



OMNI | Opportunities
for Micronutrient
Interventions

micronutrient update

TECHNICAL SERIES

Micronutrient Malnutrition

Key Points

- **Vitamin A deficiency (VAD)** leads to increased childhood death from infections and is the most common cause of preventable blindness in children. Approximately 2.8 million preschoolers are at risk of xerophthalmia (the clinical eye lesions in VAD leading to rupture of the cornea and blindness) each year, and it is estimated that between 250,000 and 500,000 preschool children go blind from vitamin A deficiency annually. Approximately 250 million people are at risk of deficiency of vitamin A worldwide, the prevention of which would reduce childhood mortality rates by up to 30 percent.
 - **Iron deficiency anemia (IDA)** increases the risk of prematurity and low birth weight, and is a major contributor to maternal mortality. Severe anemia may account for one in five maternal deaths. IDA affects an estimated 42 percent of all women, 58 percent of pregnant women, and a third of all young children globally. IDA is a primary cause of cognitive deficit in infants and young children. In adults, physical work capacity is reduced with even moderate anemia.
 - **Iodine deficiency disorders (IDD)** impair growth, development, and intellectual capacity, and contribute to reproductive problems in women. IDD affects an estimated 655 million people worldwide, and 915 million more people live in areas that put them at risk for IDD. Iodine deficiency is the greatest single preventable cause of intellectual impairment in the world today. It is a significant health problem in 118 countries.
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Overview of Micronutrient Malnutrition

Micronutrient malnutrition -- insufficient dietary intake of nutrients such as vitamin A, iron, and iodine -- affects the health and survival of more than 2 billion people worldwide. Deficiencies of these three micronutrients are closely linked with childhood illness and mortality, yet these deficiencies are largely preventable. Diet diversification, food fortification, supplementation, and public health measures are ways to control and prevent micronutrient malnutrition.

The elimination of micronutrient malnutrition would constitute a significant contribution to social, economic, and public health development. The governments of 159 countries, along with non-governmental organizations and the international development community, are committed to reducing iron deficiency anemia in women by one-third and eliminating vitamin A deficiency and iodine deficiency as public health problems by the year 2000.

Deficiencies of vitamin A, iron, and iodine can waste up to 5 percent of the gross domestic product (GDP) of a country, while addressing them effectively would cost only 0.3 percent of GDP. Vitamin A supplementation costs about \$0.50 per child per year, and preventing vitamin A deficiency in children aged six months to two years old alone would save about 250,000 lives per year.

Women and children in poverty are most at risk for deficiencies of all three micronutrients.

Prevention and Control

Micronutrient interventions include food-based approaches such as dietary diversification, home gardens, fortification, and plant breeding. Complementary, supplementary or pharmaceutical approaches include distribution of vitamin A capsules and iron/folate supplementation. Public health interventions focus on controlling infectious diseases, coordinating supplement distribution with National Immunization Days, and promoting breastfeeding.

Diet diversification involves encouraging people to eat micronutrient-rich foods and is key to the long-term prevention and control of micronutrient malnutrition. Programs that provide information on plant and animal sources of micronutrients, promote home gardens featuring micronutrient-rich plants, and teach food preservation, processing, and preparation techniques that retain micronutrients, are underway.

Fortification has long been considered a medium-term approach in areas where micronutrients are not naturally available, but based on its success in industrialized countries, should now be considered a long-term intervention. While there are still technological problems with fortifying foods with more than one or two micronutrients at the same time, the combination of fortification and the large potential health gains in populations where deficiencies are prevalent means that food fortification is one of the most cost-effective health interventions. The World Bank recommends that micronutrient interventions, including fortification, be included in an "essential package" of public health and clinical services which governments should ensure are available to the whole population and should subsidize for the poor.

Fortifying commonly consumed foods with one or a combination of micronutrients appears to be among the most effective, sustainable interventions for populations at risk of micronutrient deficiencies. Legislation and regulations may be required to ensure that fortification programs, such as salt iodization, are actually implemented and comply with legal minimum levels of the micronutrient fortificant.

Supplementation with vitamin A has been in existence as an intervention for over 20 years in some countries and it may, if additional approaches are not explored, be required in others for many years before VAD can be controlled as a public health problem.

While supplementation with vitamin A capsules is an effective intervention, it should not be the exclusive approach as it is difficult to sustain over time and often does not reach the children most at risk. Targeted interventions, such as giving a high-dose capsule to mothers immediately post-partum, strongly encouraging breastfeeding, and specifically targeting children who are malnourished, have measles or suffer from repeated diarrhea is probably a more sustainable and effective long-term approach than attempts at universal supplementation.

Short-term iodine supplementation programs include oral doses of iodized oil and iodized oil injections. Iodized oil injections in particular have been very successful; however, they can divert efforts from critical salt iodination programs and have only a limited role for hard-to-reach populations.

Iron (with folate) is traditionally given in supplement form, particularly during pregnancy. Public health scientists and nutritionists are also exploring the efficacy and cost-effectiveness of intermittent dosages, once or twice a week, in controlling IDA in at least six different country settings.

Public health interventions such as the control of infectious disease, oral rehydration therapy, intestinal parasite control, childhood immunization, and promotion of breastfeeding have tremendous impact on micronutrient status. Control of malaria is critical to the goal of reducing anemia by one-third by the year 2000. In developing countries, 56 percent of child deaths are associated with malnutrition, although the identified cause of the deaths is often classified as one of the infectious diseases. Infectious diseases can also hinder appetite (and thus micronutrient intake), nutrient absorption and utilization.

Integrated Approaches

Treating iron deficiency anemia with both iron and vitamin A is more effective than treatment with either of the two micronutrients alone, and both are good candidates for an integrated food-based approach. Iodine is less suitable to an integrated approach, but salt iodination is a proven method of reducing IDD in iodine-deficient areas. Currently, over 70 percent of the countries affected by IDD have national salt iodination programs in place, and people in the remaining 30 percent are being encouraged to use iodized salt.

Reducing micronutrient malnutrition leads to a significant positive change in the public health of populations. Their effectiveness has been acknowledged at the national level, but demand for them needs to be more consumer-driven. Those most at risk for micronutrient malnutrition need emergency interventions in the form of supplements, sustainable food-based approaches, and the knowledge to demand the micronutrients that will improve their health and that of their children.

Key Sources

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