

5 Low Cost: High Return Investment

This chapter returns to the compelling economic argument for investment in micronutrients. Among the evidence are:

- ✓ proven results
- ✓ relative low cost of interventions
- ✓ integration with existing health, agricultural, and other economic activities
- ✓ Copenhagen Consensus endorsement
- ✓ data on vitamin A, zinc, iron, iodine, and fortification investments

THE CASE FOR INVESTMENT in micronutrient interventions is convincing. Impressive results have been produced in a range of countries and settings, each with unique needs and challenges. Micronutrient interventions save and transform individual lives. As such, they produce national economic gains due to savings in health-care costs, maximization of investments in education, and increased economic activity. Added to these are the resulting intergenerational benefits of improved health, intellect and productivity.

On their own, such results place a moral obligation on all who are committed to achieving the Millennium Development Goals to invest in micronutrient programmes. But in this complex world of competing demands for limited resources, a compelling reason for prioritizing investment in micronutrient initiatives is their remarkable benefit:cost ratio. With the low cost of interventions and their high return in improved human capacity, the benefit:cost ratio of micronutrient programming is virtually unmatched by any other large-scale health or economic intervention.

Micronutrients are not expensive commodities. Terrific research and development has already taken place to produce low-cost supplements that are being used around

the world. Fortificants used during food processing can also be procured at low cost and the technology needed to add micronutrients to food is relatively inexpensive to install. The regenerative nature of biofortification means that naturally fortified crops are eminently cost-effective.

Supplementation and fortification programmes also build on ongoing health initiatives and economic activity. From its earliest days, vitamin A supplementation has been an easy and valued addition to health outreach campaigns. Iodization and other forms of food fortification require relatively minor changes to the food production process. Zinc supplements can readily be integrated into existing health-care provision and practice. The newest multiple micronutrient powders for in-home use are a straightforward addition to public health programmes and daily household food preparation routines. Lastly, biofortified crops show great promise in reducing vitamin and mineral deficiencies through the agricultural sector.

The Copenhagen Consensus Agrees

The Copenhagen Consensus is a formidable intellectual resource in the search for solutions to the global challenges of the new millennium. It commissions and reviews research to identify the most cost-effective solutions to the world's biggest challenges.

The goal of the Copenhagen Consensus was to set priorities among a series of proposals for confronting 10 great global challenges: air pollution, conflicts, diseases, education, global warming, malnutrition and hunger, sanitation and water, subsidies and trade barriers, terrorism, women and development.

In May of 2008, a panel of eight of the world's most distinguished economists (including five Nobel laureates), was invited to consider these issues. The panel was asked to address the 10 challenge areas and to answer the question:

What would be the best ways of advancing global welfare, and particularly the welfare of the developing countries, illustrated by supposing that an additional US\$ 75 billion of resources were at their disposal over a four-year initial period?

Table 4. Copenhagen Consensus 2008: results

| RANK | SOLUTION |
|------|--|
| 1 | Micronutrient supplements for children (vitamin A and zinc) |
| 2 | The Doha development agenda |
| 3 | Micronutrient fortification |
| 4 | Expanded immunization coverage for children |
| 5 | Biofortification |
| 6 | Deworming and other nutrition programmes at school |
| 7 | Lowering the price of schooling |
| 8 | Increase and improve girls' schooling |
| 9 | Community-based nutrition promotion |
| 10 | Provide support for women's reproductive role |

The panel determined that vitamin A and zinc supplementation for children provided the very best return on investment in global development.

Micronutrient fortification – in the form of salt iodization and flour fortification – ranked third out of a list of more than 30 options. Biofortification ranked a close fifth.

Globally, an annual investment of US\$ 60 million in vitamin A and zinc supplementation combined would yield benefits of more than US\$ 1 billion per year, with every dollar spent generating benefits of more than US\$ 17.⁹⁰ Every dollar spent on salt iodization and flour fortification would result in benefits of more than US\$ 9.⁹¹

The research presented to the panel demonstrated that an annual investment in micronutrient programming of US\$ 1.2 billion over five years would result in annual benefits of US\$ 15.3 billion, representing better health, fewer deaths and increased future earnings.

Vitamin A

Supplementation of children with vitamin A shared, along with zinc supplementation, the highest ranking by the Copenhagen Consensus for the best global return on investment. It is a highly cost-effective intervention for helping prevent illness and death among children.

Vitamin A supplementation is inexpensive on a per-child basis. The cost of the capsule itself is approximately two cents.⁹² The total cost of supplementing each child with two doses per year varies by region and by degree of existing



A young mother holds her son as he receives his first dose of vitamin A from a woman health worker in Myanmar. Efforts are underway to ensure that 90% of children in the country receive regular, high-dose vitamin A supplements during their first five years of life. © UNICEF/NYHQ2005-1632/Thame

coverage, and can be reduced by combining supplementation with other programmes. Recent estimates suggest a total cost of US\$ 1.20 per child per year for South Asia and sub-Saharan Africa (with significantly higher costs for Central Asia and Latin America).⁹³

These cost estimates are based on large-scale national programmes serving the majority of the population. Intensified efforts needed to access those not reached by such mainstream programmes generally cost more per child, but these are often the most vulnerable children who will benefit the most from vitamin A.

Measured against the result of saved lives, the cost of vitamin A supplementation is impressive. The estimated costs per death averted range from US\$ 64–500 depending on the county.⁹⁴ When considered against the result of healthy years of life gained, some estimates show the cost per DALY saved as US\$ 9.⁹⁵

Zinc

As endorsement by the Copenhagen Consensus panel indicates, zinc supplementation is quickly proving itself to be a very cost-effective method of fighting diarrhoeal disease.

The cost per zinc tablet and treatment is low. The tablets cost just two cents each, meaning that for the course of a 10–14 day treatment, the tablet cost is 20–28 cents. With the additional distribution and administration costs added, the cost of zinc supplementation as an incremental cost of diarrhoeal management is approximately 47 cents.⁹⁶ In the case of diarrhoeal management, the estimated average cost per death averted is US\$ 2,100 and the cost per DALY saved is US\$ 73.⁹⁷

At this incremental cost, a five-year investment of US\$ 58 million could extend therapeutic zinc supplementation coverage to 80% of 6–12 month old children in South Asia and sub-Saharan Africa – providing 58 million children with a highly effective weapon to mitigate the effects of diarrhoeal disease in their lives.⁹⁸



A hand holds a packet of iron and folic acid tablets, a pre-natal supplement, at the Reynaldo Gutierrez laboratory in Havana, Cuba.

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Iron

Iron fortification shared third place with salt iodization in the ranking of the Copenhagen Consensus. The cost for fortification of wheat or maize flour is approximately 12 cents per person per year.⁹⁹ The iron compound itself accounts for a very small portion of this, with the processing and capital costs accounting for the balance.

Despite a significant expansion of flour fortification in previous years, it was estimated in 2007 that approximately 27% of flour from large mills was being fortified.¹⁰⁰ Because of this, flour fortification offers a phenomenal opportunity for investment in building productive capacity within nations.

Supplementation of pregnant women with iron is another cost-effective intervention that costs as little as US\$ 66–115 per DALY saved in high mortality regions of Southeast Asia and sub-Saharan Africa.¹⁰¹ The cost per pregnant woman is estimated to be US\$ 10–50 per year, including all costs of promotion and distribution.¹⁰²

Disability-adjusted life year (DALY)

DALY is a measure of disease burden designed to quantify the impact of premature death and disability by combining them into a single, comparable measure. One DALY can be thought of as one lost year of "healthy" life.

Think of the sum of these DALYs across the population as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.



A community health worker in rural Myanmar demonstrates how table salt turns purple when a drop of a testing solution is added, indicating the presence of sufficient iodine to prevent iodine deficiency disorders (IDD). Salt iodization costs a mere five cents per child per year. © UNICEF/NYHQ2004-1337/Noorani

Iodine

Salt iodization has been a major international success, reaping great benefits for the intellectual health of nations that have embraced it. While several regions have held back progress toward the goal of universal salt iodization, the investment required to close the gap within five years and put these regions on track is relatively small.

Each dollar invested in salt iodization returns US\$ 30 in benefits.

With the cost of iodization a mere five cents per child per year,¹⁰³ it is estimated that an annual investment of US\$ 19 million alone could increase iodized salt coverage to 80% from 51% in South Asia, 64% in sub-Saharan Africa and 50% in Central and Eastern Europe and the former Soviet Union.¹⁰⁴ This investment would benefit 380 million people.¹⁰⁵ The value of resulting benefits in terms of better health and increased future earnings is estimated at US\$ 570 million.¹⁰⁶ Thus, each dollar invested returns thirty dollars in benefits.

Biofortification

Although biofortification efforts are relatively new, they are already producing promising results in terms of improved household vitamin intake and reduced deficiencies. It is estimated that the annual cost per crop, per country, ranges from US\$ 500,000-1,000,000.¹⁰⁷ The cost per DALY saved ranges from US\$ 10-120.¹⁰⁸

Home Fortification

Studies on the effect of multiple micronutrient powders for in-home fortification of foods suggest great health and economic gains for users. The effects were most notable in low-income countries with high rates of infant mortality, anaemia and diarrhoea.

Estimates show the cost per death averted to be US\$ 406, and the cost per DALY saved to be US\$ 12-20.¹⁰⁹ Because of the effect of the iron supplementation on anaemia and the resulting higher cognitive functioning, the gain in earnings for each dollar spent on the multiple micronutrient powder programme is estimated to be US\$ 37.¹¹⁰

Table 5. Cost-effectiveness data for a range of micronutrient interventions

| INTERVENTION | REGION | COST/PERSON /YEAR (US\$) | BENEFIT: COST RATIO |
|----------------------------------|---|--------------------------|---------------------|
| Vitamin A Supplementation | South Asia, Sub-Saharan Africa, East Asia | \$1.20 | 17:1 |
| | Central Asia | \$1.60 | <13:1 |
| | Latin America and the Caribbean | \$2.60 | <8:1 |
| Zinc Supplementation | South Asia, Sub-Saharan Africa, East Asia | \$1.00 | 13.7:1 |
| | Central Asia | \$1.35 | <10:1 |
| | Latin America and the Caribbean | \$2.20 | <6:1 |
| Salt Iodization | | \$0.05 | 30:1 |
| Flour Fortification | | \$0.12 | 8:1 |

Source: Copenhagen Consensus best practices paper on Micronutrient supplements for child survival (Vitamin A and Zinc), Horton et al., 2008; and Copenhagen Consensus best practices paper on Food fortification (Iron and Iodine). Horton et al., in press.