

PART 1: FACT SHEET

The fact sheet is part one of four parts contained in this module. It provides an overview of how to assess *micronutrient malnutrition*. Interventions to reduce micronutrient malnutrition are covered in module 14. Words in *italics* are defined in the glossary.

Introduction

Micronutrients include both vitamins and the minerals that are essential for human health. They are required in only small amounts but, nonetheless, are needed for a wide range of body functions. Micronutrients have to be consumed in the diet in adequate amounts or else deficiency disorders or disease will result.

Vitamins are either water-soluble (e.g. the B vitamins and vitamin C) or fat-soluble (e.g. vitamins A, D, E and K). Essential minerals include iron, iodine, calcium, zinc, and selenium.

There are internationally accepted dietary requirements for many micronutrients. Sphere standards state that people affected by emergencies have a right to a diet that is nutritionally adequate. Therefore, there should be no cases of clinical micronutrient disease. In particular there should be no cases of *scurvy* (vitamin C deficiency), *pellagra* (niacin deficiency), *beriberi* (thiamine deficiency) or *ariboflavinosis* (riboflavin deficiency). The rates of *xerophthalmia* (vitamin A deficiency) and *iodine deficiency disorders* should be below levels of public health significance.

Globally, iron deficiency *anaemia* is the most common micronutrient disorder and large numbers are also affected by iodine and vitamin A deficiencies. These endemic deficiencies often affect populations in emergencies. Young children and women are often the most vulnerable to micronutrient deficiencies but they can also affect other population groups. For example, pellagra is found in adult males and scurvy has been described in adult prisoners.

Despite the existence of international standards for dietary requirements there have been recent outbreaks of many of these diseases. This emphasises the importance of effective monitoring.

Approaches to the assessment of micronutrient malnutrition

There are two main approaches to assessing micronutrient malnutrition in emergencies.

1. **Indirect assessment** involves the estimation of nutrient intakes at a population level and extrapolating from this the risk of deficiency and the likely prevalence of micronutrient deficiency disease.
2. **Direct assessment** involves the measurement of actual clinical or sub-clinical micronutrient malnutrition in individuals or populations.

The **indirect assessment** approach involves two stages. Firstly, measuring or estimating the dietary intake of the population of concern and, secondly, comparing this intake with the nutrient requirements of the population.

The individual nutrient intake requirements currently recommended by the World Health Organisation (WHO) are called Reference Nutrient Intakes (RNI). Sphere provides population requirement planning figures that are based on these RNI. The micronutrients include vitamins A, B-complex, C, D, E, and K, and the minerals, iron, iodine, zinc, calcium, copper, selenium, and magnesium. Older requirement figures for emergency affected populations, the WHO safe levels of intake (SLI), are still sometimes used for calculating requirements.

The micronutrient content of general rations distributed in many food aid operations has been the subject of criticism for a number of years. Policy makers and managers have a responsibility to advocate for general rations that are nutritionally adequate. To ensure that food aid rations do meet international standards, good ration planning, monitoring of the logistics chain, on-site distribution monitoring, and post-distribution monitoring are required.

FACT SHEET

Estimating the micronutrient intake from non-food aid sources is particularly challenging. Full dietary intake studies involving the weighing of foods are very resource intensive and not suitable for use in standard programmes. In contrast, the use of food frequency questionnaires to generate food variety and diet diversity scores is increasingly common practice and can help provide an indication of the risk of micronutrient malnutrition and trends in consumption over time.

As well as monitoring for the occurrence of micronutrient deficiencies the possibility of excessive intakes must not be forgotten. Excessive intake of micronutrients can be toxic and where there are multiple micronutrient programmes (e.g. *food fortification, supplementation* and use of micronutrient powders at household level) careful consideration needs to be given to the possibility of excessive intakes.

Direct assessment of micronutrient deficiencies uses clinical signs and symptoms and/or biochemical testing to diagnosis the presence of micronutrient malnutrition. These detection methods can be combined with survey techniques to generate an estimate of the population *prevalence* or rate of micronutrient malnutrition.

Information on actual or potential micronutrient malnutrition should always be cross checked against other available data to try and obtain the most accurate picture of what is happening. Micronutrient malnutrition remains a major public health issue that is far from being eliminated.

Key messages

1. Micronutrient malnutrition continues to effect populations in emergencies and is a significant cause of morbidity, mortality, and reduced human capital.
2. The main cause of micronutrient malnutrition is usually an inadequate dietary intake of vitamins and/or minerals.
3. Food aid rations have often failed to meet Sphere standards for micronutrient adequacy. A low diversity diet with the absence of micronutrient-fortified foods is a strong predictor of micronutrient deficiency disease (MDD).
4. Infections are an additional and important cause of micronutrient malnutrition and can negatively affect nutritional status by increasing nutrient requirements and reducing nutrient absorption.
5. Globally, iron deficiency anaemia is the most common micronutrient disorder. Large numbers are also affected by iodine and vitamin A deficiencies. These endemic deficiencies often affect populations in emergencies.
6. In addition, epidemics of MDD such as pellagra, scurvy, beriberi, and ariboflavinosis occur in populations affected by severe poverty or experiencing crisis.
7. Assessment of micronutrient malnutrition can be conducted using either direct or indirect approaches.
8. In addition to deficiencies, it is important to be aware that excessive intakes of micronutrients can occur and this possibility needs to be considered.
9. Appropriate ration planning and monitoring in food aid programmes can greatly reduce the risk of micronutrient malnutrition. Software tools such as *NutVal* are available to assist in this task.
10. Ensuring that micronutrient deficiency diseases are monitored as part of the health information system is an important part of effective surveillance.
11. Major challenges exist in conducting investigations of MDD outbreaks. Specialist approaches may be required to accurately identify and quantify the extent of a deficiency problem.