Micronutrients Save Lives and Strengthen Societies

What are micronutrients?
Micronutrients are vitamins and minerals that all humans need to maintain strong bodies and mental sharpness, fight off disease, and bear healthy children.

Why are micronutrients important in the developing world?
Micronutrients play a life-saving role in developing countries, as well as affecting people’s quality of life. Three of them—vitamin A, iron, and iodine—have been shown to profoundly affect child survival, women’s health, educational achievement, adult productivity, and overall resistance to illness.

Why do people lack micronutrients?
Only certain foods contain significant amounts of micronutrients. People may have enough to eat, but still not consume enough micronutrients. Doing so depends on the availability and accessibility of nutrient-rich foods and the dietary practices related to their preparation and consumption. In addition, infections and parasites can lower levels of micronutrients in the body.

How serious is the problem in the developing world?
- Vitamin A: According to WHO, about 250 million children under five years of age were suffering from vitamin A deficiency worldwide prior to the significant supplementation efforts now under way. Most children affected are in south/southeast Asia; there are many in Africa, the western Pacific, and Latin America, as well.
- Iron: Recent estimates indicate that iron deficiency and anemia afflict more than 3.5 billion people in the developing world. Preschool children and pregnant women suffer high rates of anemia in sub-Saharan Africa, southeast Asia, the eastern Mediterranean, and some areas of Latin America.
- Iodine: Iodine deficiency is a public health problem in nearly every country of Africa and southeast Asia, the eastern Mediterranean, and more than half the countries in Europe and in the Americas.

How do micronutrient programs support social and economic development?
When people are well nourished, healthy, and productive, they can take better advantage of education, health, and economic opportunities. A well-designed micronutrient program, therefore, contributes to social and economic development.

Government officials in developing countries may hesitate to invest in programs addressing poverty-related malnutrition because of their belief that only the alleviation of poverty will result, automatically, in a reduction of that malnutrition. Experience suggests, however, that the alleviation of poverty is many years away in much of the developing world. Despite persisting poverty, enormous strides can be made toward eliminating malnutrition through well-targeted public health interventions. Micronutrient programs can be an attractive first step toward developing the confidence of government officials that advancements in curbing malnutrition can be made even in the presence of poverty.

How do these programs deliver micronutrients?
For immediate impact, micronutrient supplements are effective in preventing and treating deficiencies. Two food-based strategies—diversifying diets and fortification of certain commonly consumed foods—increase the amount of micronutrients that people get each day. A mix of supplementation and fortification can dramatically improve health for less than a dollar per person per year and reduce the costs of illness to families, communities, and nations.

Three key nutrients
Vitamin A is important to a healthy immune system, vision, and reproduction. Vitamin A is found naturally in meat, breast milk, dairy products, eggs, and some fruits and vegetables.
Iron is important in blood cell formation and functioning and, therefore, to work productivity and mental development. Iron is found in red meat and breast milk, and, in a less easily absorbed form, in grains, legumes, and vegetables.
Iodine is important to the formation of thyroid hormones and mental development. Iodine is found naturally in some soils and in seawater. People consume it in seafood, crops grown in iodine-rich soils, and, most commonly, in iodized salt.

How deficiencies impact children and mothers
Micronutrient deficiencies are most devastating for young children but also affect mothers in their childbearing years:
- Vitamin A: Six of ten preschool children with severe vitamin A deficiency die, particularly from common childhood infectious illnesses.
- Iron: Severe iron deficiency causes as many as one in five maternal deaths. Anemic mothers produce sickly children with low birth weight. Less severe deficiency in children harms mental development and learning capacity.
- Iodine: Iodine deficiency increases fetal deaths and stillbirths, retards neurological development, and lowers mental performance.
Taking Action on Micronutrients

Confirming that a micronutrient problem exists

**Vitamin a deficiency**
- More than 10 percent of children six months to five years of age have low levels of vitamin A in their blood (less than 20 µg/dl plasma).
- Dietary intake of vitamin A is less than 50 percent of the recommended level among 75 percent of children under six years of age.
- In the absence of biochemical or dietary information, a mortality rate for children under five that is greater than 100 per 1,000 individuals indicates that a vitamin A deficiency problem is likely.

**Iron deficiency**
- Anemia in more than 20 percent of women or children indicates a significant health problem.

**Iodine deficiency**
- Urinary iodine excretion of less than 100 µg/l in 50 percent of schoolchildren indicates a significant iodine deficiency.
- Goiter prevalence greater than 5 percent indicates a severe iodine deficiency problem.

Determining the best approaches

Each country is unique, with its own history, culture, and social organization. Micronutrient programs should be customized to this context. They should ideally represent a mix of supplementation and food-based interventions, coupled with public health measures to reduce infections. They should also be consistent with national policies and integrated into existing nutrition and health programs.

**Safety of vitamin A supplements**

Vitamin A supplements are safe and effective. Side effects in children rarely occur and are short term and mild if they do occur. For example, a temporary rash or redness may develop with excessive intake of vitamin A but this would dissipate with disuse. Age-appropriate doses are completely safe for children when given at least a month apart. Safe low doses have been established for pregnant women, while a high dose is safe during the eight weeks immediately following childbirth.

**Supplementation**

Vitamin A supplementation entails distributing high doses of the vitamin twice a year to children aged 6-60 months and once to women immediately after childbirth. Vitamin A supplements are also recommended for treating children whose eyes show signs of severe deficiency or who have measles, severe malnutrition, or prolonged diarrhea.

High-dose supplements rapidly replenish body stores of vitamin A that last for several months and temporarily correct deficiency. The supplement itself costs only about US$0.02 per dose. Adding the costs of logistics and distribution raises the cost of two doses per person per year to approximately $0.50.

Universal vitamin A supplementation for preschool children has been widely implemented. High coverage (at least 80 percent) should be maintained until food-based interventions are in place. Even so, targeted supplementation may continue to protect high-risk groups not sufficiently covered by other interventions, for example, children 6-24 months of age.

**Food-based approaches**

*Fortification* involves adding specific micronutrients to processed staple foods, such as vitamin A to sugar and margarine, iron and B vitamins to wheat and corn flour, and iodine to salt. Successful food fortification requires appropriate regulatory instruments, effective public-private partnerships, and a functioning quality assurance and monitoring system. The United States has been fortifying its milk with vitamins A and D since the 1930s.

Fortification of foods can greatly contribute to reducing micronutrient deficiencies because it is generally socially acceptable, may not require changes in food habits, and can be introduced quickly. The cost of fortifying foods is relatively small (usually 0.5 to 2 percent of the product’s retail price) and can be passed on to the consumer. Government usually pays for inspection, monitoring, and surveillance, or about 3 percent of the total cost of a fortification program.

*Dietary diversification* involves increasing production and availability of foods rich in micronutrients, promoting food production and consumption at the community level (e.g., through home gardening programs), and encouraging a diet diversified to include natural and fortified micronutrient-rich foods. Key to this strategy is changing people’s dietary choices and practices. Program planners need to choose the most feasible and acceptable behaviors to promote, overcome identified barriers to new ideas, and support positive practices. The new practices can be disseminated and popularized through national campaigns, the media, and community workers, mothers’ groups, extension agents, religious leaders, and teachers.

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Research shows . . .

Vitamin A supplementation can reduce child deaths by at least 23 percent because it strengthens immune systems, lowering the risk of children dying from common infections, especially from measles and diarrhea.

Iron supplementation of iron-deficient children can lead to dramatic improvements in mental and motor skills.

Iodized salt contributes to improved mental development, learning capacity, reduced school failure rates, and increased productivity.