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Childhood Malnutrition in India

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Abstract

India is home to 46.6 million stunted children, a third of world's total as per Global Nutrition Report 2018. Nearly half of all under-5 child mortality in India is attributable to undernutrition. Any country cannot aim to attain economic and social development goals without addressing the issue of malnutrition. Poor nutrition in the first 1000 days of a child's life can also lead to stunted growth, which is associated with impaired cognitive ability and reduced school and work performance. Malnutrition in children occurs as a complex interplay among various factors like poverty, maternal health illiteracy, diseases like diarrhoea, home environment, dietary practices, hand washing and other hygiene practices, etc. Low birth weight, episode of diarrhoea within the last 6 months and the presence of developmental delay are often associated with malnutrition in most developing nations including India. This chapter is a small attempt to highlight the state of malnutrition in India and tries to get an insight to overcome the problem. This chapter also highlights the issues and challenges for not obtaining the desired nutritional outcomes. It also provides an insight that this issue can be addressed by adopting comprehensive, coordinated and holistic approach with good governance and help of civil society.

Keywords: childhood malnutrition, determinants, diarrheal diseases, nutritional programmes, challenges

1. Introduction

'Good nutrition allows children to survive, grow, develop, learn, play, participate and contribute—while malnutrition robs children of their futures and leaves young lives hanging in the balance'.

Adequate Nutrition is essential for human development. Malnutrition includes both undernutrition as well as over-nutrition and refers to deficiencies, excesses or imbalances in the intake of energy, protein and/or other nutrients. Benefits of good health are perceived not only at the individual level but also at the level of society and country level as well. Health of an individual is determined by interplay of various factors like social factors, economic factors, dietary factors, lifestyle related factors, environmental factors, government policies and political commitment, etc. [1]. Foundation of an individual's health is laid in early phase of life. It is a well-known fact that in some developing nations, India being one of them, nearly half of children under 5 years of age succumb to death every year due to poor nutrition. It is quite difficult for the poor to bear the cost of treatment

especially suddenly occurring out-of-pocket expenditures [2]. A dissimilar trend is observed among individuals of affluent society. Sedentary habits coupled with unhealthy food habits results in weight gain in them. Health experts refer these conditions as malnutrition. The irony is, India being the world's second largest food producer and yet is also home to the large number of undernourished children in the world.

It is well acknowledged that investment in human resource development is a pre requisite for any nation to progress. In year 2012, while releasing HUNGaMA (Hunger and Malnutrition) Report-2011, the then prime minister of India, Dr. Manmohan Singh, expressed dismay at the 'unacceptably high' levels of malnutrition despite high and impressive GDP growth and said it was a matter of 'national shame'. He, being renowned economist, also expressed that that 'the health of our economy and society lies in the health of this generation [3]. We cannot hope for a healthy future for our country with a large number of malnourished children'.

India is home to 46.6 million stunted children, a third of world's total as per Global Nutrition Report 2018. Nearly half of all under-5 child mortality in India is attributable to undernutrition. Children of today are citizens of tomorrow, and hence improving nutritional status of children becomes extremely important. Early childhood constitutes the most crucial period of life, when the foundations are laid for cognitive, social and emotional, language, physical/motor development and cumulative lifelong learning.

Recently Millennium Development Goals (MDGs) has been transformed into Sustainable Developmental Goals (SDGs) and maternal & child health (MCH) has received attention in the last two decades as never before. Adequate nutrition has always been a definitive tool for achieving the maternal and child health targets. Nutrition is defined as the science of food and its relationship with health. Nutrition is a basic human need and a prerequisite for a healthy life. A proper diet is essential from the very early stages of life for growth, development and for a state of overall well-being. Food consumption, which largely depends on production and distribution, determines nutrition and health of the population. Apart from supplying nutrients, food provides other components (non-nutrient phytochemicals), which have a positive impact on health.

2. Methods for the literature review

We searched PubMed, Google search engine and other databases on the internet for relevant literature. We searched reference lists of all primary and review articles based on the key words 'childhood malnutrition, determinants, diarrheal diseases, India, problem burden, intervention strategies and control program'. Apart from that database of government run nutritional programmes, critical review and analysis of these programmes and related published books were also studied. At few instances, stakeholders of nutritional programmes were also consulted. Relevant data was collected, summarized and analysed.

3. Meaning of malnutrition

Malnutrition is a term that refers to any deficiency, excess or imbalance in somebody's intake of energy and/or nutrients. In simple words, malnutrition can

either be due to inadequate intake or an excess intake of calories. The term malnutrition covers two broad groups of conditions namely undernutrition and overnutrition. One is 'undernutrition'—which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). Another one is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer).

Stunting refers to a child who is too short for his or her age. These children can suffer severe irreversible physical and cognitive damage that accompanies stunted growth. The devastating effects of stunting can last a lifetime and even affect the next generation.

Wasting refers to a child who is too thin for his or her height. Wasting is the result of recent rapid weight loss or the failure to gain weight. A child who is moderately or severely wasted has an increased risk of death, but treatment is possible.

Overweight refers to a child who is too heavy for his or her height. This form of malnutrition results from energy intakes from food and beverages that exceed children's energy requirements. Overweight increases the risk of diet-related non-communicable diseases later in life.

4. Why childhood malnutrition matters to us?

Malnutrition is a universal problem that has many forms. No country is untouched. It affects all geographies, all age groups, rich people and poor people and all sexes. All forms of malnutrition are associated with various forms of ill health and higher levels of mortality. Undernutrition explains around 45% of deaths among children under-5, mainly in low and middle-income countries.

As far as adverse effects of child malnutrition are concerned, growth failure and infections are quite important. Malnourished children do not attain their optimum potential in terms of growth and development, physical capacity to work and economic productivity in later phase of life. It is commonly observed that school absenteeism is much higher in such child that leads to poor performance in the class. Cognitive impairment resulting from malnutrition may result in diminished productivity. Apart from these, Undernutrition increases the risk of infectious diseases like diarrhoea, measles, malaria and pneumonia and chronic malnutrition can impair a young child's physical and mental development. As per estimates of World Bank, childhood stunting may result in a loss of height among adults by 1%, which may further lead to a reduction in individuals economic productivity by 1.4% [4].

Micronutrient deficiencies can lead to poor health and development, particularly in children. Overweight and obesity can lead to diet-related noncommunicable diseases such as heart disease, high blood pressure (hypertension), stroke, diabetes and cancer.

Malnutrition is also a social and economic problem, holding back development across the world with unacceptable human consequences. Malnutrition costs billions of dollars a year and imposes high human capital costs—direct and indirect—on individuals, families and nations. Estimates suggest that malnutrition in all its forms could cost society up to US\$3.5 trillion per year, with overweight and obesity alone costing US\$500 billion per year [5]. The consequences of malnutrition are increases in childhood death and future adult disability, including diet-related

non-communicable diseases (NCDs), as well as enormous economic and human capital costs [6]. According to UNICEF, one in three malnourished children in the world is Indian. It is estimated that reducing malnutrition could add some 3% to India's GDP.

5. The consequences of the problem

- This inter-generational cycle of undernutrition transmitted from mothers to children greatly impacts on India's present and future. Undernourished children are much more likely to suffer from infection and die from common childhood illnesses (diarrhoea, pneumonia, measles, malaria) than well-nourished children.
- According to recent estimates, more than a third of all deaths in children aged 5 years or younger is attributable to undernutrition.
- Undernutrition puts women at a greater risk of pregnancy-related complications and death (obstructed labour and hemorrhage).
- Undernourished boys and girls do not perform as well in school as compared to their well-nourished peers, and as adults they are less productive and make lower wages.
- Widespread child undernutrition greatly impedes India's socio-economic development and potential to reduce poverty [7].

6. Measurement of malnutrition

Underweight is defined as weight that is 2 standard deviations below the WHO child growth standards for that particular age. In other words, child is underweight if Z-scores of child for a given weight for age is less than -2 SD from the median of the WHO/NCHS Child Growth Standards or References.

Wasting is defined as loss of body weight with reference to height. In other words, child is having wasting if Z-scores of child for a given weight for height is less than -2 SD from the median of the WHO/NCHS Child Growth Standards or References.

Wasting is also known as 'acute malnutrition' and is characterized by a rapid deterioration in nutritional status over a short period of time in children under 5 years of age. In children, it can be measured using the weight-for-height nutritional index or mid-upper arm circumference (MUAC). There are different levels of severity of acute malnutrition: moderate acute malnutrition (MAM) and severe acute malnutrition (SAM).

Stunting is defined as a height that is more than 2 standard deviations below the WHO child growth standards median. In other words, child is stunted if Z-scores of child for a given height for age is less than -2 SD from the median of the WHO/NCHS Child Growth Standards or References.

Stunting is also known as 'chronic undernutrition', although this is only one of its causes. Stunting is often associated with cognitive impairments such as delayed

motor development, impaired brain function and poor school performance, as it often causes these negative impacts.

7. Magnitude of problem

In present era malnutrition is reflected as double burden, one aspect is undernutrition and other being overnutrition. But, in India and other low and middle-income countries (LMICs), basically malnutrition is synonymous with protein energy malnutrition or undernutrition, which signifies an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function.

7.1 Global scenario

Globally, approximately 149 million children under-5 suffer from stunting. In 2018, over 49 million children under-5 were wasted and nearly 17 million were severely wasted. There are now over 40 million overweight children globally, an increase of 10 million since 2000 [8]. (Figures 1–3) It is estimated that by 2050, 25 million more children than today will be malnourished [9].

7.2 Indian scenario

India is one among the many countries where child undernutrition is severe and also undernutrition is a major underlying cause of child mortality in India. Pattern of stunting prevalence among Indian districts is shown in Figure 4.

The prevalence of underweight children under age 5 was an indicator to measure progress towards MDG 1, which aims to halve the proportion of people who suffer from hunger between 1990 and 2015. For India, this would imply a reduction in the child underweight rate from 54.8% in 1990 to 27.4% in 2015. Sustainable development

Figure 1.
Global burden of malnourished under-5 children [8].

Figure 2.
Trends in global burden of malnourished under-5 children [8].

Figure 3.
Comparison of burden of malnourished under-5 Asian and African children [8].

Goals (SDG) 2 focuses on end hunger, achieves food security and improves nutrition and promotes sustainable agriculture. By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons and indicators are primarily prevalence of stunting, wasting and overweight among children under 5 years of age. In a recently released Global Nutrition Report 2018, revealed the prevalence of stunting, wasting and overweight at national level as 37.9, 20.8 and 2.4% respectively [10].

In India as per National Family Health Survey IV (2014–2015, recent in the series) 38.4, 21 and 35.7% of children below 5 years suffer from stunting, wasting and underweight respectively (corresponding figure for NFHS III, 2005–2006 were 47.9, 19.8 and 42.5% respectively). Prevalence of severe acute malnutrition (SAM) in India is 7.5% [11]. Trends in various nutritional indicator values and U5 mortality rate from 2000 to 2018 (India) are shown in **Figure 5**.

Figure 4.
Pattern of stunting prevalence among Indian districts (source: Menon et al. 2018).

Figure 5.
Trends in various nutritional indicator values and U5 mortality rate from 2000 to 2018 (India).

In the 2018 Global Hunger Index, India ranks 103rd out of 119 qualifying countries [12]. With a score of 31.1, India suffers from a level of hunger that is serious. **Figure 6** depicts dimensions and indicators of Hunger index and its relationship with child malnutrition.

Figure 6.
Diagrammatic representation of child undernutrition with Hunger Index.

8. Web of factors maintaining malnutrition in Indian communities

‘Asian enigma’ is a phenomenon of persistent and unusually high prevalence of child undernutrition in South Asia as compared to countries at similar levels of income or economic growth. In-depth analysis into why malnutrition is so resistant to improvement shows its complex aetiology. The immediate causes of undernutrition reflect a negative synergy between inadequate food intake and repeated infectious diseases. Underlying these causes is a constellation of factors particularly salient to India [13]. These include especially poor sanitation and high rates of open defecation that leads to various kinds of infestations, infections and environmental enteropathy; poor coverage of health services and half-hearted implementation of nutritional programs and policies; no political commitment and will, and economic, social determinants including economic growth and income distribution, deficiencies in governance and strategic leadership and the status of women [14, 15].

A new study from Harvard Chan School of Public Health has now pinpointed the five top risk factors responsible for more than two-thirds of the problem. Short maternal stature, extreme poverty, poor dietary diversity and mother’s lack of education are among the top five risk factors for malnutrition in children in India. Examining an array of 15 well-known risk factors for chronic undernutrition among children in India, the study found that the five top risk factors were essentially markers of poor socioeconomic conditions as well as poor and insecure nutritional environments in children’s households [16].

Economic conditions definitely play a crucial role. On the one hand, money is required to look after food, water and sanitary living conditions, whereas on the

other hand, approximately 22% of the Indian population live below the poverty line. Rural population, a major chunk (especially agriculturists) is mostly dependent on rains for their income. They always live in a state of uncertainty of income. Apart of income, illiteracy plays a crucial role. Most of the people are not aware about their health, nutrition, balanced diet and breastfeeding practices. Without these, effective nutrition communication campaign cannot succeed in their purpose.

India ranked 97 among a list of 118 countries on hunger as per Global Hunger Index (GHI). It concludes that Indian population does not have access to sufficient and nutritious food. National Food Security Act is a great step in the direction of ensuring greater access to adequate quantity of quality food at affordable cost via Targeted Public Distribution System (PDS). Desired outcomes were not achieved due to corruption in PDS [17]. Wastage of food grains (theft, rotting) in Food Corporation of India (FCI) warehouses has also dented the access of food to common man. Greater efforts are needed to strengthen the existing initiatives to make them as corruption free and efficient institutions to get better results.

State of maternal health illiteracy is an important determinant of child nutritional status. The type of care a mother provides to her child depends to a large extent on her knowledge and understanding of some aspects of basic nutrition and health care [18].

Millions of beneficiaries have benefitted by ICDS Scheme however, problems are being observed in ensuring supply of quality food, and its uniform distribution. Anganwadi Workers (AWWs) and Anganwadi Helpers (AWHS) at Anganwadi centres are often dissatisfied by low wages. Thus they fail to play an effective role in tackling the problem of malnutrition.

8.1 Scam in ICDS project unearthed

Dibrugarh, Assam: two organizations have brought charges of rampant corruption in the Integrated Child Development Scheme (ICDS) amounting to more than Rs. 37 lakh in Panitola ICDS project of the district. While the officer-in-charge of the ICDS project in Panitola development block has drawn the money for 2007–2008 through two cheques (Nos. 107,895 and 017896) from UCO Bank, Dibrugarh after collecting the cheque from the district social welfare department, All India Youth Federation and All Assam Mottock Yuba Chatra Sanmilan unearthed through Right to Information (RTI) Act that the money has not been utilized till date. Suspecting misuse of the allotted money, the two organizations have demanded that the district administration institute an enquiry into the anomaly immediately. They have also demanded exemplary punishment on the erring officials (source: The Assam Tribune, 12 May 2008).

Village Health, Sanitation and Nutrition committee (VHSNC), one of the key elements of the National Rural Health Mission are non-functional in many of the states due to lack of funds. Similarly, Village Child Development Centres (VCDCs) were set up by state government of Maharashtra to provide malnourished children with medical care and nutritious meals. These centres are mostly non-functional due to lack of funds [19].

8.2 Toffees in the name of nutritious food

In Nigoha, the hot food scheme has stopped functioning due to lack of funds. The condition of Rampura AWC is also the same. The centre does not open on regular basis. The AWH, Sarvesh Kumari, distributes toffees instead of proper nutritional food to the limited number of children who come to the centre. Villagers are not even aware of the facilities provided to them by the AWC. Community

participation is also lacking as parents do not sent their children to the centres (source: Dainik Jagran, Lucknow, 1 November 2009).

Social and cultural factors may also affect malnutrition. State government of Uttar Pradesh launched Hausla Poshan Yojana in 2016 to combat malnutrition among mothers and children by providing food cooked by Anganwadi Workers. Surprisingly beneficiaries refused to consume food because lower caste people prepared it [20]. Upper caste community considers lower caste as untouchables. Another cultural practice still prevalent in Indian communities is child marriage that is acting as limiting factor in improving health of children. 27% of girls in India are married before their 18th birthday and 7% are married before the age of 15. According to UNCIEF, India has the highest absolute number of child brides in the world [21]. A weak mother is likely to give birth to a weak child. This maintains the cycle of undernourishment.

As discussed earlier that poor sanitation is directly linked to malnourished children. The Census 2011 told us only 32% of India’s rural households had toilets. 59% of the 1.1 billion people in the world who practice open defecation live in India. On 2 October 2014, Swachh Bharat Mission was launched throughout country with an aim to achieve the vision of a ‘Clean and Open Defecation-Free India’ by 2 October 2019 [22]. These targets are difficult to achieve, as implementation is poor, as observed from the slow progress in meeting the targets, and the existence of several newly constructed but non-functional toilets [21, 23].

Diarrheal disease kills an estimated 300,000 children less than 5 years of age (13% deaths in this age-group) in India each year. Most mortality related to diarrhoea occurs in less developed countries, and the highest rates of diarrhoea occur among malnourished children under-1. The case fatality rate is highest among children aged 6–12 months because at this age the immune system is not yet fully mature, maternal antibodies are waning, and the foods introduced to complement breastfeeding may be contaminated. Among children who survive severe diarrhoea, chronic infections can contribute to malnutrition. In turn, malnutrition makes children vulnerable to diarrhoea infections. Better access to clean water and sanitation is the key, with fewer weak and malnourished children becoming infected [24, 25].

9. Commitments and targets to track progress to end malnutrition

Recognizing the seriousness of malnutrition for global health, in 2012 and 2013, the member states of the World Health Organization (WHO) adopted a series of targets to significantly reduce the burden of many of these forms of malnutrition by 2025 (Table 1).

Progress to tackle all forms of malnutrition remains unacceptably slow. The 2018 Global Nutrition Report [10] tracks country progress against the following global

Child health goals under NHP-2017 and SDG-2030			
Child health indicator	Current status	NHP 2017	SDG 2030
Neonatal mortality rate (NMR)	24	16 by 2025	<12
Infant mortality rate (IMR)	34	28 by 2019	—
Under-5 mortality rate (U5MR)	39	23 by 2025	≤25

Source: Ref. [33]

Table 1.
Global nutrition targets 2025 [12].