themes in Nutrition IEC

IEC approaches will vary in different contexts depending on the type of problem faced by the population and the type of food aid intervention. It is useful to consider four main themes with regard to food that can be addressed through IEC approaches: *promotion, enhancement, protection and avoidance*.

Promotion of new foods

The acceptability of a new food depends on several factors including its quality, status, taste, smell and similarity to other familiar foods. Information about new food items - those which are not part of the traditional diet - is essential. The information covered should include requirements for special processing, cooking and storage. Beneficiary populations receiving pre-cooked blended foods, for example, should be informed that blended foods are a good source of essential micronutrients and that over cooking will reduce micronutrient content. Similarly, where rice is introduced, beneficiaries should understand that over washing will reduce its nutrient value and waste water, whilst saving the rice water to use in food preparation is nutritionally beneficial.

An example of the acceptance of a new food, which was facilitated through a public information campaign, is described in Box 11.1.

Enhancement of the diet

The full general ration, although meeting 100% of energy needs, fails to meet 100% of micronutrient requirements (see Chapter 8). It is important, therefore, to promote access to other sources of micronutrients to help supplement the ration and enhance the diet of all family members. Nutrition IEC in this case can be used to promote alternative strategies such as the cultivation of fresh fruit and vegetables, the consumption of micronutrient-fortified foods (see chapter 3) or the purchase of micronutrient-rich foods from local markets.

Box 11.1 Promotion of Parboiled Rice Among Bhutanese Refugees

Bhutanese refugees in Nepal have been supplied with parboiled rice since 1994, although they traditionally preferred polished rice which they grew themselves. At the time that parboiled rice was introduced, there was a public information campaign stressing how the rice should be washed to maximise its nutrient value. In 1997, an acceptability study revealed that significant numbers of refugees were saying that not only had they accepted parboiled rice, but that they now actually preferred it to polished rice. The explanations for this included the fact that many refugees associated parboiled rice with improved health and nutrition status particularly with the decline in beriberi which 2-3 years previously had been prevalent in the camps. Acceptance also seemed to have been helped because of its digestibility and the fact that although there were initial complaints about its unappetising smell, the problem was resolved through providing information on how to improve processing and thus the smell. Acceptance was greatly enhanced by the public information campaign.

Promoting the collection and consumption of wild fruits and berries, where these are traditionally consumed, can also help supplement the diet. There are many examples of these coping strategies. For example, in Liberia during 1996 certain groups of people were reported to be dependent on wild foods from the forest as their main food source. In the Democratic People's Republic of Korea, where the population traditionally collects wild mushrooms and grasses from the mountains during the summer, these foods have provided an important source of micronutrients for young children at kindergarten and nursery schools during food shortages.

Protection of existing beneficial food practices

Food aid beneficiaries often have extensive knowledge about food and nutrition, resulting in positive practices. These need to be protected and supported, especially in emergency and protracted relief operations. An important example is breastfeeding. In most developing countries, mothers will strive to continue to breastfeed their infants. Indeed, breastfeeding is even more important in emergencies than in normal times to ensure the health of infants by protecting them from the increased risk of infections and malnutrition. Protection, promotion and support for exclusive breast feeding for the first 6 months of a child's life, together with support for the initiation and maintenance of breastfeeding for newborns and its re-establishment when this has temporarily stopped, is a very important element of nutrition IEC.

IEC strategies can also be successfully employed to revive breastfeeding in countries where a bottle-feeding 'culture' has eroded traditional practices. The example in box 11.2 illustrates how breastfeeding was successfully reintroduced during the emergency in Bosnia.

Box 11.2 Protecting Infant Feeding in Bosnia

During the emergency in Bosnia, doctors and nurses, who were not supportive of breastfeeding, attended training seminars to increase their knowledge and skills about breastfeeding. The training was followed by a breastfeeding promotion campaign aimed at mothers. The promotional campaign was successful in heightening awareness about the benefits of breastfeeding and in changing the attitudes and practices of health workers. There was also some evidence that breastfeeding levels increased as a result.

There are, however, some situations where the promotion of breastfeeding is inappropriate. One such example is illustrated in box 11.3. Where the introduction of breastmilk substitutes is considered unavoidable, adequate nutrition IEC and strict adherence to the guidelines outlined in the International Code of Marketing of Breastmilk Substitutes are essential.

Box 11.3: Protecting Infant Feeding in Rwanda

In late 1997, escalating civil conflict led to large numbers of Hutu refugees returning from Zaire to Rwanda. Among these were unaccompanied infants. Because of the high prevalence of HIV, the practice of wet nursing was unacceptable to mothers, potential wet-nurses, and staff in therapeutic feeding centres. In this situation, breast milk substitutes had to be introduced under carefully controlled conditions.

Avoidance of dangerous food practices

In certain situations, information about potentially dangerous foods that should either be avoided or adequately processed to be made safe for consumption is needed. During the civil war in Mozambique, for example, some people consumed unprocessed cassava containing cyanide which resulted in an outbreak of paralysis. More recently, it was reported from Rwanda that poisonous tree bark was being consumed by people foraging in the forest for wild foods. These examples emphasise the importance of gathering information about previous survival strategies from new arrivals in an emergency situation.

Identifying the Appropriate IEC Approach

A number of steps should be followed to identify both key nutrition messages and the appropriate medium for communication. These are shown in box 11.4

Box 11.4: Identification of key nutrition messages and the medium of communication

Steps:

1. Identify the problem. The problem may relate to a particular food related behaviour that places children at risk of developing malnutrition or a situation where a new food has to be introduced.
2. Identify the target group for IEC. For example, is it the entire population or a sub-group such as women with young children, fathers or influential leaders? At this stage, it is important to consult with key members of the community who can play a role in influencing their community. The consultation process will help in the development of a common approach and will reduce potential misunderstandings or conflicts.
3. Find out how the community views the problem. This dialogue will help to develop a consensus about the problem and thereby ensure that the key IEC message is focused on a problem that both the donor and recipient population have identified.
4. Assess the potential channels for communication (see below) including cost, availability of skilled manpower and accessibility of the beneficiaries to the proposed medium.

Channels of Communication

There are two main methods of communicating nutrition messages: face-to-face or through the mass media. In many successful IEC approaches, a combination of methods has been applied. The skills of personnel from a range of sectors (e.g., health, agriculture and community development) should be harnessed. Special training of local personnel may be necessary (e.g. health staff for breastfeeding counseling or influential community leaders who can fulfil a peer education role in promoting certain food related behaviours). The knowledge and skills of local personnel or influential community members involved in IEC approaches will be a major factor in determining the method and success of the intervention.

Face-to-face or interpersonal communication is an interactive and effective approach not simply to impart knowledge but to promote behaviour change. The relatively small number of people who can be reached, however, will limit its impact. It is often more costly then a mass media approach and is usually adopted in the following settings:

- For targeting individuals with specific nutrition related information (e.g., parents of malnourished children attending health centres or therapeutic feeding centres);
- For targeting specific sub-groups (e.g., school children that are receiving school meals through a WFP project).

In many WFP supported school feeding programmes, nutrition IEC has been introduced into the formal school curriculum and through more traditional approaches such as song, dance and theatre. The Child-to-Child programme, which is a network for mobilising schools for health education is a widely used approach. School children are involved in a wide range of health and nutrition learning with the aim of improving their own understanding of how to improve health and through them, the knowledge of their siblings, parents and communities.

Face-to-face communication can be made more effective through:

- The use of printed materials (e.g., wall charts, flip charts and brochures), although these require a certain level of literacy among the target group. It is possible to produce picture only materials accompanied by careful explanation.
- Practical demonstrations which do not require a literate audience (e.g., demonstrations of how to prepare blended foods for complementary feeding, how to process and cook a new food commodity, or demonstrations of re-lactation methods for nursing mothers).

Mass media communication has the potential advantages of reaching large numbers of people rapidly without the need for fieldworkers. Well-planned mass media communication has been used successfully for public information campaigns in emergency situations. It should utilise all available forms of media, target a single problem or behaviour, and communicate a single message clearly and in a positive way. Common forms of mass media communication include:

- Radio messages that are listened to by a large number of people. The audience needs frequent exposure to the message, which should be specific, simple and positive. Radio messages can be imparted through spot announcements, slogans and jingles, discussions, interviews, mini-dramas and music.
- Printed messages in newspapers, magazines or posters that ensure longer-term exposure to messages when widely displayed.
- Messages relayed through popular media such as traditional storytelling, participatory theatre, puppet theatre, song and dance. These forms of communication combine entertainment with education.

Key Words

Nutrition communication	The method by which nutrition information is imparted.
Nutrition education	Training or orientation for a particular nutritional purpose such as supports for breastfeeding.
Nutrition information	New knowledge such as information about new foods which are being introduced.

Key Reading

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Annex 1.1 Micronutrient functions, sources and effects of processing

Vitamin A

Function

Vitamin A is a fat-soluble vitamin required for the normal functioning of the visual system, growth and development, maintenance of epithelial cell integrity, immune function, and reproduction.

Forms

Vitamin A is present in food in two forms:

- as preformed vitamin A (retinol) contained in foods of animal origin
- as provitamin A carotenoids (largely β-carotene) contained in plant foods and which can be biologically transformed to vitamin A but are less easily absorbed

Sources

Retinol is chiefly found in dairy products, liver and some fatty fish. Carotenes are found in yellow and red fruits and vegetables, and in green leafy vegetables, especially the green outer leaves. Vitamin A is absent in vegetable oils with the exception of red palm oil and fortified margarines.

Sources of retinol:	*ug retinol per 100 grams*
Liver	15,000-20,000
Fatty fish	1,200-2,500
Margarine or oil (fortified)	900
Butter	830
Cheese	320
Milk (dried whole)*	318
Eggs	140

Sources of β-carotene:	*ug retinol equivalent per 100 grams*
Red palm oil	4,000-10,000
Carrots	2,000
Green leafy vegetables	685
Sweet potatoes (red and yellow)**	670
Tomatoes	100
Bananas	30
Yellow maize	30-180

* Dried skimmed milk only contains traces of vitamin A unless fortified.
** Most root crops contain minimal amounts of vitamin A. Red and yellow sweet potatoes are the exception.

Absorption enhancers and inhibitors (of provitamin A)

Many factors influence the absorption and utilization of provitamin A including:

- the amount, type and physical form of the carotenoids in the diet
- intake of fat, vitamin A and fibre
- protein and zinc status
- existence of diseases
- parasitic infections

High intakes/ toxicity

Vitamin A toxicity can be classified into three categories: acute, chronic and teratogenic:

- Acute toxicity results from one or several closely spaced very large doses of vitamin A, usually more than 100 times the safe intake. The signs (vomiting, headaches and hair loss) are usually transient and disappear after a few days.
- Chronic toxicity occurs with recurrent intakes over a period of months to years of excessive doses of vitamin A that is usually at least 10 times the safe intake. Most people recover fully from chronic toxicity.
- Teratogenic toxicity in pregnant women leads to foetal resorption, abortion, birth defects and permanent learning difficulties in the offspring as well as toxic effects on the mother. It results from substantial doses (more than 7,500 ug) of vitamin A injected daily, or from larger doses (more than 30,000 ug) taken for several days or weeks, or from a single large dose (150,000 ug). The most sensitive period for toxic effects is the first trimester of pregnancy.

Regular intakes of vitamin A should not exceed the following levels:

Population group	*ug retinol per day*
0-12 months	900
1-3 years	1,800
4-6 years	3,000
7-12 years	4,500
Adolescents	6,000
Adult men	9,000
Adult women	7,500
Pregnant women	3,300

Vitamin C	
Function	Vitamin C is a water-soluble vitamin and serves a number of essential metabolic functions. It also assists in absorption of non-haem iron and is an important anti-oxidant.
Sources	Fresh fruit and fruit juices are the richest sources of vitamin C, but amounts vary greatly from species to species. *mg per 100 grams* Guava 242 Papaya 73 Citrus fruits (oranges, grapefruit, lemons) 40-50 Mango 30 Melons and pineapple 25 Green leafy vegetables 15-35 Tomato, lettuce, radish 15-25 Potatoes 9-15
Absorption enhancers and inhibitors	Vitamin C is readily and rapidly absorbed. Excess amounts are excreted in the urine.
High intakes/ toxicity	The risk of toxicity is low as excess amounts are simply excreted.
Effects of storage, processing and preparation	Vitamin C is easily destroyed by oxygen (heat or air). That means that as soon as fruit or vegetables are harvested the vitamin C content begins to be reduced and that cooking reduces the content of vitamin C. Long storage times decrease vitamin C content.

Vitamin D	
Function	Vitamin D is fat-soluble and its active form is involved in calcium homeostasis (bone mineralisation).
Forms	Vitamin D is found in two forms: (i) as ergocalciferol (vitamin D_2) (ii) as cholecalciferol (vitamin D_3)
Sources	Sunlight on the skin is the major source of vitamin D and there are few dietary sources. The only rich sources are the liver oils of fish, which obtain the vitamin by ingesting plankton living near the surface of the sea, and so are exposed to sunlight. *ug per 100 grams* Cod liver oil 213 Fatty fish 20-25 Canned fish 6-13 Margarine or oil (fortified) 8 Eggs 2
Absorption enhancers and inhibitors	Vitamin D is only absorbed when there is sufficient fat in the diet.
High intakes/ toxicity	Infants are most at risk of developing hypervitaminosis D. Hypercalcaemia may result from doses of 50 ug per day, and mild hypercalcaemia may result from 15 mg doses taken every 3 to 5 months
Effects of storage, processing and preparation	Storage, processing and preparation have no adverse effects on vitamin D content.

Folate	
Function	Folate is water-soluble and has a number of metabolic functions, an important one of which is the formation of red blood cells. It also plays a role in the development of the foetus.
Sources	Folate is found in a variety of foodstuffs. The richest source is liver.

	ug per 100 grams
Liver	110-590
Peanuts	110
Green leafy vegetables	30-14066
Avocado	54
Bread (wholemeal)	37
Orange juice	30
Melon	20
Mung beans	20
Banana	

Absorption enhancers and inhibitors	The availability of folate in food varies and absorption may be affected by other factors in food.
High intakes/ toxicity	High intakes of folate are unlikely to be toxic.
Effects of storage, processing and preparation	Food preparation can cause serious losses of folate; in canning, in prolonged heating, when cooking water is discarded, and from reheating. Reducing agents in food tend to protect folate.

Niacin	
Function	Niacin is water-soluble and plays a central role in the utilization of food energy.
Forms	Niacin can be synthesized from the amino acid tryptophan. On average 1 mg of niacin is derived from 60 mg of dietary tryptophan.
Sources	Niacin is widely distributed in plant and animal foods, but only in small amounts, except in meat (especially offal), fish, wholemeal cereals and pulses.

	mg per 100 grams
Liver and kidney	7-17
Peanuts	16
Beef, mutton, pork	3-6
Canned meat	1-6
Fish	2-6
Bread	2-4
Rice	2-4.5
Sorghum	2.5-3.5
Pulses	1.5-3
Dried fruit	0.5-5

Absorption enhancers and inhibitors	In many cereals, especially maize, niacin is present in a bound, non-absorbable form. It can be liberated by treatment with alkali such as soaking in limewater.
High intakes/ toxicity	Doses of niacin in excess of 200 mg cause vasodilatation and hence flushing. Very high doses (3-6 g per day) cause changes in liver ultra-structure and function, in carbohydrate tolerance and in uric acid metabolism, which may result in clinical signs of hepatotoxicity.
Effects of storage, processing and preparation	Cooking causes little actual destruction of niacin but considerable amounts may be lost in the cooking water and 'drippings' from cooked meat if these are discarded.

Thiamin	
Function	Thiamin is water-soluble and is required mainly during the metabolism of carbohydrate, fat and alcohol. It is also necessary for the proper function of the peripheral nervous system and the heart.
Sources	All animal and plant tissues contain thiamin. The only rich sources, however, are plant seeds and yeast. *mg per 100 grams* Yeast 6-24 Pulses 0.4 Sorghum 0.4 Wheat 0.4 Rice (home pounded) 0.08-0.14 Rice (parboiled and milled) 0.11 Bread 0.2-0.5 Milk (dried skimmed) 0.4
Absorption enhancers and inhibitors	
High intakes/ Toxicity	Chronic intakes in excess of 50 mg per kg or more than 3 g per day are toxic to adults.
Effects of storage, processing and preparation	Large losses of thiamin occur during milling or pounding when the outer layer of cereals is lost. Parboiling rice prior to milling reduces losses as thiamin is driven into the interior of the grain. As thiamin is water soluble, there are losses when water in which cereals are cooked is discarded.

Iodine	
Function	Iodine is an essential constituent of hormones produced by the thyroid gland in the neck. In the foetus, iodine is necessary for the development of the nervous system during the first three months of gestation.
Sources	The level in the soil determines the iodine content of plants and animals. As most soils contain little iodine, most foods are poor sources. The only rich source of iodine is seafood. *ug per 100 grams* Sea fish 200-3500 Vegetables, cereals and meat 20-50 Iodised salt Varies depending on estimated daily intake of salt
Absorption enhancers and inhibitors	*Absorption Inhibitors (goitrogens):* Goitrogens interfere with iodine uptake by the thyroid. Foods, which have goitrogens, include the *Brassicas* (members of the cabbage) family such as cassava.
High intakes/ toxicity	High iodine intakes can cause toxic modular goitre and hyperthyroidism. Toxicity may arise with intakes in excess of 5,000 ug per day.
Effects of storage, processing and preparation	Iodine in food is stable.

Iron	
Function	Iron has two major roles in the body. Firstly, it is necessary for the synthesis of haemoglobin (Hb), which carries oxygen to the body's cells and transports carbon dioxide from the tissues to the lungs. Secondly, it is a component of myoglobin (a muscle protein) and many enzymes.
Forms	Iron is found in two forms: (i) as haem iron contained in blood (ii) as non-haem iron contained in vegetables
Sources	Meat, cereals, vegetables and fruit all contain iron, but haem iron is much more easily absorbed than non-haem iron. *Sources of haem iron:* — *mg per 100 grams* Liver — 7-21 Red meat — 1-3.5 Eggs — 2 Milk (dried skimmed) — 0.4 *Sources of non-haem iron:* — *mg per 100 grams* Millet — 3.8-8 Pulses — 1.9-14 Dried fruit — 1.6-6.8 Bread — 1.7-2.5 Green leafy vegetables — 0.4-18 Rice — 0.5
Absorption enhancers and inhibitors (of non-haem iron)	*Absorption enhancers:* • organic acids (e.g. foods high in vitamin C) • fructose, sorbitol • alcohol • amino acids *Absorption inhibitors*: • polyphenols, tannins (e.g. tea) • phospates, phytates (e.g. in cereals) • bran, lignin • proteins (e.g. in eggs and legumes) • inorganic elements (e.g. Ca, Mn, Cu, Co) Breast-fed infants absorb approximately 50% of iron in milk. Infants up to the age of 3 months fed on formulated milks only absorb 10% of iron in milk.
High intkes/ toxicity	The acute toxic dose in infants is approximately 20 mg per kg body weight and the lethal dose is about 200-300 mg per kg. In adults, a 100 g dose of iron is lethal.
Effects of storage, processing and preparation	Iron is stable. Iron from pots can be absorbed into food during cooking thereby increasing intakes.

Annex 1.2
Vitamin Requirements (safe levels of intake)

Age/Sex Group Years	Vitamin A *ug retinol per day*	Vitamin B_{12} *ug per day*	Vitamin C *mg per day*	Vitamin D *ug calciferol per day*	Folate *ug per day*	Niacin *mg per day*[b]	Riboflavin *mg per day*[b]	Thiamin *mg per day*[b]
0	350	0.1	20	10	24	4.2	*0.5*	0.3
1	400	0.45	20	10	50	6.4	*0.8*	0.5
2	400	0.53	20	10	50	7.5	*0.9*	0.55
3	400	0.61	20	10	50	8.2	*1.0*	0.6
4	400	0.69	20	10	50	8.9	*1.1*	0.65
0-4	390	0.50	20	10	45	7.1	0.8	0.5
5-9	400	0.82	20	2.5	80	10.3	1.2	0.75
10-14 M	550	1.0	25	2.5	150	13.1	1.6	0.95
10-14 F	550	1.0	25	2.5	130	11.3	1.35	0.8
10-14 M and F	550	1.0	25	2.5	140	12.2	1.5	0.9
15-19 M	600	1.0	30	2.5	200	15.3	1.8	1.1
15-19 F	500	1.0	30	2.5	170	11.9	1.4	0.9
15-19 M and F	550	1.0	30	2.5	185	13.6	1.6	1.0
20-59 M	600	1.0	30	2.5	200	14.5	1.7	1.0
20-59 F	500	1.0	30	2.5	170	11.5	1.4	0.8
20-59 M and F	570	1.0	30	2.5	185	12.9	1.55	0.9
Pregnant	+100	+0.4	+20	+7.5	+250	+1.1	+0.1	+0.1
Lactating	+350	+0.3	+20	+7.5	+100	+2.7	+0.3	+0.2
60+ M	606	1.0	30	3.2	200	11.9	1.4	0.9
60+ F	500	1.0	30	3.2	170	10.3	1.2	0.75
60+ M and F	540	1.0	30	3.2	185	10.9	1.3	0.8
Whole population	500	0.9	28	3.2-3.8[a]	160	12.0	1.4	0.9

[a] The higher figure is for developing countries because of the higher proportion of children under 5 years whose requirement is higher.

[b] B-complex vitamin requirements are proportional to energy intake and are calculated: Thiamin: 0.4 mg per 1000 kcals ingested; Riboflavin: 0.6 mg per 1000 kcals ingested; Niacin equivalents: 6.6 mg per 1000 kcals ingested;

[c] Based on: (WHO, 1995). Sources: (FAO and WHO).

Annex 1.3
Mineral requirements (safe levels of intake)

Age/Sex Group	Calcium[a]	Iron (bioavailability)[1]				Iodine
		Very low (<5%)[b]	Low (5-9%)[c]	Moderate (10-18%)[d]	High (>19%)[e]	
Years	*g per day*	*mg per day*	*mg per day*	*mg per day*	*mg per day*	*ug per day*
0	0.5-0.6	24	13	6	4	50-90[f]
1	0.4-0.5	15	8	4	3	90
2	0.4-0.5	16	8	4	3	90
3	0.4-0.5	17	9	5	3	90
4	0.4-0.5	18	9	5	3	90
0-4	0.4-0.5	18	9	5	3	90
5-9	0.4-0.5	29	16	8	4	110
10-14 M	0.6-0.7	45	24	12	7	140
10-14 F	0.6-0.7	50	27	13	8	140
10-14 M and F	0.6-0.7	47	26	12.5	7.5	140
15-19 M	0.5-0.6	28	15	10	7	150
15-19 F	0.5-0.6	60	32	16	10	150
15-19 M and F	0.5-0.6	44	24	12	8.5	150
20-59 M	0.4-0.5	28	15	8	5	150
20-59 F	0.4-0.5	59	32	16	11	150
Pregnant (latter half)	+0.6-0.7	+120-240	+60-120	+30-60	+20-50	+50
Lactating (first 6 mos)	+0.6-0.7	33	17	9	6	+50
Menopausal	0.4-0.5	26	15	6	4	150
60+ M and F	0.4-0.5	26	15	7	4.5	150
Whole population	0.45-0.55	41	22	11	7	150

[a] The lower figure is for developing countries, where (i) body weight is lower and (ii) the population is adapted to lower levels of calcium intake that apparently do not give rise to disabilities. The higher figure is for industrialized countries (levels of intake to which the population is accustomed).

Basis of calculations of iron requirements:

[b] = 4% (diets as in South Asia)

[c] = 7.5% (diets as in developing countries)

[d] = 15% (diets as in middle-income countries)

[e] = 22% (diets as in industrialized countries)

[f] The lower figure is for breast-fed babies and the higher for artificially fed babies;

[g] Based on (WHO, 1995).

Sources: (FAO and WHO, 1988; De Maeyer, 1989; FAO and WHO, 1995).

Annex 1.4
Micronutrient deficiencies

Vitamin A		
Deficiency signs	Vitamin A deficiency results in xerophthalmia, which affects the eyes. The signs in order of presentation are: • Night blindness • Dryness accompanied by foamy accumulations on the conjunctiva (inner eyelids), that often appear near the outer edge of the iris (Bitot's spots) • Dryness, dullness or clouding (milky appearance) of the cornea (corneal xerosis) • Softening and ulceration of the cornea (keratomalacia). This is sometimes followed by perforation of the cornea, which leads to the loss of eye contents and permanent blindness. Ulceration and perforation may occur alarmingly fast (within a matter of hours).	
Population prevalence rates to indicate a serious situation	*Criteria:* Night blindness Bitot's spot Corneal xerosis and/or ulceration Xerophthalmia-related corneal scars	*Prevalence (%):* 1.0 and above 0.5 and above 0.01 and above 0.05 and above
At risk groups	Vitamin A deficiency occurs widely in developing countries with the highest prevalence rates in the regions of South East Asia and Africa. Children suffering from measles, diarrhoea, respiratory infections, chickenpox and other severe infections are at increased risk of vitamin A deficiency.	

Vitamin C	
Deficiency signs	Deficiency of vitamin C results in scurvy. This usually develops gradually with progressive fatigue and pain in the limbs. Typical signs include: • Swollen and bleeding gums • Minute haemorrhages around hair follicles spreading to sheet haemorrhage on limbs • Brittle hair • Slow healing of wounds • Infants tend to be fretful and scream on being handled because of tenderness of the limbs. They may lie on their backs in a characteristic 'frog's legs' position
Population prevalence rates to indicate a serious situation	There are no international standards to indicate when vitamin C deficiency is a serious situation. A single confirmed case of scurvy, especially in an emergency situation, should be investigated and stimulate a re-assessment of dietary adequacy.
At risk groups	Only populations with no access to fruit or vegetables are at risk of deficiency. These include emergency affected populations entirely dependent on inadequate rations. The risk of scurvy is higher in women (especially pregnant women) than men and increases with age.

Vitamin D	
Deficiency signs	Vitamin D deficiency results in rickets. Early signs include: • General ill ease, sleeplessness, restlessness and nervousness • Anorexia (loss of appetite) • Frequent crying More developed signs include: • Excessive sweating • Delayed closure of fontanelles • Swollen wrists and ankles • Squared head caused by bossing of frontal bone structure • Swelling of the ends of the ribs ('ricketty rosary') • • Decreased muscle tone • Protuberant abdomen Severe signs include: • Spontaneous fractures • Bowing of legs • Tetany (twitching in feet and hands) and convulsions Rachitic children show reduced bone growth, are anaemic, and prone to respiratory infections
Population prevalence rates to indicate a serious situation	There are no international standards to indicate when vitamin D deficiency is a serious situation. Rickets is still endemic in parts of the world and has been linked with calcium deficiency. As bowed legs (a common sign of rickets) indicates past deficiency, it is not necessarily a reliable indicator of present deficiency. Concern about rickets is usually only necessary in situations where children have limited access to sunlight.
At risk groups	Rickets is endemic in most Middle Eastern countries in a band going from Morocco to Pakistan and can occur as far south as Ethiopia. It is also common in parts of eastern Europe. Lack of exposure to the sun in combination with a diet low in pre-formed vitamin D and high in phytic acid (e.g. bread) can cause rickets. Populations living in desert areas where atmospheric dust acts as a filter for ultra-violet light are susceptible, particularly when people stay inside to avoid the heat of the day and wear extensive clothing. Populations who are forced to remain inside due to shelling or fighting are also at risk.

Folate		
Deficiency signs	Folate deficiency can result in megaloblastic anaemia, which shows the same signs as iron-deficiency anaemia. These are: • Pale conjunctivae (inner eyelid), nailbeds, gums, tongue, lips and skin • Tiredness • Headaches • Breathlessness	
Individual cut-off points to indicate anaemia	*Population group:* 0-5 years 6-15 years Adult men Adult women Pregnant women	*grams per litre* < 110 < 120 <130 <120 <110
	Severe anaemia has been defined as <70 g/L and very severe anaemia as < 40 g/L. Cut-off levels must be shifted upwards for people living at high altitudes and for those who smoke.	
Population prevalence rates to indicate a serious situation	*Criteria:* Anaemia	*Prevalence (%):* 30 and above (among high-risk groups young children and pregnant women)
At risk groups	Megaloblastic anaemia occurs commonly in developing countries. It may occur at any age, but adult women, infants and young children are affected most frequently. It particularly affects pregnant women.	

Niacin	
Deficiency signs	Niacin deficiency results in pellagra, which affects the skin, gastro-intestinal tract and nervous systems. For this reason, it is sometimes called the 3Ds: dermatitis, diarrhoea and dementia. Dermatitis is the most distinctive feature and shows the following signs: • Redness and itching on all areas of the skin exposed to sunlight resembling sunburn • The redness develops into a distinctive 'crazy pavement' pattern • Where dermatitis affects the neck, it is sometimes termed 'Casal's necklace' Complaints of the digestive system include: • Nausea and sometimes constipation Disturbances of the nervous system include: • Weakness, tremor, anxiety, depression and irritability in mild cases • Delirium in acute cases • Dementia in chronic cases
Population prevalence rates to indicate a serious situation	There are no international standards to indicate when niacin deficiency is a serious situation. A single confirmed case of pellagra, especially in an emergency situation, should be investigated and stimulate a re-assessment of dietary adequacy.
At risk groups	Maize eating populations, who do not treat the maize to release niacin, are at risk of developing pellagra. Where legumes, such as peanuts, have not been provided in emergency rations pellagra has arisen. Women are at higher risk than men and risk increases with age.

Thiamin	
Deficiency signs	Thiamin deficiency results in beri-beri. There are 8 clinically recognisable syndromes of beri-beri; 5 in adults and 3 in children. Only four forms commonly due to low intake in developing countries are described here. *Wet beri-beri*: Early signs include: • Anorexia (loss of appetite) and ill-defined malaise, associated with heaviness and weakness of the legs • Slight oedema (swelling) in the legs • Slight increase in pulse rate • Tenderness in the calf muscles on pressure and complaints of 'pins and needles' Later signs include: • Oedema spreading from legs to the face and trunk • Restlessness and breathlessness • Rapid pulse rate and palpitations *Dry beri-beri*: The early signs of dry beri-beri are the same as for wet beri-beri. Later signs include: • Polyneuropathy (general dysfunction of the nervous system) starting with loss of feeling in the feet and diminished touch sensation • Muscles become progressively wasted and weak, and walking becomes difficult *Infantile acute cardiac beri-beri*: Peak prevalence occurs in breast-fed babies of 1-3 months of age. Signs include: • Colic-like symptoms with screaming bouts, restlessness, anorexia and vomiting • Oedema • Breathlessness with signs of heart failure • Increased pulse rate • Low urine volume occur • Heart failure eventually leads to death *Aphonic beri-beri*: Peak prevalence is in 4-6 month old children. Signs include: • Voice changes with a cry that becomes more and more hoarse until no sound at all is produced • Restlessness and breathlessness • Oedema
Population prevalence rates to indicate a serious situation	There are no international standards to indicate when thiamin deficiency is a serious situation. A single confirmed case of beri-beri, especially in an emergency situation, should be investigated and stimulate a re-assessment of dietary adequacy.
At risk groups	Populations who consume non-parboiled polished rice as a staple are at risk, particularly where the rice is contaminated with moulds.

Iodine		
Deficiency signs	Iodine deficiency causes a range of abnormalities including goitre (swelling of the thyroid gland in the neck) and cretinism which occurs in the offspring of women with severe deficiency in the first trimester of pregnancy. *Goitre*: WHO currently recommend a simple three grade classification of goitre: Grade 0 No palpable (can't feel) or visibly enlarged thyroid Grade 1 A palpable but not visibly enlarged thyroid with the neck in a Normal position Grade 2 A palpably and visibly enlarged thyroid with the neck in a normal a Position *Cretinism*: There are 2 types of cretinism; *Neurological cretinism:* • Mental deficiency • Deaf mutism • Spasticity • Ataxia (lack of muscular coordination) *Hypothyroid or myxoedematous cretinism:* • Dwarfism • Hypothyroidism (small thyroid gland)	
Population prevalence rates to indicate a serious situation	*Criteria:* Goitre	*Prevalence (%):* Above 5
At risk groups	Goitre is endemic in many mountainous areas of Europe, Asia, the Americas and Africa where there is limited access to seafoods. The prevalence of goitre increases with age and reaches a peak during adolescence. Goitre tends to affect girls more than boys and women more than men because of increased activity of the thyroid gland during pregnancy.	

Iron		
Deficiency signs	Lack of iron eventually results in iron-deficiency anaemia. Typical signs are: • Pale conjunctivae (inner eyelid), nailbeds, gums, tongue, lips and skin • Tiredness • Headaches • Breathlessness	
Field methods of assessment	*Filter paper method:* A drop of blood is obtained through a prick to the finger, earlobe or heel. A blood spot is placed on filter paper and the colour compared to a printed set of colour standards, which indicate level of anaemia. The method is highly subjective and not very accurate. It is cheap, simple, portable and rapid, however. *Haemoglobinometer:* A small sample of blood through a finger prick is collected and placed in a disposable cuvette. The cuvette is placed in a portable haemaglobinometer (hemoCue) which gives a digital reading of Hb level within 45 seconds. The method is rapid and accurate but expensive.	
Individual cut-off points to indicate anaemia	*Population group:* 0-5 years 6-15 years Adult men Adult women Pregnant women	*grams per litre* < 110 < 120 <130 <120 <110
	Severe anaemia has been defined as <70 g/L and very severe anaemia as < 40 g/L. Cut-off levels must be shifted upwards for people living at high altitudes and for those who smoke.	
Population prevalence rates to indicate a serious situation	*Criteria:* Anaemia	*Prevalence (%):* 30 and above (among high-risk groups young children and pregnant women)
At risk groups	At risk groups are: • Women of child-bearing age (because of blood loss through menstruation); • Pregnant and breastfeeding women (because of increased iron requirements); • Babies exclusively breastfed beyond the age of 6 months (because iron in breast milk is inadequate); • Babies given cow's milk (because of intestinal blood losses); • Weaning-age children (because of inappropriate weaning diets). Regions where malaria and intestinal parasitic infestation are prevalent are at risk.	

Annex 2.1
Specifications and Examples of Blended Foods

Blended foods are a mixture of milled cereals and other ingredients, such as, pulses, dried skimmed milk, and possibly sugar and or some kind of vegetable oil. Blended foods are produced either by:

- Dry blending of milled ingredients.
- Toasting or roasting, and milling of ingredients.
- Extrusion cooking, which results in a 'pre-cooked' product.

The final product is usually milled into powder form, and fortified with a vitamin mineral premix.

A range of 'blended' foods is available worldwide for a variety of purposes. Some blended foods were originally designed to provide protein supplements for weaning infants and younger children or for low-cost weaning foods in developing countries.

Guidelines on Formulated Supplementary Foods for Older Infants and Young Children have been developed by the FAO Codex Alimentarius Commission (1991). These guidelines refer to blended foods suitable for use for infants from six months of age up to the age of three years, for feeding young children as a supplement to breastmilk or breastmilk substitutes. They are intended to provide those nutrients, which either are lacking or are present in insufficient quantities in the basic staple foods.

Several locally produced blended foods have been developed for the commercial market, and only later used or adapted for emergency relief (e.g. likuni phala in Malawi and faffa in Ethiopia). Some of these products are now used in the general ration distribution programmes for adults and children as a means of providing an additional source of micronutrients.

Blended foods have also been designed for use in therapeutic feeding programmes. These products are more expensive than regular blended foods, partly because of their higher quality ingredients and higher specification packaging. They also contain a wider range of micronutrients suitable for the needs of severely malnourished children.

Blended food should be produced in accordance with the 'Code of Hygienic Practice for Foods for Infants and Children' and 'Code of Sound Manufacturing Practices' of the Codex Alimentarius.

It is a mixture of the following ingredients:

- Cereal like maize, sorghum, millet, wheat or combination, providing carbohydrates and protein;
- Pulses (chickpeas) or soya beans as an additional source of protein;
- Oilseeds (groundnuts, dehulled sunflower seeds, sesame), soya bean or stabilized vegetable oil as an additional source of oil;
- Vitamin/mineral supplement;
- If required sugar can be included in the recipe; it replaces an equivalent amount of cereal

It is manufactured according to the following recipe:

- Whole maize: 80% by weight
- Whole soya beans: 20% by weight
- Vitamin/mineral premix (as specified below)

It should be manufactured by use of extrusion or roasting/milling. It should be fortified to the extent that to each MT of finished product 1kg vitamin premix and 3kg mineral premix (obtained from La Rote Ltd. Switzerland, or its local authorized dealer) should be added.

Annex 2.2
Guidelines for the use of milk powder

Dried milk powder should not be distributed to emergency affected populations as part of a general dry ration.

This is because of the danger of it being used as a breast-milk substitute and the risk of high levels of microbial contamination when prepared with unclean water or in unsanitary conditions. These risks are greatly increased in an emergency setting.

Milk powder can be used safely:

- As an ingredient in High Energy Milk (or porridge) prepared under strict control and in hygienic conditions in a supervised environment for on-the-spot consumption (well-managed supplementary and therapeutic feeding).
- As an ingredient in porridge pre-mix, prepared from cereal flour, oil, sugar and DSM. This should be prepared centrally under strict control and hygienic conditions for distribution in dry supplementary feeding programmes.
- As an ingredient in the local production of processed foods, for example, blended foods, noodles, or biscuits. Although the high cost of milk powder may mean this is an inefficient use of resources.

Use of breastmilk substitutes

If a breast milk substitute (BMS) is considered essential, for example, among an emergency affected population accustomed to bottle-feeding, they may be provided as long as certain precautionary measures are followed. *BMS should only be available to mothers who have been identified as needing it (by health workers) through specially designed supervised programmes. BMS should never be distributed through the general ration programme.*

WFP supports the policy of the World Health Organization concerning safe and appropriate infant and young child feeding, in particular by protecting, promoting and supporting breastfeeding, and encouraging the timely and correct use of complementary foods.

Storage

Microbial contamination is the major problem in using reconstituted milk powders, so high energy milk must only be prepared and consumed under strict control and in hygienic conditions.

During storage, as long as the product is kept clean and dry the low moisture content of the product will not allow microbial growth. Milk powders are packaged in expensive plastic lined bags which must be handled carefully, so as not to damage the packaging, and stored away from direct sunlight and kept cool.

Most WFP supplied milk powder can be stored for 6 months to two years, depending on the temperature:

- In a cold climate (4°C) 24 months
- In a tropical climate (21°C) 18 months
- In a very warm climate (32°C) 6 months.

Annex 2.3
Policy Statements on Infant Feeding and Infant Formula

Joint Policy Statement on Infant Feeding

In April 1999 a revised Joint Policy Statement on Infant Feeding in the Balkan Region signed by UNHCR, UNICEF, WFP and WHO was circulated in Macedonia in April 1999. A revised statement re-circulated in June 1999.

The following is a summary of the key recommendations:

- Exclusive breastfeeding is protected, supported and promoted for all infants until about six months and continued breastfeeding through the second year of life.
- Donations of infant formula displaying brand names are not accepted.
- In very exceptional circumstances infant formula provided in generic, non-brand formula may be used.
- If artificial feeding is required as a last resort, cups and not feeding bottles should be use
- Local produce (e.g. fruit and vegetables) and basic food aid commodities (e.g. rice, beans and lentils) are recommended as complementary infant foods. The use of specialised manufactured complementary products, which may create a dependency, is discouraged.
- The Joint Statement refers to the distribution of supplementary food commodities such as dried milk powder and biscuits to children aged 0 - 5 years. It states that dried milk must not be used to feed infants.
- An education component should be an integral part of every project where supplementary food commodities (especially infant formula and commercial complementary foods) are distributed.

The International Code (WHO, 1981) and subsequent relevant resolutions of the World Health Assembly (4, 5)

The Code sets out the responsibilities of national governments, companies, health workers and concerned organisations in ensuring appropriate practice in the marketing of breastmilk substitutes, feeding bottles and teats. The Code has the following aim:

to contribute to the provision of safe and adequate nutrition for infants by the protection and promotion of breastfeeding and by ensuring the proper use of breastmilk substitutes when these are necessary on the basis of adequate informsation and through appropriate marketing and distribution.

The Code has a series of articles covering a number of possible avenues that could be used by companies and others to market breastmilk substitutes:

- No donations of free or subsidised supplies of breastmilk substitutes, bottles or teats should be given to any part of the health care system (WHA 47.5). Donations may be made to institutions outside the health care system for infants who have to be fed on breastmilk substitutes and when these are distributed outside the institution supplies should be continued for as long as the infants concerned need them (Article 6, The Code).
- No facility of a health care system should be used for the purpose of promoting infant formula or other products covered by the Code including the display of these products or posters or

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placards concerning these products.

- Breastmilk substitutes, bottle and teats should only be given if all the following conditions apply (WHA 47.5):
- Infants have to be fed on substitutes according to agreed criteria
- The supply is continued for as long as the infants concerned need it
- The supply is not used as a sales inducement
- Manufacturers and distributors of infant formula responsible for marketing the products have to ensure certain labelling requirements are met e.g. that the label is in an appropriate language and include instructions for appropriate preparation and does not include any picture or text which idealises the use of infant formula (Article 9, The Code).

The Joint Policy Statement recommends that it is the responsibility of the Ministries of Health and local authorities to ensure that relief agencies comply with the International Code and subsequent WHA resolutions. UNICEF is a member of the local authority involved in developing and implementing the Code in Macedonia. Draft legislation incorporating the Code is before the Macedonian parliament but not currently not incorporated into the country's legislation. UNICEF has been involved in the generation of this draft legislation in close co-operation with the Macedonian Breastfeeding Interest Group of which UNICEF is a member.

Annex 2.4
WFP commodity list and corresponding nutritional value

	Nutritional value/100g		
	ENERGY (Kcal)	PROTEIN (g)	FAT (g)
CEREALS			
Wheat	330	12.3	1.5
Rice	360	7.0	0.5
Sorghum/Millet	335	11.0	3.0
Maize	350	10.0	4.0
PROCESSED CEREALS			
Maize meal	360	9.0	3.5
Wheat flour	350	11.5	1.5
Bulgur wheat	350	11.0	1.5
BLENDED FOODS			
Corn soya blend (CSB)	380	18.0	6.0
Wheat soya blend (WSB)	370	20.0	6.0
Soya-fortified bulgur wheat	350	17.0	1.5
Soya-fortified maize meal	390	13.0	1.5
Soya-fortified wheat flour	360	16.0	1.3
Soya-fortified sorghum grits	360	16.0	1.0
DAIRY PRODUCTS			
Dried skim milk (enriched) (DSM)	360	36.0	1.0
Dried skim milk (plain) (DSM)	360	36.0	1.0
Dried whole milk (DWM)	500	25.0	27.0
Canned cheese	355	22.5	28.0
Therapeutic Milk (TM)	540	14.7	31.5
MEAT & FISH			
Canned meat	220	21.0	15.0
Dried salted fish	270	47.0	7.5
Stockfish	-	-	-
Canned fish	305	22.0	24.0
OIL & FATS			
Vegetable oil	885	-	100.0
Butter oil	860	-	98.0
Edible fat	900	-	100.0
PULSES			
Beans	335	20.0	1.2
Peas	335	22.0	1.4
Lentils	340	20.0	0.6
MISCELLANEOUS			
Sugar	400	-	-
Dried fruit	270	4.0	0.5
Dates	245	2.0	0.5
Tea (black)	-	-	-
Iodized salt	-	-	-

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Annex 3.1
Examples of the Nutrient Content of WFP General Rations

The nutrient content of three different rations have been calculated below. These were the actual rations, which were distributed in three emergencies during 1994 and have been selected because they were based on different cereals. The Bosnian ration (Ration 2) contains no blended food while Rations 2 and 3 contained fortified blended food which were included as a method of improving the micronutrient content of the ration.

Food item	Quantity (grams per day)		
	Ration 1 (Tanzania)	Ration 2 (Bosnia)	Ration 3 (Nepal)
Cereal	Maize flour 350	Wheat flour[a] 400	Parboiled rice 430
Oil[b]	20	25	25
Pulses[c]	120	40	60
Canned meat		40	
Blended food[d]	30		40
Sugar		20	20
Salt[e]	5	5	7
Yeast		4	
Fresh vegetables[f]			100

[a] Wheat flour fortified with calcium and B vitamins
[b] Oil fortified with vitamin A,
[c] Types of pulses: Tanzania = red haricot, Bosnia = red haricot, Nepal = red lentils;
[d] Types of blended foods: Tanzania = corn soya blend, Nepal = wheat soya blend
[e] Salt fortified with iodine;
[f] Fresh vegetables: Nepal = onions

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Nutrient	Whole population Requirements per day [a]		% adequacy for a whole population [b]		
			Ration 1 (Tanzania)	Ration 2 (Bosnia)	Ration 3 (Nepal)
Energy	2100	kcals	91	89	106
Protein	53	g	124	112	100
Fat	40	g	88	89	81
Vitamin A (retinol)	500	ug	67	45	86
Vitamin B12	0.9	ug	133	89	178
Vitamin C	28	mg	60	6	75
Vitamin D	3.2	ug	563	0	750
Folate	160	ug	135	188	106
Niacin	12	mg	41	75	65
Riboflavin	1.4	mg	47	32	50
Thiamin	0.9	mg	211	177	210
Calcium	500	mg	50	122	76
Iron	22	mg	112	57	83
Iodine	150	ug	113	134	160

Note:
Nutrients are only included for which WHO has established whole population requirements. The nutrient content of the rations has been estimated from raw foods. The actual nutrient content of the food after preparation and cooking would be lower than the values shown.

[a] Source: (WHO, 1995);

[b] Calculated using ACF-NUTCALC programme

All three rations are notably short of vitamin A, vitamin C, niacin and riboflavin. The Bosnian ration contained virtually no vitamin C at all. Even with the addition of fortified foods, these rations were dangerously low on certain essential micronutrients. It should be noted that the energy content of the Tanzanian and Bosnian rations was below the recommended energy requirement of 2100 kcals. This energy requirement was introduced in 1997 (the energy content of the rations did satisfy the former recommendation of 1890 kcals). Thus, even when general rations, which are adequate in energy and protein are provided, the micronutrient content is below recommended requirements and deficiencies will result without other food supplements.

Annex 3.2
WFP fortification specifications for different commodities

	Vitamins/Minerals	Amount	Remarks
Vegetable oil	Vitamin A	30,000 I.U./kg = 9000 µg RE Vitamin A/kg	
	Vitamin D	3.000 I.U./kg = 75 µg Vitamin D/kg	
Salt	Iodine	20-40mg of Iodine/kg salt or 33-66mg potassium iodate (KIO3/kg salt)	**Assumi5ng average salt intake of 10g/day; Assuming 20% iodine loss from production site to household; Assuming another 20% loss during cooking**
Wheat and maize Flour	Thiamine (Vitamin B1)	4.4 mg/kg flour	**Not less than not more than twice the amount indicated**
	Riboflavin (Vitamin B2)	2.6 mg/kg flour	**Not less than not more than twice the amount indicated**
	Niacin	35 mg/kg flour	**Not less than not more than twice the amount indicated**
	Folic Acid	0.4 mg/ kg flour	**Not less than not more than twice the amount indicated**
	Iron	29 mg/kg flour (as reduced iron)	**Not less than not more than twice the amount indicated**
Blended foods (provisional)	Vitamin A	1664 I.U./100g finished product	
	Thiamine	0.128 mg/100g finished product	
	Riboflavin	0.448 mg/100g finished product	
	Niacin	4.8 mg/100g finished product	
	Folate	60 µg/100g finished product	
	Vitamin C	48 mg/100g finished product	
	Vitamin B12	1.2 µg/100g finished product	
	Iron ++ (as ferrous fumarate)	8 mg/100g finished product	
	Calcium ++ (as Calcium Carbonate)	100 mg/100g finished product	
	Zinc ++ (as Zinc Sulphate)	5 mg/100g finished product	
High Energy Biscuits (provisional)	Vitamin A	250µg RE/100g biscuit	
	Thiamine	0.5 mg/100g biscuit	
	Riboflavin	0.7 mg/100g biscuit	
	Niacin	6 mg/100g biscuit	
	Folic Acid	80 µg/100g biscuit	
	Vitamin C	20 mg/100g biscuit	
	Vitamin B12	0.5 µg/100g biscuit	
	Iron	11 mg/100g biscuit	
	Calcium	250 mg/100g biscuit	
	Magnesium	150 mg/100g biscuit	
	Iodine	75 µg/100g biscuit	
	Panthothenic Acid	3 mg/100g biscuit	
	Vitamin B6	1 mg/100g biscuit	
	Vitamin B12	0.5 µg/100g biscuit	
	Vitamin D	1.9 µg/100g biscuit	
	Vitamin E	5 µg/100g biscuit	

Annex 3.3
Examples: Fortified pre-cooked blended foods available in field study sites

	UNILITO	WSB (ex-USA)	FAMIX	TENAMIX	CSB (ex-USA)
Manufacturer	Mahalaxmi Foods Biratnagar	Protein Grain Products International	Faffa factory, Addis Ababa	HCFM Addis Ababa	Protein Grain Products International
Ingredients	Wheat pre-cooked Maize pre-cooked Soya pre-cooked vit/min premix	wheat pre-cooked soya flour salad oil vit/min premix	Maize pre-cooked Soya flour full fat Sugar Vit/min premix	maize pre-cooked soya pre-cooked chickpea pre-cooked sugar vit/min premix	maize (processed, gelatinized) soya flour (defatted,toasted) soya oil vit/min premix
Process	Roastiing	Extrusion	Roasting	roasting	extrusion
Food values Per 100gm dry product	400 Kcal 14 gm protein 6 gm fat	360 Kcal 20 gm protein 6 gm fat 60 gm carbohydrate	402 Kcal 14.7 gm protein 7 gm fat 70.1gm carbohydrate	380 Kcal 13.3 gm protein 7.4 gm fat 65 gm carbohydrate	380 Kcal 18 gm protein 6 gm fat 60 gm carbohydrate
Preparation instructions	None		Famix: water 2:5 5 -10 minutes boiling	Tenamix:water 2:5 2 teaspoon oil Cook for 10 minutes	

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Annex 3.4
Micronutrient Specifications
(per 100 gm. dry finished product)

	WFP Rome recommendations	Unilito (available in Nepal)	WSB ex-USA	Famix (available in Ethiopia)	Tenamix (available in Tanzania)	CSB ex-USA
Vit. A	1,664.0 i.u.	400.0 microgram	1,658 i.u.	1,300.0 i.u.	1,500.0 i.u.	1,700 i.u.
Vit. B1(thiamine)	0.128 mg	0.1 mg	1.49 mg	0.1 mg	0.3 mg	0.7 mg
Vit. B2(riboflavin)	0.448 mg	1.0 mg	0.59 mg	0.4 mg	0.5 mg	0.5 mg
Vit. B3(niacin)	4.8 mg	5.0 mg	9.1 mg	5.0 mg	-	8.0 mg
Folate	60.00 microgram	50.00 microgram		50.00	0.06 mg	
Vit. C	48.0 mg	50.0 mg	40.0 mg	30.0 mg	20.0 mg	40.0 mg
Vit. B12	1.2 microgram	5.0 microgram	4.0 microgram	1.0 microgram	0.3 microgram	4.0 microgram
Iron	8.0 mg (as ferrous fumarate)	15.0 mg	20.8 mg	8.0 mg	12.0 mg	18 mg
Calcium	100.0 mg (as calcium carbonate)	100.0 mg	749.0 mg (? not as calcium carbonate)	100.0 mg	200.0 mg	800.0 mg (? not as calcium carbonate)
Zinc	5.0 mg (as zinc sulphate)	5.0 mg	4.6 mg	5.0 mg	10.0 mg	3.0 mg
Vit. B6	-	-	0.52 mg	-	0.4 mg	0.7 mg
Iodine	-	-	50 microgram	-	0.05 mg	50 microgram
Magnesium	-	-	202 mg	-	20.0 mg	100 mg
Selenium	-	-	-	-	25.0 mg	-
Potassium	-	-	624 mg	-	164.0 mg	700 mg

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Annex 4.1
How to calculate percent of the median and SD scores

Percent of the median = [Actual weight / Reference child's weight] x 100

Actual weight: actual weight of the individual child being measured
Reference weight:the weight of the reference child from the reference tables

SD scores = [Actual weight – Reference weight] / Reference standard deviation

Actual weight: actual weight of the individual child being measured
Reference weight: the weight of the reference child from the reference tables
Reference standard Deviation: the value of + or – 1 standard deviation of the reference population

Example of a child:

Length:	82cm
Weight:	9.4kg
Reference weight:	11kg
Reference standard deviation:	0.9kg

Weight-for-length % median = (9.4 / 11) x 100 = 85%

Weight-for-length SD score = (9.4 – 11) / 0.9 = -1.77

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Annex 8.1
Energy Requirements for Emergency-Affected Populations, Developing country profile Kilocalories per day

Age/sex group (years)	Male[a]		Female[a]		Male & Female[a]	
	% of total population	Energy requirement per caput	% of total population	Energy requirement per caput	% of total population	Energy requirement per caput
0	1.31	850	1.27	780	2.59	820
1[b]	1.26	1250	1.20	1190	2.46	1220
2[b]	1.25	1430	1.20	1330	2.45	1380
3[b]	1.25	1560	1.19	1440	2.44	1500
4[b]	1.24	1690	1.18	1540	2.43	1620
0-4	6.32	1320	6.05	1250	12.37	1290
5-9	6.00	1980	5.69	1730	11.69	1860
10-14	5.39	2370	5.13	2040	10.53	2210
15-19	4.89	2700	4.64	2120	9.54	2420
20-59[c]	24.80	2460	23.82	1990	48.63	2230
60+[c]	3.42	2010	3.82	1780	7.24	1890
Pregnant			2.4	285(extra)	2.4	
Lactating			2.6	500(extra)	2.6	
Whole Population[c]	50.84	2250	49.16	2010		2070

Sources:

(1) Energy requirements derived from WHO Technical Report Series No. 724

(2) Population data (mid-1995): UN Population Division, New York

[a] Adult weight: male 60 kg, female 52 kg.

[b] Population estimates for years 1, 2, 3 and 4 are not available from UN. Estimates for these years were made by interpolation between the figures given by UN for 0 year and 5 years.

[c] The figures given here apply for ?light? activity level (1.55 x BMR for men, 1.56 x BMR for women).

(The BMR - basal metabolic rate - is the rate of energy expenditure of the body when at complete rest e.g. sleeping.) Adjustments for moderate and heavy activity: see Annex II.

N.B.

The requirements as expressed above do not take into account the varying fibre content, digestibility and complex-carbohydrate composition of the diet.

In developing countries, a relatively high proportion of fibre and less-available carbohydrate is usually present. The carbohydrate content of foods may be expressed in terms of its various components (starches, sugars, fibre, cellulose, lignins, etc.) or simply as the calculated ?difference? between the total weight and the sum of the other components (fat, protein, minerals and water). This issue is discussed in WHO Technical Report Series No. 724, section 7.1. If the Atwater factor (4 Kcals per gramme) is applied to carbohydrate by difference, the real energy available in the food should be decreased by 5% or the ?requirement? for this type of diet increased by 5%; which, for this Table, means an increase of +100 Kcals in the energy requirement indicated.

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Annex 8.2
Mean population energy requirement, and recommended increments of energy (Kcal per day) needed, taking into account the levels of activity, environmental temperature and food losses during transport

			Developing country
1.	Mean energy requirement		2070
2.	Adjustment to requirement for activity-level of adults (18 years+)		
	Moderate*	Males	+ 360
		Females	+ 100
		Whole population (adults & children)	+ 140
	Heavy*	Males	+ 850
		Females	+ 330
		Whole population	+ 350
3.	Adjustment to requirement for mean daily temperature (°C):		
		20°C	-
		15°C	+ 100
		10°C	+ 200
		5°C	+ 300
		0°C	+ 400
4.	Adjustment to cover possible food losses in transport:		
		Country with port	+ 5%
		Landlocked country	+ 10%

(These figures are not absolute but should be adjusted up or down according to local realities)

ANNEX 8.3
Fuel-Saving Strategies in Emergencies

Because emergency situations are not always short-lived, approaches to ensuring an adequate fuel supply must go hand in hand with strategies to conserve scarce energy resources and to minimise any subsequent environmental degradation. A range of strategies should be pursued including:

- fuel saving cooking technologies;
- energy saving cooking practices,
- the use of alternative biomass fuels and non biomass fuels.

Fuel-saving cooking technologies
There are various types of improved stoves (fuel efficient) available. They rely on the two principles of (a) enclosing and insulating the fire and (b) controlling the airflow. Simply by shielding a wood fire from draughts 30 – 40 percent fuel savings can be achieved. Improved stoves are usually made with metal, clay, ceramic or a combination. Mud stoves can be constructed using locally available materials. They can vary from simple filling-in of two sides of a 3 stone fire with a mud wall to prevent through-draughts, to designs incorporating a circular fire chamber, arched doorway for fuel and integral pot rests.

Energy-saving cooking practices
Examples include, the use of tightly fitting lids, the correct choice of pot, removal of excess soot build-up, cutting foods up small, pre-soaking of beans, putting fires out promptly etc. The grinding of beans and hard grains, such as maize, reduces cooking time by many hours and energy consumption by up to 80 percent. Collective cooking arrangements also achieve considerable energy savings. Especially inefficient are cooking groups of one or two people. Cumulative energy savings begin to decline rapidly above group sizes of seven to eight.

The use of alternative biomass fuels, (alternative to firewood). For example, peat, charcoal, briquettes (manufactured fuel pellets), carbonized briquettes, grass. The use of these fuels should only occur when sufficient renewable residues exist which do not compromise future soil fertility. Typical consumption levels of firewood range between 1 – 2 kg per person per day, although this varies considerably depending on a range of factors.

The use of certain fuels for cooking has health implications through exposure to pollutants released in combustion. Women, the elderly and very young are likely to be disproportionately affected. Some of the documented health effects of cooking with biomass fuels in unventilated areas include; acute respiratory infections, chronic obstructive lung disease, anaemia and eye disorders, conjunctivitis and blindness. Open fires pose the threat of burns and scalds, especially to young children.

Use of non-biomass fuels, such as solar cookers and kerosene. Solar cookers can only be used where there are high enough insolation levels (exposure to the sun's rays). It is possible to cook with an insulated container into which a pot of partially cooked food can be placed to continue cooking without the use of additional fuel. Fireless cookers or haybasket cookers, are usually made with a basket or box insulated with cloth, newspaper or wood shavings and with a tightly-fitting insulated lid.

The use of kerosene for cooking in an emergency requires special stoves and fuel storage containers to be made available. The fire risk is considerable at all stages of distribution. People may be unaware how to operate the stoves which increases already significant fire risk. For these reasons it has been opposed at household level, but may be used communally where there is less chance of sale of fuel and hardware.

Strategies to provide fuel in emergencies should be developed in full consultation with the affected population, particularly women. Where new or alternative fuels are distributed, people must be kept informed and where necessary allowed the opportunity to acquire relevant skills.

For guidelines about domestic energy see the UNHCR Environmental Guidelines Domestic energy in Refugee Situations, UNHCR, May 1998.

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