

Undernutrition and the Health of Children in Low- and Middle-Income Countries: Nutritional Challenges Remain, But They Can Be Addressed¹

Richard Skolnik, M.P.A.

Shireen was a one-year-old from Dhaka, Bangladesh. She weighed only 1,800 grams at birth (~~four~~ pounds), significantly below the 2,500 grams (5.5 pounds) considered to be “low birthweight.” In addition, after she finished exclusively breastfeeding, her family lacked the income needed to provide her with sufficient protein and energy. ~~Moreover~~, Shireen was ill repeatedly with respiratory infections and diarrhea and ~~was~~ now hospitalized with pneumonia. Despite the best efforts of the hospital, Shireen died after ~~two~~ days there.

Sarah is an 18-month-old child who lives in rural Kenya. Sarah’s mother did not know that she should exclusively breastfeed her daughter for six months. Thus, along with breast milk, she regularly gave Sarah sugary water and other food when Sarah was an infant. In addition, only a few foods are available in the local market and Sarah’s family has not been able to feed Sarah a diverse diet. Sarah is about 60~~percent~~ of the normal weight for a child her age. She is only 20~~percent~~ of the normal height for children her age. If Sarah does not get better nutrition soon, she will be permanently stunted physically and may also suffer permanent cognitive impairment.

Rafael is an ~~eight~~-year-old living in the Ecuadorian ~~h~~ighlands. Iron-deficiency anemia affects almost one in three people from these areas. However, a micronutrient fortification program has helped Rafael to have an adequate iron intake. This program is based on the fortification of wheat flour, which is a staple of the diet of the ~~h~~ighland people. Rafael has not suffered from anemia. Rather, he has been healthy and energetic enough to attend school regularly and do his best while there.¹²

Maria is from a poor family that lives in a small town in northern Brazil. In the past, many of the poor children in this area were poorly nourished, chronically underweight, and

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stunted. Especially in the last two decades, however, the government of Brazil has implemented a series of programs to improve childhood nutrition and related physical and cognitive growth. Poor families have received cash supplements for ensuring, for example, that their children got well-baby checkups and preventive health services such as vaccines. In addition, Brazil has enhanced its programs for food and micronutrient supplementation for young children.^{3 4}

The Importance of Nutrition to Child Health

The children in the vignettes above are not “real.” Their stories, however, *are* real and affect millions of children in the world daily.

In fact, nutritional status is an exceptionally important determinant of the life prospects of young children. It has been estimated, for example, that all forms of undernutrition caused about 45,percent of the almost 6.8 million under-five child deaths in 2011.⁵ As shown in the table below, the most important nutrition-related risk factors for young child death are childhood underweight, suboptimal breastfeeding, and deficiencies in vitamin A, zinc, and iron.⁶ Such nutritional risks are especially important in South Asia, Sub-Saharan Africa, among indigenous communities in Central and Latin America, and among pockets of the poor and marginalized throughout low- and middle-income countries.

Table 1: Top 10 Risk Factors for Young Child Death, 2010⁷

Global	Sub-Saharan Africa	South Asia
1. Childhood underweight	1. Childhood underweight	1. Childhood underweight
2. Household air pollution	2. Household air pollution	2. Household air pollution
3. Vitamin A deficiency	3. Vitamin A deficiency	3. Zinc deficiency
4. Zinc deficiency	4. Zinc deficiency	4. Vitamin A deficiency
5. Sanitation	5. Sanitation	5. Ambient particulate matter pollution
6. Ambient particulate matter pollution	6. Unimproved water	6. Sanitation
7. Smoking	7. Ambient particulate matter pollution	7. Suboptimal breastfeeding
8. Suboptimal breastfeeding	8. Suboptimal breastfeeding	8. Smoking
9. Unimproved water	9. Smoking	9. Unimproved water

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10. Iron deficiency	10. Iron deficiency	10. Iron deficiency
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Given the importance of nutrition to child wellbeing, it important to understand the nutritional state of the world's young children, the factors that determine their nutritional status, and how these needs might be addressed as rapidly as possible, and at least cost.

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Undernutrition

Despite some progress, the nutritional status of the world's under-five children is abominable by any of the common measures that are used to gauge it: birthweight, weight-for-age, weight-for-height, and height-for-age.

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Table 2: Key Terms and Definitions^{8 9}

Low birthweight	Birthweight less than 2,500 grams.
Micronutrient	Essential vitamins and minerals required in small quantities. These include vitamin A, zinc, iron, and iodine.
Stunting	Failure to reach linear growth potential because of inadequate nutrition or poor health. Stunting is measured as height-for-age two z-scores below the international reference.
Underweight	Low weight-for-age; that is, two z-scores below the international reference for weight-for-age. It implies stunting or wasting and is an indicator of undernutrition.
Wasting	Weight, measured in kilograms, divided by height in meters squared, that is two z-scores below the international reference.

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Birthweight is a powerful indicator of whether the child will thrive or not and we want all children to be born above 2,500 grams (5.5 pounds). Yet, it has been estimated that 27 percent of all the babies born in low- and middle-income countries are small for their gestational age.¹⁰ We also want all children to have a "healthy weight" for their age. Yet, almost 17 percent of children under five globally are underweight for their age.¹¹ We want all children to have an appropriate weight for their height. Yet, eight percent are wasted.¹² In addition, height-for-age is an important indicator of how children are growing, both physically and mentally. Yet, 26 percent of children globally are stunted, including about 36 percent of children in Oceania and Sub-Saharan Africa.

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In addition, many children in low- and middle-income countries suffer from significant deficiencies in key vitamins and minerals, known as “micronutrients.” The most important of these, in terms of their impact on healthy child growth and development, are vitamin A, zinc, iron, and iodine. It is estimated that:

- About 18 percent of children globally suffer from iron deficiency anemia.
- About 17 percent of all people globally are deficient in zinc, and
- About one percent of children suffer from night blindness due to a lack of vitamin A and about one-third of all children suffer from subclinical vitamin A deficiency.¹³
- It has also been estimated that about 20 million children a year are born with cognitive impairment due to iodine deficiency and that about one-third of all school age children are deficient in iodine.¹⁴

Those who are not familiar with the nutrition field might think that children are “normally” much smaller in some settings than others. If they visit the highlands of South America, or meet indigenous people from Central America or the Andes, they may be shocked by how short many people are, but they often believe this is just “normal.” It is not. Rather, if mothers were healthy and well nourished at birth, children were breastfed exclusively for six months and then fed a diverse and healthy diet, and children were kept free from infection, they would be of similar stature across populations. In fact, the World Health Organization has established global standards against which the growth of children is measured.¹⁵ We must get as many children as possible up to those standards.

The Consequences of Undernutrition and Micronutrient Deficiency

The consequences of undernutrition and micronutrient deficiencies can be severe and irreversible.¹⁶ A child who is chronically undernourished, for example, is likely to be stunted or

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“much too short for their age.” Generally, however, it is not just their body that is stunted. Chronic undernutrition also limits cognitive development. Until recently, it was thought that both physical and cognitive stunting that occurred by two years of age were irreversible. Evidence is emerging, however, that young children whose nutritional status improves after their second year may overcome some of these cognitive deficits.¹⁷ This highlights both the importance of focusing on the child under two, but also continuing to pay careful attention to children’s nutritional needs after two years of age, especially those of children at risk.

Most of us learned in school that a lack of iron can make one anemic and the lack of iodine can give you goiter and reduce your mental capacities. We also learned that vitamin A was important for good vision. However, most of us did not learn how important vitamin A and zinc are to general immunity. To a large extent, the young child deaths that are attributed to undernutrition often stem from suboptimal breastfeeding in their first six months, chronic undernutrition, and the lack of vitamin A and zinc. To put it simply, if these children were not undernourished, they would, among other things, get less diarrhea and pneumonia, get sick less from malaria, diarrhea, measles, and pneumonia, and about three million of the almost seven million children under five years of age who die every year would live instead.¹⁸

These nutritional deficits have enormous consequences on the future prospects of every child. Children who are undernourished, for example, will enroll in school less, attend school less, perform worse in school, be less productive in the work force, and earn less as adults than those who were better nourished as children.^{19 20}

The Determinants of Nutritional Status

The determinants of the nutritional status of young children are complex. However, UNICEF has a framework that can help us understand them. The framework focuses on:

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- **Causes**, such as food availability and utilization, disease prevention, and the quality of maternal and child care;
- **Underlying Causes**, including inadequate access to food, public health services and the environment, and inadequate care for women and children; **and**
- **Basic Causes**, such as inadequate education, resources and control, and political and economic factors and structures.²¹

It is easy to believe that the nutritional status of a child is dependent on family income and how much food they can buy with that money. This notion, however, is not correct. Rather, that status depends on a variety of factors that concern the underlying social and political environment, the health of the mother and child, how the family cares for the child, and the availability and accessibility of food, as UNICEF suggests.

Moreover, the nutritional status of children in many countries today is constrained by governments that may be controlled by elites, who act mainly in their own interest and do not prioritize investing in the health and education of their young. A government that discriminates or allows discrimination against women or other groups will also harm the nutritional status of its children. Constraints to free expression may also hurt nutrition, as would poor economic policies that fail to help people uplift themselves. As the Nobel Laureate Amartya Sen said, “No famine ... has ever taken place in a functioning democracy.”²²

Good health of the mother is also critical to the health of the child. Birthweight is a key indicator of child survival and unhealthy mothers are much more likely than healthy mothers to give birth to low birthweight children. It is also important that births be attended by skilled birth attendants, preferably in a hospital, so that the mother and child can avoid birth complications.

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Parents also need to know how to care for their child appropriately and to put into practice good caring behaviors. Ideally, they will know, among other things, how to keep the young child healthy, the importance of breastfeeding exclusively for six months, and how essential it is to introduce complimentary foods that are hygienic and diverse.

Of course, availability of food and access to it is also essential. This depends on food markets and food distribution and storage systems that work and that include the makings of a diverse and healthy diet. In addition, families have to be able to afford to buy healthy foods or have access to programs that can assist them in making up food deficits.

There is also an important link between infection and nutrition. Infection makes it harder for children to absorb the food they eat; undernutrition heightens the risk to children of becoming infected. Thus, immunization and access to safe water and sanitation are central to ensuring that children can be well nourished. It is also important for the health system to provide early diagnosis and treatment of pneumonia, diarrhea, and malaria, among other key burdens of disease for young children.

Moreover, it is essential to understand that the first 1,000 days of a child's life, starting from conception, are especially important to the eventual nutritional status and wellbeing of the child. Those working in international nutrition have called this period the "window of opportunity."²³ As noted earlier, missed opportunities for successful child growth and nutrition during that period are very difficult to recover from.

These determinants of nutrition play out in different ways in different places and some interesting challenges have emerged in some places — particularly India — in understanding what has driven such high rates of childhood stunting for so long.

Sidebar: Why Are So Many Children in India Stunted?

Introduction

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India has one of the highest rates of undernutrition in the world. Stunting affects 61 million Indian children or 48, percent of all Indian children under five years of age. India alone accounts for almost one in three stunted children worldwide.²⁴

In recent years, India has enjoyed strong economic growth and reduced poverty. Although poverty is a key determinant for child undernutrition, India's economic gains have not translated into improved child nutrition.²⁵ Remarkably, even one-third of the children from India's richest families are stunted.²⁶

Perhaps surprisingly, as well, children born in India are more likely to be stunted than children born in Sub-Saharan Africa, despite the fact that India is wealthier and has better development indicators, including life expectancy, education, and infant mortality.²⁷ This paradox has been called the "South Asian enigma."

Researchers have sought to explain the South Asian enigma for the past two decades. Three potential causes of India's disproportionate stunting include the status of women, poor sanitation, and cultural preferences for the firstborn son, as discussed below.

The Status of Women

Vulimiri Ramalingaswami, Urban Jonsson, and Jon Rohde suggested in an important piece in 1996 that the South Asian enigma can be attributed to the low status of women in South Asian society. The authors argued that the particularly low status of women in South Asian society might impede mothers from optimally caring for their children. The authors noted that, "However much a mother may love her children, it is all but impossible for her to provide high-quality child care if she herself is poor and oppressed, illiterate and uninformed, anemic and unhealthy, has five or six other children, lives in a slum or shanty, has neither clean water nor safe sanitation, and if she is without the necessary support either from health services, or from

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her society, or from the father of her children. We are therefore talking as much about care of the mother as care by the mother.”²⁸

For instance, low birthweight, which is the best predictor for undernutrition throughout infancy and childhood, affects one-third of Indian babies but just one-sixth of ~~Sub~~-Saharan African babies. Low birthweight reflects the nutritional status of the mother during not just her pregnancy, but also her infancy, childhood, and adolescence. The authors therefore argued that the low birthweight of Indian babies and the resulting undernutrition of Indian children ~~could~~ be at least partially attributed to the low status of women in Indian society.²⁹

Sanitation

Sanitation in India is remarkably poor. Half of India’s population defecates outdoors, compared to just ~~one percent~~ of people in China and ~~four percent~~ in Bangladesh.³⁰ In addition, no Indian city has a comprehensive system for the disposal of human waste and half of Indian households drink from contaminated water supplies.^{31 32} As a result, Indian children are frequently exposed to infections and disease. This inhibits nutrient absorption, decreases appetite, and results in nutrient loss through vomiting and diarrhea. Furthermore, precious energy is spent on combatting infection, rather than on growth and development.³³

Not surprisingly, therefore, commentators on undernutrition in India have also suggested for many years that there is an important link between poor sanitation and undernutrition. Recently, however, important research has suggested that the lack of clean water, sanitary disposal of human waste, and poor hygiene explains most of India’s undernutrition because of its links with infection.³⁴

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Another new study, however, suggests that the high prevalence of stunting in India can be explained by the cultural emphasis on the firstborn son. This study found that firstborn sons in India are less stunted than firstborn sons in Sub-Saharan Africa. It also found that the disproportionate stunting of Indian children begins only with the second-born child.³⁵

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Moreover, this research indicated that firstborn sons often enjoy higher diet quality and better medical care than their siblings. It also showed that if the mother is potentially pregnant with the eldest son, families often shower resources on the care of the mother, such as nutritious foods and medical care.³⁶

The study also indicated that once the “male heir” has been born, parental investments decline for each subsequent child. The study concluded that as a result of this unequal allocation of resources, girls and younger siblings are deprived of the resources needed to reach their full growth potential.³⁷

Equity and the Nutritional Status of Young Children

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Although income and location status are only two among many determinants of health, nutritional status of young children still varies largely by location, family income, and by sex of the child. In Latin America and the Caribbean, for example, rural children have a rate of stunting more than twice that of urban children. In South Asia, the children from the poorest 20percent of families have a rate of stunting more than three times as high as the children from the richest 20percent of families.³⁸

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Addressing Nutrition Challenges

In the long run, economic development will reduce undernutrition and preventable child deaths. However, getting to that point could take many years and many young children will

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needlessly die in the interim. Thus, it is critical to make nutrition central now to every development agenda and every agenda for enhancing the lives young children.

Sadly, there have been major challenges to enhancing the nutritional status of young children in many low- and middle-income countries. First, nutrition often is an “institutional orphan” in many countries; no single ministry or agency is in charge of nutrition and the country is unable to think or act strategically about nutrition. As a result, they frequently fail to implement either direct nutrition interventions or “nutrition-sensitive” interventions, as they need to do if they are to address their problem of undernutrition. Second, there have been substantial gaps in country understanding of the centrality of nutrition to good child health. Parents may accept stunting, for example, as “normal” if they do not know or realize that it is not. Third, even countries that have engaged in sound nutrition efforts may not yet have taken them to the scale needed.

This is all the more regrettable, since there is a known set of interventions that are low-cost and highly effective that can improve the nutritional status of young children. Evidence suggests for example, that fortification programs can cost as little as three to five cents for each person reached.³⁹ In addition, a group of international economists have rated the benefit-cost ratio of trying to reduce undernutrition and micronutrient deficiencies as exceptionally high.⁴⁰ There is also increasing evidence of how such interventions can be put in place.

In fact, UNICEF, WHO, and a nutrition series in *The Lancet* have a set of direct nutrition interventions for young children. These include, for example:

- Micronutrient supplementation and enhanced nutrition of pregnant and lactating women;
- Delivery with a skilled attendant;

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- Promotion of early and exclusive breastfeeding for six months;
- Supplementation with vitamin A;
- Supplementation with zinc during bouts of diarrhea; and
- Safe introduction of complementary foods, fortified foods, and a diversified diet, with continued breastfeeding ⁴¹

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Some countries or regions of countries have made substantial progress in addressing important parts of the undernutrition agenda. The state of Tamil Nadu in India used a community-based growth monitoring and promotion scheme to substantially reduce underweight in young children.⁴² Many countries have made excellent progress in reducing vitamin A deficiency by providing vitamin A supplements along with polio vaccination. Despite its poverty and weaknesses in governance, Nepal has been a leader in reducing vitamin A deficiency. Many countries have also made good progress in promoting the use of zinc with oral rehydration solution to reduce the severity of diarrhea.

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Several countries have also made important progress in reducing stunting, underweight, wasting, and low birthweight. As mentioned in one of the opening vignettes, Brazil, for example, significantly reduced child undernutrition through strong political will and strategic investment in policies and programs to improve access to social services.⁴³ Under-five stunting fell from 37.1 percent in 1974 to 7.1 percent in 2007 and undernutrition among children between one and two years of age decreased from 20 percent to five percent. As importantly, Brazil dramatically reduced the nutritional gaps between their better-off and less well-off children over this period.⁴⁴ In addition, less than two percent of children currently suffer from wasting. Bangladesh, Malaysia, Mauritania, Indonesia, and Vietnam, have also experienced substantial reductions in the prevalence of moderate and severely underweight children under five years of age.⁴⁵

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Peru also experienced dramatic improvements in stunting →, particularly in rural areas → through a policy reform integrating nutrition into social protection strategies. Linked to this, under-five stunting dropped from 22.9, percent in 2005 to 17.9, percent in 2010, a 22, percent reduction. Notably, reductions in poor rural areas were greater than the national average.⁴⁶

WHO and UNICEF have also well articulated the importance of keeping young children healthy in order to enhance their nutritional intake through well, baby care, immunization, and early diagnosis and treatment of the most important health conditions that affect children in each locale.

With the help of the GAVI, Alliance, many countries have also made progress in reducing vaccine, preventable diseases, although large pockets of children who are not fully immunized remain in some countries.⁴⁷ There has also been especially good progress in some countries, such as Rwanda, in reducing the toll of malaria on young children.⁴⁸

In the coming months, the world will announce a comprehensive framework for nutrition that will articulate measures that countries can take to carry out development in a nutrition, sensitive way that enables better availability of food and access to it, particularly for the poor, the uneducated, and the rural. Some of the most important and value, adding suggestions of the framework will probably include: ▼

- Strengthening institutional arrangements for nutrition within countries,
- Revising policies that affect food security,
- Promoting dietary diversity and quality,
- Providing incentives for healthy dietary choices,
- Providing community-related social protection programs,
- Building nutrition into everything, and

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- Providing additional money for nutrition.⁵⁰

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In line with the above approach, an increasing number of countries are engaging in multisectoral planning for nutrition-related activities. On this front, we are learning that some of the most successful large-scale efforts to date to address undernutrition and its underlying determinants have been based on:

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- An institutional base of importance and authority for nutrition, such as in the presidency;
- Nutrition goals that were articulated at the highest levels of government;
- Strategic plans that were multisectoral and included both direct nutrition interventions and nutrition-sensitive interventions;
- Individual agencies working on the principle of convergence – each had their own discrete set of actions to be carried out in the same nutritionally vulnerable targeted districts;
- The provision of incentives on the supply side to the providers of services to encourage them to meet clearly specific impact and outcome objectives;
- The provision of incentives in some settings, as well, to the beneficiaries to stimulate demand for the programs; and
- Advocacy for the programs by civil society.⁵¹

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To put it simply, these programs worked on the principles of: “plan multisectorally, implement sectorally, and review multisectorally,” rather than try to carry out or evaluate a diverse set of actions in a “coordinated” manner.⁵²

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Moving Nutrition Forward

Despite important progress in some countries, we still live in a world in which around three million deaths a year occur in children under five years of age due to nutrition-related causes. This is more than 8,200 children each day who die of such causes. There are children who die of hunger. However, the overwhelming majority of children who die of nutrition-related causes, as described in this piece, die as a result of chronic undernutrition or because of deficiencies in vitamin A or zinc. These predispose them to illness, to more severe illness than would otherwise be the case, or to death. This is despite known and cost-effective ways to address these problems.

Nothing can be more central to the health of young children than their nutritional status, starting at conception. Yet, many countries fail to realize this or to act on it. Those who care about the health of children, especially the world's most vulnerable children in low- and middle-income countries, must take steps to make nutrition front and center on the development agenda.

Without faster progress in reducing childhood undernutrition, there is no chance that the world can meet its goals on improving child health and education or ensure that children everywhere have an increasing chance to reach their full potential and "be all that they can be."

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