

Overview

Vitamin and mineral deficiencies have a significant impact on human welfare and on the economic development of poorer countries. These deficiencies can lead to serious health problems, including blindness, mental retardation and reduced resistance to infectious disease, and in some cases to death. Among the debilitating consequences of these dietary deficiencies is loss of human capital and worker productivity.

Unlike many other impediments to social and economic development, vitamin and mineral deficiencies can be reduced with relatively small investments in public health, agriculture and education. The technology is available to address many of these deficiencies. They persist for a variety of reasons, including insufficient awareness by policy makers of the importance of addressing them and insufficient understanding by program planners of either their consequences or the strategies available to combat them.

During the past few decades the research community, governments, development agencies and non-governmental organisations (NGOs) have made significant progress in identifying groups at greatest risk of micronutrient deficiencies and outlining programs to provide short-term alleviation of specific deficiencies. Several countries have adopted international goals and targets to reduce deficiencies by the end of this decade.

However, progress in promoting and implementing food-based strategies to achieve sustainable improvements in micronutrient status has generally been slow. These strategies focus on improving access to and availability and consumption of vitamin- and mineral-rich foods. Benefits of such food-based strategies include not only improved intakes of specific nutrients but also improved overall diet and health status.

THE MICRONUTRIENT MALNUTRITION PROBLEM

Globally, the three deficiencies of greatest public health significance are those of vitamin A, iron and iodine. These nutrients are referred to as micronutrients because the body needs them in minute quantities for growth, development and maintenance.

Vitamin A deficiency is most common in young children. Untreated, it can lead to blindness and death. Iron deficiency is the most common dietary deficiency globally, affecting mostly children and women of childbearing age. It leads to anaemia, which contributes significantly to maternal and neonatal deaths. Iodine deficiency disorder occurs in mountainous and flood plain areas of the world where iodine has been washed away from soils. It is the most common cause of preventable mental retardation, including low IQ (intelligence quotient). Severe iodine deficiency can lead to cretinism, stillbirth and birth defects.

Strategies to overcome micronutrient deficiencies include:

- dietary diversification,
- food fortification,
- vitamin and mineral supplementation and
- global public health and disease control measures.

This manual focuses on the first two approaches, which are food-based strategies to promote the consumption of micronutrient-rich foods. One important advantage of food-based strategies is that foods provide several essential micronutrients, simultaneously addressing a combination of deficiency problems. In addition, physiological interactions between vitamins and minerals can enhance the body's ability to absorb essential micronutrients.

Promoting consumption of micronutrient-rich foods fosters better overall health for all members of society. Most importantly, food-based strategies promote sustainable improvements by encouraging market solutions and long-term behaviour change among high-risk groups. In addition, food-based strategies are often linked to income-earning activities.

IMPLEMENTING FOOD-BASED STRATEGIES

Small-scale community vegetable and fruit gardens can play a significant role in increasing production of micronutrient-rich foods. To improve micronutrient status, gardening projects must lead to increased consumption of the micronutrient-rich foods produced. Success requires a good understanding of local conditions. Community participation and the involvement of women are usually key to building support and achieving nutritionally beneficial change. Land and water limitations are common

constraints which may require local government intervention or assistance.

Production of small animals (e.g., rabbits, goats and guinea pigs), poultry and fish can provide excellent food sources of essential micronutrients, including bioavailable iron and vitamin A. Efforts to promote small livestock and fishery projects should address cost constraints and the need for education and support to producers.

Efficient, large-scale commercial vegetable and fruit production can supply micronutrient-rich foods at reasonable prices. Effective and competitive markets lower prices for the consumer without reducing the producer price. Commercial oil seed production is a major means of providing low-cost dietary fat, which is necessary for absorption of vitamin A, especially beta-carotene. In some countries red palm oil cultivation may present opportunities for improving vitamin A status. Fruit and milk beverages may also be accessible sources of micronutrients.

Post-harvest loss of micronutrient-rich foods, such as fruits and vegetables, can be high because these foods tend to be perishable. At the commercial level, storage losses can be reduced by improving marketing, grading, packaging, transport and cold storage facilities. At the household level, practical food preservation and processing methods, such as solar drying, can be adopted to increase the availability of seasonal micronutrient-rich foods.

Improving the micronutrient content of soils and plants can result in improved yields as well as increased micronutrient content in plant foods. Further research in gene modification of plant foods to increase the uptake of nutrients holds promising possibilities. Long-term food-based solutions to micronutrient deficiencies will require improved agricultural practices and improvements in the nutritional quality of grains through genetic modification.

FOOD FORTIFICATION

In developing countries, food fortification is increasingly recognized as an effective medium- to long-term approach to improving micronutrient status in large populations. Fortification does not require changes in the dietary habits of the population, can often be implemented relatively quickly and can be sustainable over long periods of time. Some studies have shown fortification to be one of the most cost-effective methods of reducing micronutrient deficiencies.

Fortification programmes require careful planning to ensure that appropriate food vehicles and fortificants are selected. It may be difficult in practice to ensure that groups which consume lower levels of the fortified foods receive adequate quantities of the added micronutrient. Food fortification may not be an appropriate intervention because of the absence of a suitable food vehicle to reach the vulnerable population, difficulty in enforcement of fortification regulations or high cost.

Although fortification may be effective without consumer education, it is generally considered wise to include a consumer education component. Because fortification usually increases the price of a food, planners must consider whether to subsidize fortified foods or pass the price increases on to consumers.

Effective quality assurance is essential to ensuring the sustained effectiveness of a fortification programme. The safety and appropriateness of fortification levels should be monitored at both the production and household level. The introduction of a fortified food may necessitate consideration of marketing issues such as packaging, pricing and promotion strategies.

COMMUNICATION STRATEGIES

Communication techniques have been used for more than two decades to help bring about changes in eating practices. Successful strategies from many countries demonstrate the importance of carefully planning communication interventions and of basing strategies on information obtained directly from those who are the targets of the strategy, for example, mothers and others who influence food production, food purchasing and child feeding behaviour.

In most countries, important improvements in the micronutrient status of the population can be obtained by changing practices at the household level and by protecting nutritionally beneficial traditional practices that are eroding because of factors such as urbanization and modernization. When incomes rise, people often reduce breastfeeding, stop gathering wild foods and eat fewer green leafy vegetables. The mass media can be a powerful force in helping to preserve positive traditional practices by enhancing their status. At the same time, communication strategies can be used to improve dietary practices.

Although micronutrient-rich foods may be both available and consumed, often they are not consumed in sufficient quantities to prevent deficiencies and they may not be consumed by all vulnerable groups. Communication strategies can be used to promote dietary and behaviour changes that increase consumption of micronutrient-rich foods. The least disruptive dietary change offers the best chance of success.

PLANNING STRATEGIES

Conducting an assessment of the problem, analysis of the causes and review of available resources (collectively referred to as a situation analysis) serves as a basis for many national planning efforts to identify and implement micronutrient deficiency prevention strategies. Although poor dietary intake of micronutrients is often the major cause of micronutrient malnutrition, non-diet-related factors can also play an important role. Analysis of underlying factors that affect micronutrient intake may help to identify appropriate preventive measures.

Government policies and regulations in the agricultural, trade and food-processing sectors greatly influence the availability and price of micronutrient-rich foods, as well as the profitability of producing, processing and marketing such foods. Reviewing such policies for their impact on micronutrient status is an important step in planning food-based strategies. For example, regulations which prohibit gardening in urban areas or restrict the marketing of fresh foods may have an impact on the availability of micronutrient-rich foods.

Most countries where micronutrient deficiencies are a public health problem lack policies to improve the availability of micronutrient-rich foods. For example, horticultural programmes and extension networks can encourage the production of fruits and vegetables. Preservation and processing of surplus food produced during the peak season ensures year-round availability of these foods. Development of local food preservation and processing facilities can be encouraged. Governments should be encouraged to adopt such policies.

National agricultural planning strategies have been shown to have an impact on micronutrient status. Approaches taken include crop diversification to promote micronutrient-rich minor crops, agroforestry projects and promotion of traditional and wild foods.

Although the three major micronutrient deficiencies have many different causes and potential solutions, opportunities exist to coordinate micronutrient deficiency control programmes. Coordination reduces costly duplication and increases the likelihood of reaching policy makers with effective messages.

The most successful approach to increasing consumption of micronutrient-rich foods is likely to be a combined strategy that addresses both increased production (supply) and increased consumption (demand) and also meets the needs of special groups such as children and women of childbearing age.

Many types of expertise are required to develop and implement a broad-based strategy to eliminate micronutrient deficiencies. Intersectoral committees can speed the process of programme development and implementation. Representatives of key authorities in the health, agriculture, food industry and educational sectors should be permanent members of micronutrient committees. Representatives of other authorities should be co-opted as appropriate when specific issues (e.g., fortification, the special needs of women and children) are discussed. NGOs can provide valuable practical advice to enhance community participation.

The success of food-based programmes to overcome micronutrient deficiencies will greatly depend on advocacy to obtain both community acceptance of and political support for programmes. **Communities are more likely to accept strategies which they perceive to be aimed at solving a problem without adding significantly to the workload of community members. Involving local people in programme assessment, analysis and action will facilitate community acceptance.**

MONITORING, SURVEILLANCE AND EVALUATION

Programme monitoring must be simple and inexpensive to carry out. Surveillance indicators should be culturally acceptable, feasible to obtain under field conditions and reasonable in cost. The inclusion of monitoring and evaluation components in food-based programmes, not only improves implementation but also contributes to demonstrating the comparative effectiveness of food-based approaches to preventing micronutrient deficiencies.

SUMMARY ACTION PLAN

The final section of this manual summarizes specific steps to be taken in planning and implementing successful, sustainable food-based strategies to prevent micronutrient malnutrition. Planning strategies must consider not only the needs of the general population but also those of vulnerable groups with special dietary problems or nutritional needs. These include women of childbearing age, pregnant and lactating women, young children and refugees and famine-affected populations, who may lack access to a diet that is sufficient in quantity or quality to provide adequate levels of micronutrients. They may also be vulnerable to infections that increase nutrient requirements and impair absorption. Special attention is needed to the design of programmes to meet the nutrient needs of these vulnerable groups.