

Review Article

Malnutrition - The Persisting Global Threat Due To Food Insecurity

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ABSTRACT

Malnutrition is an underlying cause of death of approximately one-third of the global total of children's deaths every year. Globally, an estimated 52 million children under-five years of age, or 8%, were wasted in 2011. Seventy percent of the world's wasted children live in Asia, most in South-Central Asia. These children are at substantial increased risk of severe acute malnutrition and death. One of the targets of the first Millennium Development Goal (MDG) is to reduce the proportion of people who suffer from hunger by half between 1990 and 2015, with hunger measured as the proportion of the population who are undernourished and the prevalence of children under five who are underweight. Many countries remain far from reaching this target, and much of the progress made has been eroded by the recent global food price and economic crises. As we enter the final five years to achieve the MDGs, we look upon one of the greatest challenges of our time with one billion people hungry, 129 million and 195 million children underweight and stunted respectively and more than 2 billion people deficient in micronutrients. Reducing child malnutrition requires nutritious food, breastfeeding, improved hygiene, health services, and prenatal care. Poverty and food insecurity seriously constrain accessibility of nutritious diets, including high protein quality, adequate micronutrient content and bioavailability, macro-minerals and essential fatty acids, low anti-nutrient content, and high nutrient density

Keywords: Malnutrition, Underweight, Stunted, Poverty, Food Insecurity

INTRODUCTION

"We have the means, we have the capacity, to eliminate hunger from the face of the earth in our lifetime. We need only the will."
-- John F. Kennedy, 1963

Malnutrition has been the most serious global challenge since the early 70's whose prevention appears to be problematic from then to this century even after the introduction of several nutritional intervention programmes in the various parts of the globe. Two form of malnutrition,

mainly Undernutrition and Overnutrition have been persisting since many years even after undertaking several measures. Undernutrition contributes to more than one-third of all deaths in children under the age of five. In 2011, it was reported that globally, 165 million children were stunted, 101 million underweight and 52 million wasted, all belonging to the under five category.^[1] Although, the basic magnitude of this problem is well known and widely agreed upon; the fact that poverty,

malnutrition and food insecurity share complex relationships with one another is less appreciated. Malnutrition and poverty can have non-food determinants and manifestations but food insecurity has proven to be an essential subset of overall poverty and of nutrition insecurity. Food insecurity and malnutrition represent serious impediments to sustainable agriculture, poverty reduction and equity.

Stunting and emaciation, major forms of undernutrition reduce a child's chance of survival, while also hindering optimal health and growth. Stunting is associated with suboptimal brain development, which is likely to have long-lasting harmful health consequences for cognitive ability, school performance and as a result leads to low future earnings. This in turn affects the development potential of nations.^[2,3] A stunted child enters adulthood with greater propensity for developing obesity and other chronic diseases. With increasing urbanization and shift in lifestyle and dietary patterns, the result could be a burgeoning epidemic of such conditions in many low and middle income countries. With the upcoming new evidences, a more strong understanding of the short and long-term consequences of undernutrition has been learned. There is even stronger chances that undernutrition can trap children and families as a result communities and nations in an interrelated cycle of poor nutrition, illness and poverty.^[4]

In May 2012, The World Health Assembly, the decision making body of World Health Organisation (WHO), agreed on a new target: reducing the number of stunted children under the age of five by 40 per cent by 2015.^[5] The United Nations Secretary-General has included elimination of stunting as a goal in his Zero Hunger Challenge, launched in June 2012.^[5] This emphasis on stunting has led to a review of national programmes and strategies to

increase the focus on prevention and integrated programmes.

With the initiation of SUN movement in 2010, there has been a major shift in the global nutrition landscape. The SUN movement seeks to build national commitment to accelerate progress to reduce stunting and other forms of undernutrition as well as overweight. More than 30 countries in Africa, Asia and Latin America have joined SUN. They are expanding their nutrition programmes, supported by donor countries, United Nations organizations, civil society and private sector. It assists nations in meeting obligations to ensure fulfillment of their citizens' right to food.^[4] As initially codified in the Universal Declaration of Human Rights and reaffirmed by the International Covenant on Economic, Social and Cultural Rights, the right to food is a fundamental human right. Through SUN, countries are working to increase access to affordable and nutritious food, as well as demand for it. They are also addressing the other factors that determine nutritional status, such as improved feeding and care practices, clean water, sanitation, health care, social protection and initiatives to empower women.

Major causes of Malnutrition- Food and Nutritional insecurity

Nutritional status is influenced by three broad factors: food, health and care. Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and good hygienic practices. These factors directly influence nutrient intake and the presence of disease.^[6] Food, health and care are affected by social, economic and political factors. The combination and relative importance of these factors differ from country to country. Understanding the immediate and

underlying causes of undernutrition in a given context is critical to delivering appropriate, effective and sustainable solutions and adequately meeting the needs of the most vulnerable people.^[7]

The immediate causes of undernutrition are inadequate dietary intake and Diseases.^[3] Inadequate dietary intake is in turn due to the household food security and inadequate care and feeding practices while Disease arise as a result of unhealthy household environment and inadequate health services. The major contribution is by the inadequate dietary intake whose basic cause lies in poor access to adequate quantity and quality of resources like land, education, employment, income and technology which may be due to inadequate financial, human, physical and social capital.

Food insecurity and malnutrition represents serious impediments to sustainable developments, poverty reduction, equity and achievement of the Millennium Development Goals. Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.^[8] Food security has four dimensions: food availability, access to food, stability of supply and access, and safe and healthy food utilization. Stability depends on food production, incomes, markets and transfer programmes (both public and private) and can be adversely affected by shocks due to weather, price fluctuations, human induced disasters and political and economic factors. Utilization refers to the proper use of food and includes the existence of appropriate food processing and storage practices, adequate knowledge and application of nutrition and child care and adequate health and sanitation services. Food security is a key factor in good nutrition, together with health, sanitation and care practices.^[9]

A similar definition was given for food security but adds a psychological dimension in terms of the absence of feelings of deprivation, restricted choice, or anxiety related to the quantity or quality of available food.^[10] A striking feature of these definitions then is that food security is largely rationalized in terms of its contribution to improved nutrition, with an oft-ignored psychological dimension being the only major distinction. Nutrition security, however, is defined not only in terms of physical and economic access but also in terms of adequate utilization and absorption of nutrients. Nutrition security therefore depends not only on adequate food security but also on adequate care practices (food storage and preparation, appropriate feeding practices, including breastfeeding) and adequate health (including hygiene and sanitation).

It is reported that Global crop production has expanded threefold over the past 50 years, largely through higher yields per unit of land and crop intensification. Global per capita food supply rose from about 2 200 kcal/day in the early 1960s to over 2 800 kcal/day by 2009. At 3 370 kcal/person/day, Europe currently has the highest average per capita food supply. Cereals occupy more than half of the world's harvested area and are the most important food source for human consumption. Of the 2.3 billion tonnes of cereals produced each year, 1 billion are destined for human consumption, 750 million tonnes are used as animal feed and 500 million tonnes are either processed by industry, used as seed, or wasted.^[8]

Food insecurity is essentially a subset of overall poverty and of nutrition insecurity, but both poverty and malnutrition can have nonfood determinants or manifestations. These complex relationships are explained in four possible cases of independence and overlap.^[11] In category 1

(C1), one's own food needs and nonfood requirements for nutrition are satisfied, but the individual is still poor (perhaps lacking access to education, for example). In C2, one's own food needs are satisfied but the individual is still poor and malnourished (perhaps lacking access to health services that are important for nutrition). In C3, an individual is food insecure and therefore both poor and nutrition insecure. And in C4 an individual is neither food insecure nor poor but malnourished.

Some authors states that temporal dimensions are factors in these issues.^[11] For any of the four categories, an individual may have adequate income, food availability, and nutrition at a given point of time but be highly vulnerable to other health issues. Thus, there is a distinction between chronic and acute forms of ill-being, or between current states and vulnerability to more adverse states. In nutrition, there are also long-standing distinctions between chronic indicators (such as height for age) and acute indicators (such as weight for height). There are many indicators used for the temporal dimensions: Underlying structural indicators include Gross domestic productivity per capita, Agricultural productivity, Governance quality, Literacy, Fertility Rates, Exposure to natural disasters and vulnerability to price hikes; Food security indicators are micro and macro nutrient availability, poverty, self reported hunger and food aid requirements and Nutrition security which includes stunting and wasting prevalence along with prevalence of underweight mothers.

While poverty, food security, and nutrition could in principle be measured at common levels of aggregation, nutrition is usually measured at the individual level, and poverty and food security are usually measured at the household level. Nutrition research has shown that lifelong physical, cognitive, and economic outcomes are

largely determined in the first 1,000 days of life.^[12] This implies that the bulk of nutritional investments should be targeted toward women and very young children. The generally positive process of economic and political development involves income growth (poverty reduction), reduced food insecurity, and improved health and childcare practices. Finally, there is a feedback loop from improved nutrition, health, and monetary outcomes into economic development. For example, nutrition and health increase labour productivity via their effect on cognitive ability and physical activity. But higher incomes can also lead to economic diversification, greater investments in education, reduced fertility rates, and even stronger demands for better governance.

Consequences of Malnutrition

There are short-term and long-term consequences of undernutrition. The short-term consequences are mortality, morbidity and disability. Stunting and other forms of undernutrition are clearly a major contributing factor to child mortality, disease and disability. Specific nutritional deficiencies such as vitamin A, iron or zinc deficiency also increase risk of death. Undernutrition can cause various diseases such as blindness due to vitamin A deficiency and neural tube defects due to folic acid deficiency. Earlier research clarified the harmful impact of inadequate intake of specific micronutrients such as iron, folic acid and iodine on development of the brain and nervous system and on subsequent school performance. The impact of iron deficiency, which reduces school performance in children and the physical capacity for work among adults, has also been well documented.^[3]

Undernutrition early in life clearly has major consequences for future educational, income and productivity outcomes. Stunting is associated with poor

school achievement and poor school performance. Recent longitudinal studies among cohorts of children from Brazil, Guatemala, India, the Philippines and South Africa confirmed the association between stunting and a reduction in schooling, and also found that stunting was a predictor of grade failure.^[13] Reduced school attendance and educational outcomes result in diminished income-earning capacity in adulthood.^[14] It is seen that the developmental impact of stunting and other forms of undernutrition happens earlier and is greater than previously thought. Brain and nervous system development begins early in pregnancy and is largely complete by the time the child reaches the age of 2. The timing, severity and duration of nutritional deficiencies during this period affect brain development in different ways, influenced by the brain's need for a given nutrient at a specific time. While the developing brain has the capacity for repair, it is also highly vulnerable, and nutrient deficiencies during critical periods have long-term effects.^[15]

This new knowledge, together with the evidence that the irreversible process of stunting happens early in life, has led to a shift in programming focus. Previously the emphasis was on children under age 5, while now it is increasingly on the 1,000-day period up to age 2, including pregnancy. Improvements in nutrition after age 2 do not usually lead to recovery of lost potential.

A consequence that is also emerging more clearly is the impact of stunting and subsequent disproportionate and rapid weight gain on health later in life. These long-term effects are referred to as the Foetal Programming Concept: Poor foetal growth, small size at birth and continued poor growth in early life followed by rapid weight gain later in childhood raises the risk of coronary heart disease, stroke, hypertension and type II diabetes. Attaining optimal growth before 24 months of age is

desirable; becoming stunted but then gaining weight disproportionately after 24 months is likely to increase the risk of becoming overweight and developing other health problems.^[16]

Current Global Nutrition Status

Almost 870 million people, or 12.5 percent of the world's population, were undernourished in 2010-2012; the vast majority of them (852 million) live in developing countries. Between 2005 and 2011, one out of four African countries reported a stunting rate of at least 40 percent. Stunting rates also exceeded 40 percent in South and South East Asia during the same period, with peaks in India, the Lao People's Democratic Republic, Nepal and Timor-Leste. African countries show the highest rates of underweight prevalence. During 2005-2011, 16 African countries showed underweight rates of at least 20 percent, with the highest levels recorded in Africa.^[8] With the increased urbanization along with the reduction of undernutrition, an increase in the population of overweight in the world has also been observed. Different forms of malnutrition have been discussed below.

Stunting- Globally an approximate of 165 million children (26%) under the age of five were stunted in 2011. But this burden is not equally distributed around the world. Sub-Saharan (40%) and South Asia (39%) are home to three fourth of the World's stunted children. Eighty percent of the world's stunted children live in 14 countries. According to the highest population they are ranked first and they are India (36% of global burden and 48% of stunting prevalence) followed by Nigeria, Pakistan, China, Indonesia, Bangladesh, Ethiopia, Congo, Philippines, Tanzania, Egypt, Kenya, Uganda and Sudan.^[4]

The global prevalence of stunting children under the age of 5 has declined by 36 per cent over the past two decades- from

an estimated 40 per cent in 1990 to 26 per cent in 2011. An annual reduction of 2.1 per cent per year was observed. The greatest declines in stunting prevalence occurred in East Asia and the Pacific. This region experienced about a 70 per cent reduction in prevalence – from 42 per cent in 1990 to 12 per cent in 2011. This major reduction was largely due to improvements made by China. The prevalence of stunting in China decreased from more than 30 per cent in 1990 to 10 per cent in 2010. Latin America and the Caribbean reduced stunting prevalence by nearly half during this same period. The South Asia and Middle East and North Africa regions have both achieved more than a one-third reduction in stunting prevalence since 1990. However, progress in reducing stunting prevalence in sub-Saharan Africa was limited to 16 per cent, from 47 per cent in 1990 to 40 per cent in 2011. More than one third of countries in sub-Saharan Africa have very high stunting prevalence. ^[8]

Underweight - Globally an estimated 101 million children under the age 5 years (16% of child population under age 5) were underweight in 2011. Underweight prevalence is highest in South Asia, which has a rate of 33 per cent, followed by sub-Saharan Africa, at 21 per cent. South Asia has 59 million underweight children, while sub-Saharan Africa has 30 million. Globally, underweight prevalence has declined, from 25 per cent in 1990 to 16 per cent today – a 37 per cent reduction. The greatest reductions have been achieved in Central and Eastern Europe and the Commonwealth of Independent States, where prevalence has declined by 87 per cent, and in East Asia and the Pacific, where it fell 73 per cent (largely by the reductions made in China). ^[4]

Wasting - Moderate and severe wasting represents an acute form of undernutrition, and children who suffer from it face a markedly increased risk of death. Globally

in 2011, 52 million children under 5 years of age were moderately or severely wasted, an 11 per cent decrease from the estimated figure of 58 million in 1990. More than 29 million children under 5, an estimated 5 per cent, suffered from severe wasting. The highest wasting prevalence is in South Asia, where approximately one in six children (16 per cent) is moderately or severely wasted. The burden of wasting is highest in India, which has more than 25 million wasted children. This exceeds the combined burden of the next nine high-burden countries. In sub-Saharan Africa, nearly 1 in 10 children under the age of 5 (9 per cent) were wasted in 2011, a prevalence that has decreased about 10 per cent since 1990. The number of wasted children in sub-Saharan Africa as a proportion of the world's total has increased over the same period of time. Countries like South Sudan, India, Timor-Leste, Sudan, Bangladesh and Chad have a very high prevalence of wasting – above 15 per cent. The ten most affected countries are India (Highest burden estimate of 20%) followed by Nigeria, Pakistan, Indonesia, Bangladesh, China, Ethiopia, Congo, Sudan and Philippines. Worldwide, of the 80 countries with available data, 23 countries have levels of wasting greater than 10 per cent. ^[17,4]

Overweight- Overweight is an upcoming major form of malnutrition mainly due to urbanization and food insecurity (Unequal distribution of foods). Rates of overweight continue to rise across all regions. Overweight was once associated mainly with high-income countries, but in 2011, 69 per cent of the global burden of overweight children under 5 years old were in low- and middle-income countries. However, the prevalence of overweight remains higher in high-income countries (8 per cent) than in low-income countries (4 per cent). Globally, an estimated 43 million children under 5 years of age are overweight, or 7 per cent of children under 5 years old. In 2011,

approximately 10 million children in sub-Saharan Africa and 7 million in East Asia and the Pacific were overweight. Prevalence estimates have more than doubled since 1990 in sub-Saharan Africa (from 3 per cent in 1990 to 7 per cent in 2011), meaning that more than three times as many children are affected today. A similar trend in estimates of child overweight has been observed in the Middle East and North Africa region. [4]

Low Birth Weight - The World Health Assembly has set a new target to reduce low birth weight by 30 per cent between 2010 and 2025. In 2011, more than 20 million infants, an estimated 15 per cent globally, were born with low birth weight. [4] India alone accounts for one third of the global burden. South Asia has by far the greatest regional incidence of low birth weight, with one in four newborns weighing less than

2,500 grams at birth. The incidence of low birth weight exceeds 20 per cent in India, Mauritania, Nauru, Pakistan, and the Philippines, and in sub-Saharan Africa the incidence is greater than 10 per cent. More than 50 per cent of the global burden of low birth weight is attributed to 5 of the 24 countries profiled in this report. The major five countries that account for more than half of global low birth weight burden are India (7.5 million), Pakistan (1.5 million), Bangladesh (0.7million), Nigeria (0.8 million) and Philippines (0.5 million). [17]

One of the major challenges in measuring incidence of low birth weight is the fact that more than half of the world's children had not been weighed at birth. This reflects a lack of appropriate newborn care and also presents a challenge to accurately estimating low birth weight incidence.

Countries with overlapping Stunting, Wasting and Overweight In Children Under Age Five [17]

Overlap/ Indicator group	No. of Countries	Total Population (Millions)	Countries
Stunting Only	12	212	Democratic People's Republic of Korea, El Salvador, Guatemala, Honduras, Liberia, Nauru, Nicaragua, Solomon Islands, Togo, Uganda, Viet Nam, Zimbabwe
Wasting Only	6	68	Guyana, Oman, Saudi Arabia, Senegal, Sri Lanka, Suriname
Overweight only	25	603	Algeria, Argentina, Belarus, Belize, Bosnia and Herzegovina, Brazil, Chile, Costa Rica, Dominican Republic, Gabon, Georgia, Kazakhstan, Kuwait, Kyrgyzstan, Mexico, Mongolia, Montenegro, Morocco, Paraguay, Peru, Serbia, The former Yugoslav Republic of Macedonia, Tunisia, Uruguay, Uzbekistan
Stunting and Wasting only	38	2462	Bangladesh, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, India, Kenya, Lao People's Democratic Republic, Maldives, Mali, Mauritania, Myanmar, Namibia, Nepal, Niger, Nigeria, Pakistan, Philippines, Somalia, South Sudan, Sudan, Tajikistan, Timor-Leste, United Republic of Tanzania, Vanuatu, Yemen
Stunting and Overweight only	7	45	Armenia, Bolivia, Equatorial Guinea, Lesotho, Malawi, Rwanda, Swaziland
Wasting and overweight only	2	70	Republic of Moldova, Thailand
Stunting, Wasting and Overweight	17	468	Albania, Azerbaijan, Benin, Bhutan, Botswana, Comoros, Djibouti, Egypt, Indonesia, Iraq, Libya, Mozambique, Papua New Guinea, Sao Tome and Principe, Sierra Leone, Syrian Arab Republic, Zambia

Measures to Combat Malnutrition

While a significant number of the world's 52 million wasted children live in countries where cyclical food insecurity and protracted crises exacerbate their vulnerability, the majority reside in countries

not affected by emergencies. In these countries factors such as frequent incidence of infectious diseases, inadequate caring capacity and social and cultural practices are the major factors that need to be addressed to reduce wasting.

Nutrition- specific interventions are actions that have a direct impact on the prevention and treatment of undernutrition, in particular during the 1,000 days covering pregnancy and the child's first two years. These interventions should be complemented by broader, nutrition-sensitive approaches that have an indirect impact on nutrition status. Equity considerations in nutrition programming are particularly important, as stunting and other forms of undernutrition afflict the most vulnerable populations. [18]

UNICEF reports of 2014 states that the global agricultural system is currently producing enough food to feed the world, but access to adequate, affordable, nutritious food is more challenging. Improving dietary diversity by increasing production of nutritious foods is achievable, particularly in rural populations. It is done by producing nutrient-dense foods, such as fruits and vegetables, fish, livestock, milk and eggs; increasing the nutritional content of foods through crop biofortification and post-harvest fortification; improving storage and preservation of foods to cover 'lean' seasons; and educating people about nutrition and diet. In several settings these types of interventions have been shown to improve dietary patterns and intake of specific micronutrients, either directly or by increasing household income. However, the impact on stunting, wasting and micronutrient deficiencies is less clear. Thus, more effort is needed to align the pursuit of food security with nutrition security and improved nutritional outcomes. [17]

Similarly, social protection involves policies and programmes that protect people against vulnerability, mitigate the impacts of shocks, improve resilience and support people whose livelihoods are at risk. Safety nets are a type of social protection that provides or substitutes for income: Targeted cash transfers and food access-based

approaches are the two main categories of safety nets intended to avert starvation and reduce undernutrition among the most vulnerable populations. Food-based safety nets are designed to ensure livelihoods (such as public works employment paid in food), increase purchasing power (through food stamps, coupons or vouchers) and relieve deprivation by providing food directly to households or individuals. [9]

CONCLUSION

More research and evidence is needed on the long-term outcomes of different programmes on undernutrition and how they can be better targeted, how long they are needed and with what interventions. Similarly, ensuring an effective food distribution system is an essentiality than the production of food as there is sufficient production to feed the entire world. Use of locally available foods, development of newer products from high protein, fat and calorie food that are readily available and cheap and use of simpler food processing techniques also help people improve their family's undernourished status. Nutrition education should be made more effective along with provision of sample preparations of different combination of foods or food materials that can improve one's nutritional status which can later be prepared at homes. But social safety net programmes can definitely be one way to ensure more equitable nutrition-sensitive development if they are aligned with local and national needs and an understanding of capacity, resources and timeliness aspects in scaling up.

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