

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Childhood Malnutrition in India

Abhishek Singh

## 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 '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.

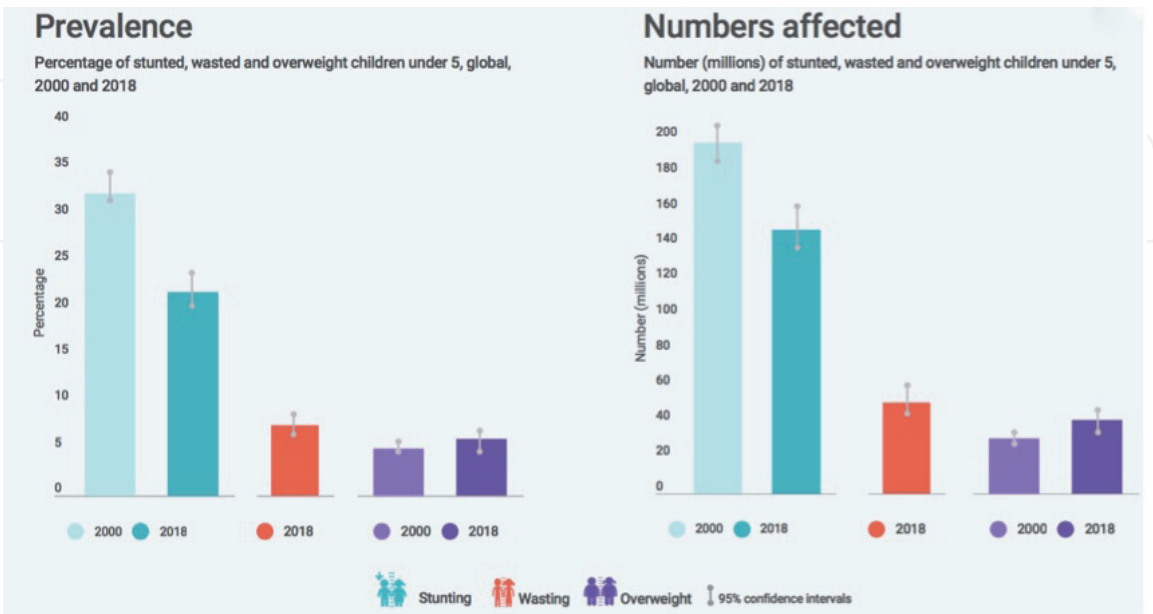
### 7.1 Global scenario

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].

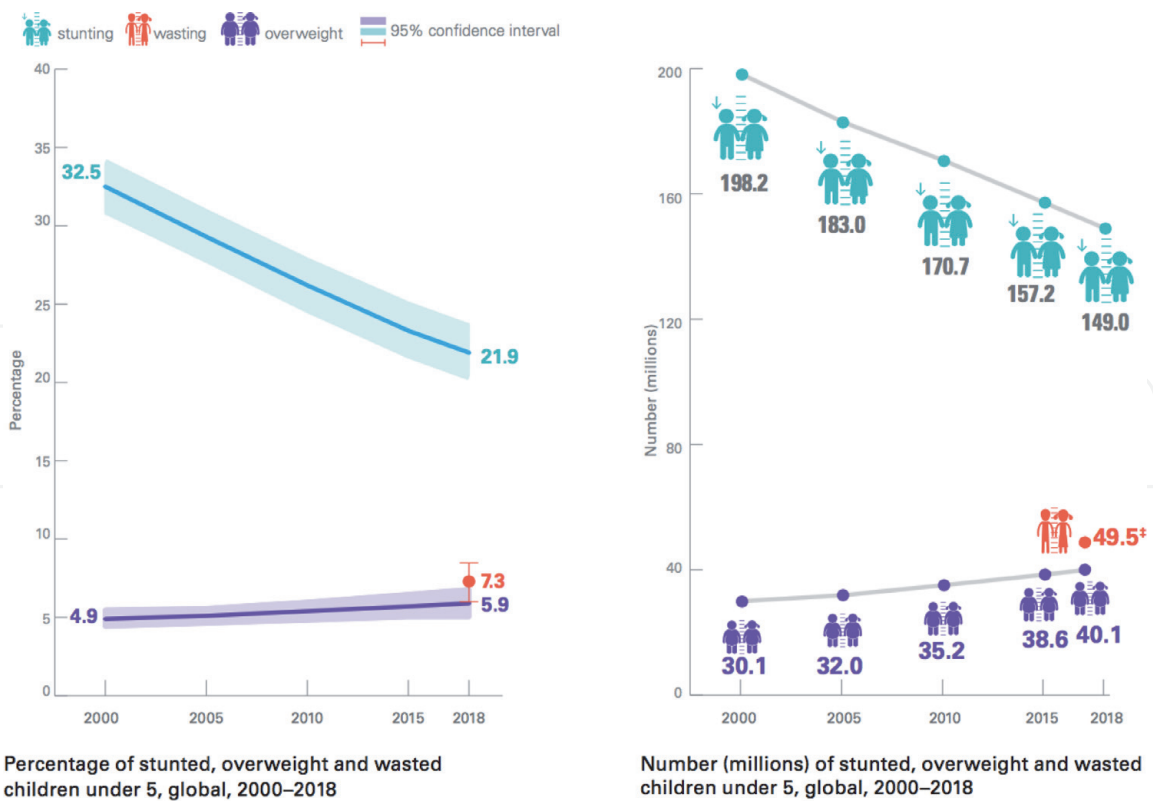
### 7.2 Indian scenario

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.

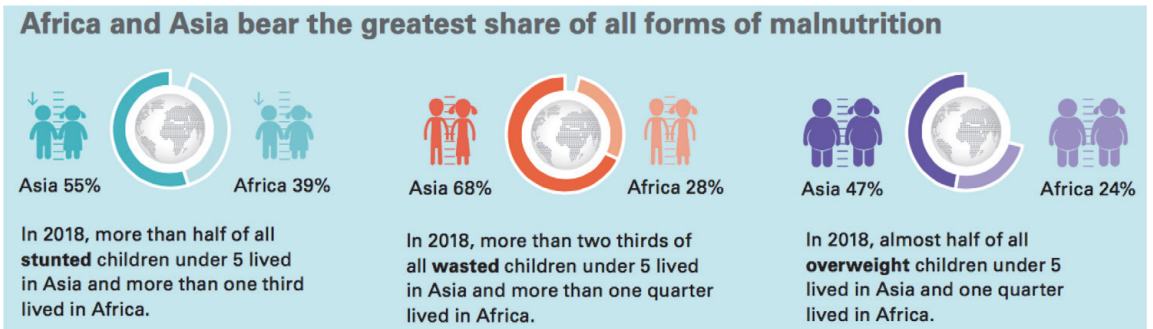
The prevalence of underweight children under age 5 was an indicator to measure progress towards MDG 1, which aims to halve the proportion of people who suffer from hunger between 1990 and 2015. For India, this would imply a reduction in the child underweight rate from 54.8% in 1990 to 27.4% in 2015.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



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



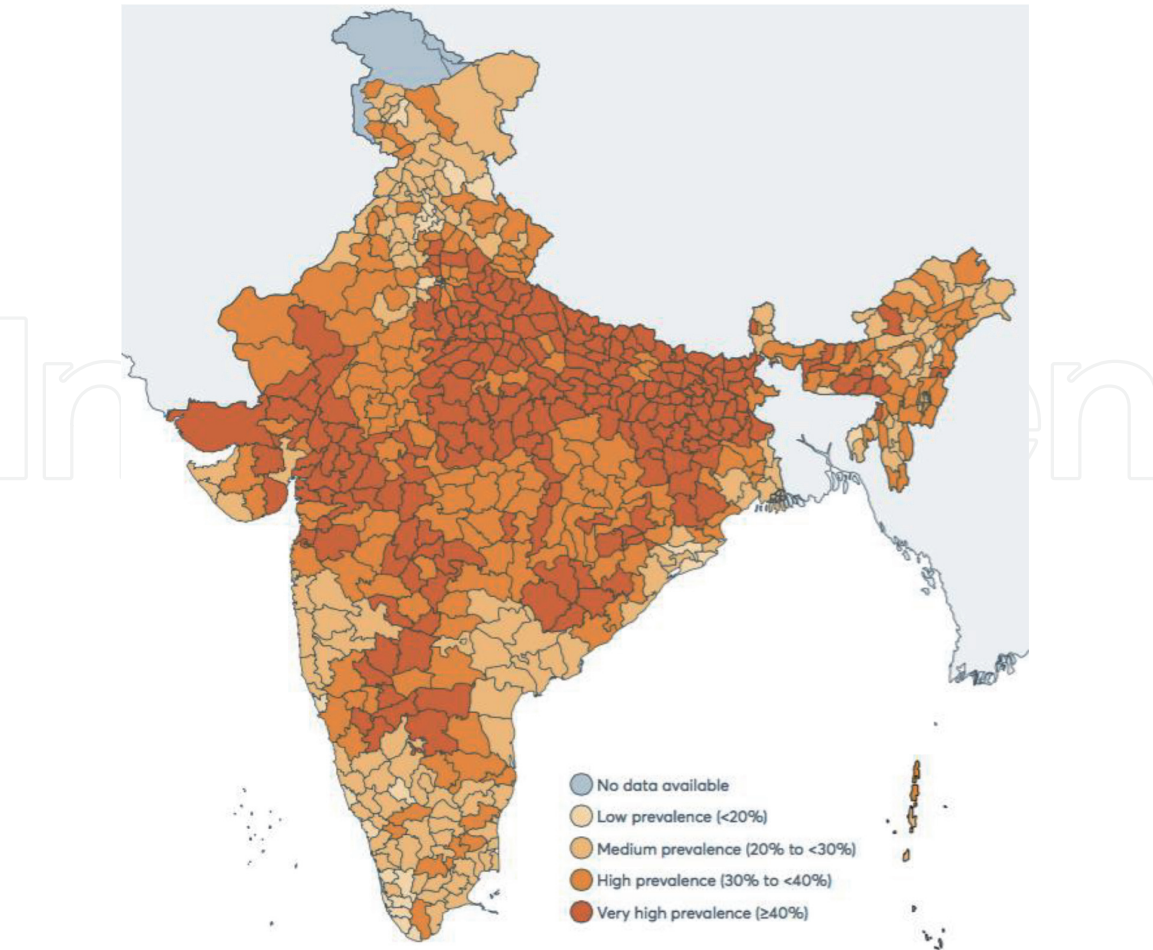
**Figure 2.**  
*Trends in global burden of malnourished under-5 children [8].*



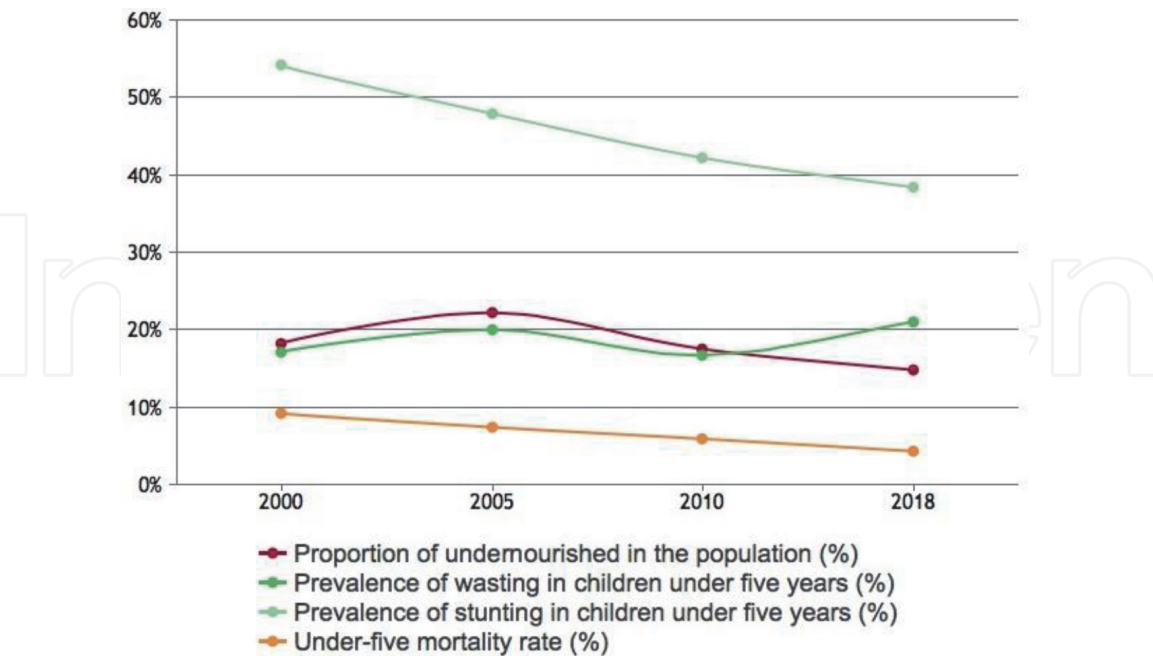
**Figure 3.**  
*Comparison of burden of malnourished under-5 Asian and African children [8].*

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**.



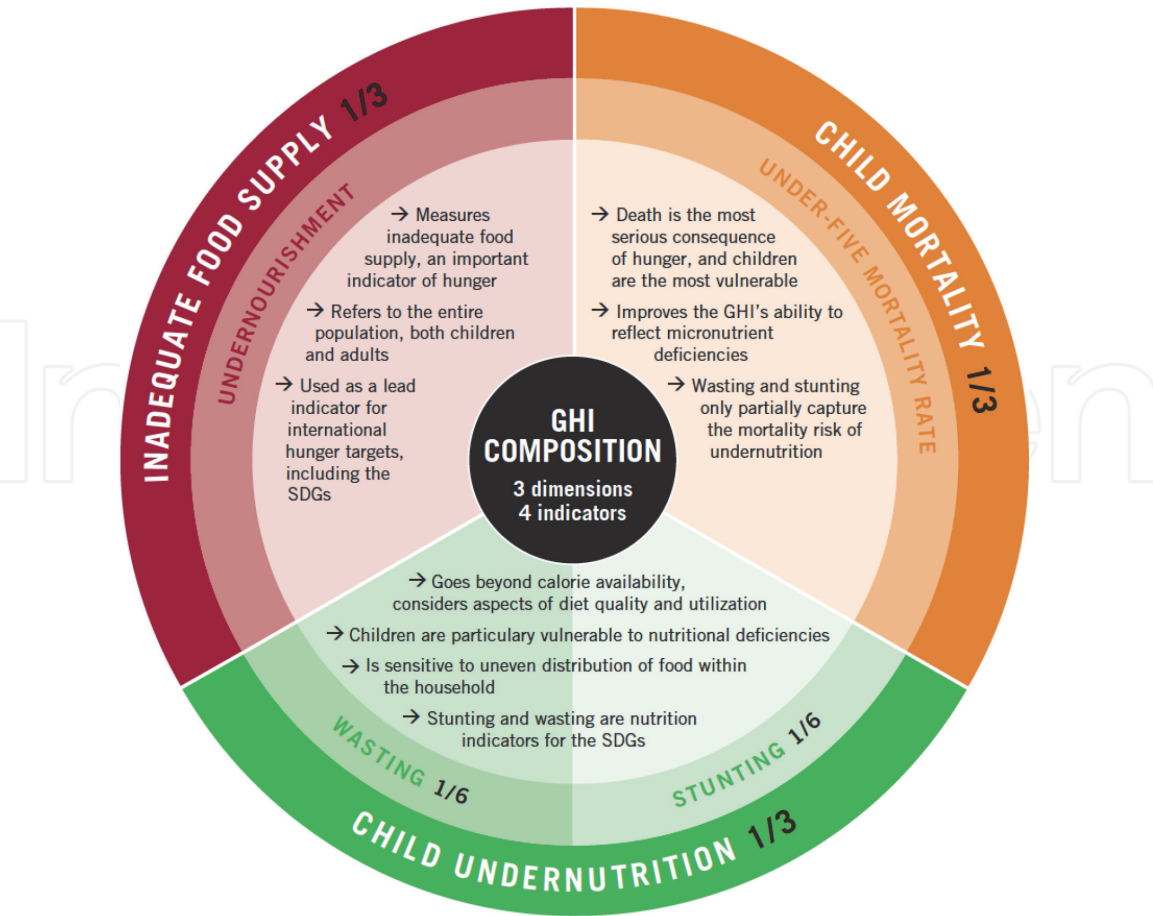
**Figure 4.**  
*Pattern of stunting prevalence among Indian districts (source: Menon et al. 2018).*



**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]

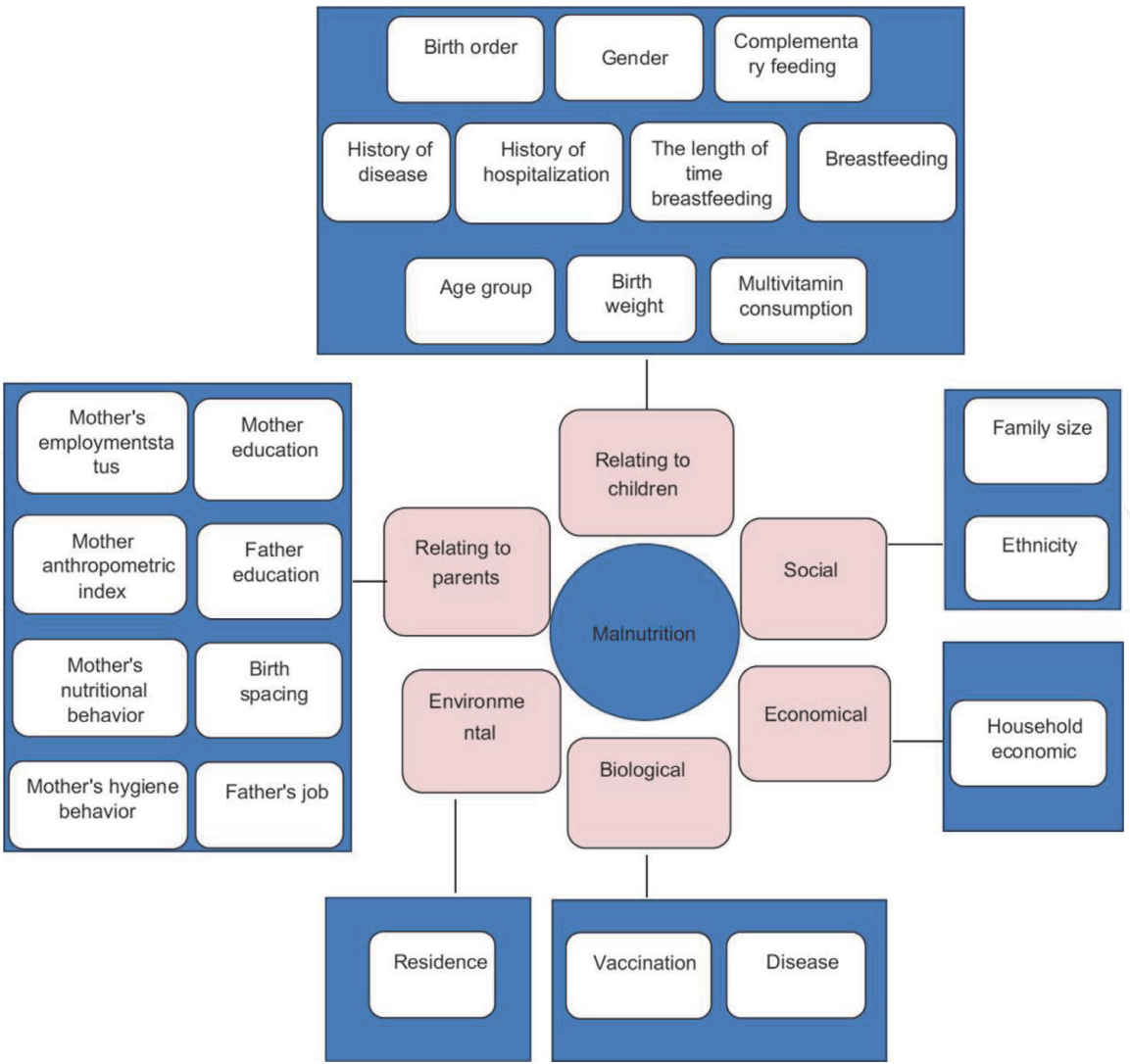
Table 1.  
Global nutrition targets 2025 [12].

targets: child overweight, child wasting, child stunting, exclusive breastfeeding, diabetes among women, diabetes among men, anaemia in women of reproductive age, obesity among women and obesity among men. Data for 194 countries was analysed. As per this report, India is listed among those countries, which are on track for none (zero) of the nine targets. The key driver behind the goal to reach Zero Hunger and malnutrition is to ensure that no one is left behind in the pursuit of food and nutrition security. In the Indian context, this will also mean greatly improving the health of women and children.

## 10. Determinants of child malnutrition

The causes of malnutrition in India are several and multifaceted, from direct factors to underlying contributors. Malnutrition in children occurs as a complex interplay among various factors like socio-demographic, maternal, gender, home environment, dietary practices, hand washing and other hygiene practices, etc. **Figure 7** depicts factors significantly associated with malnutrition among under-5 children in India.

*Socio-economic and demographic factors:* literacy status of parents especially mother's education, caste, birth order of child, gender of household head, residence,



**Figure 7.**  
*Factors significantly associated with malnutrition among under-5 children [36].*



type of house, type of family (single/joint) lower socio-economic status, poverty, food insecurity, etc. are such important factors.

*Gender:* female gender is vulnerable to severe forms of malnutrition across all ages due to socio-cultural factors (responsible for child bearing and rearing, last one to consume food in the family). Undernourished girls grow up to become undernourished women who give birth to a new generation of undernourished children [26].

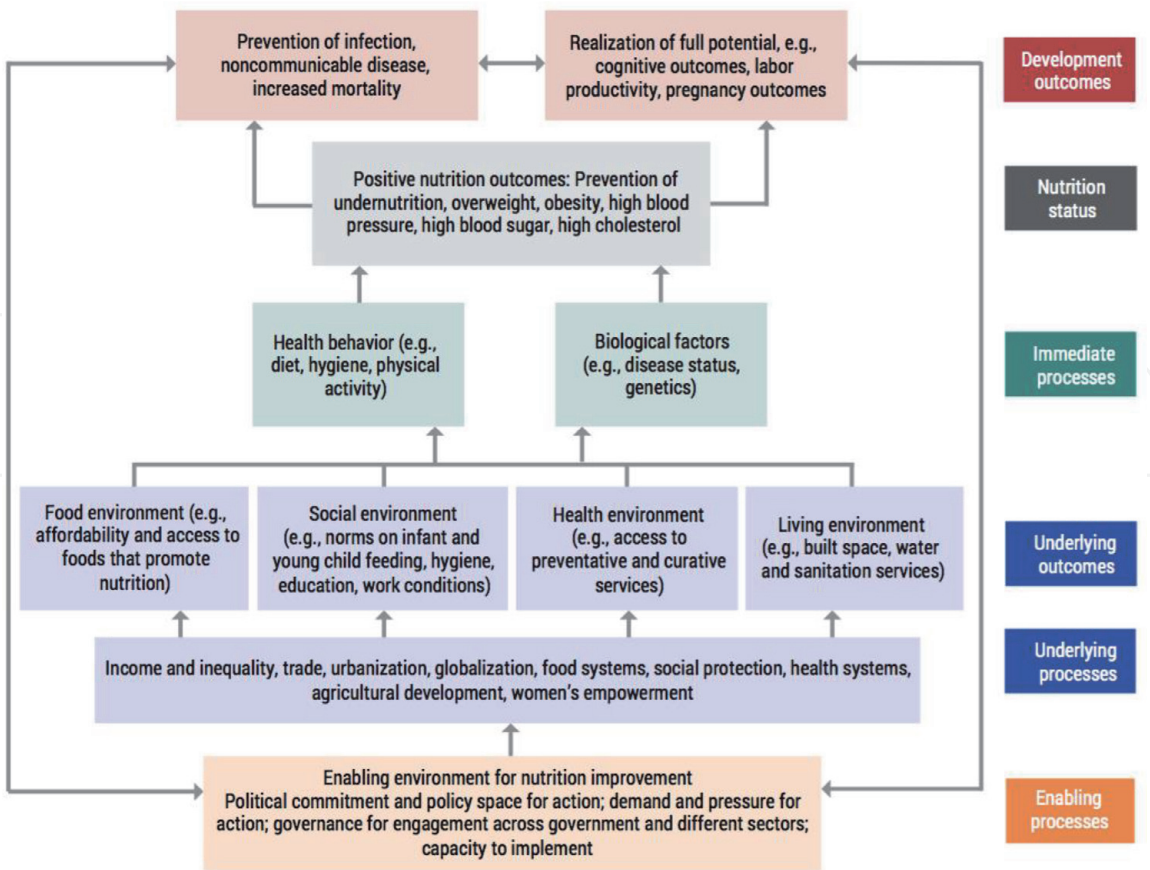
*Maternal factors:* short stature, mother’s nutrition, mother’s age, antenatal and natal care, infections, smoking and exposure to second hand smoke are important maternal factors.

*Breastfeeding practices:* inadequate, insufficient, inappropriate breastfeeding practices lay down foundation of malnutrition. Breastfed children are protected from infections in better way than who are not breastfed. Early initiation of breastfeeding and right timing of initiation of complementary feeding are also quite important [27].

*Home environment:* large family size, food insecurity, toilet facility, sanitation and hygiene practices, water storage and handling practices are extremely important factors.

*Open air defecation:* open defecation, the practice of people defecating out in the open wherever it is convenient, is one of the main factors leading to malnutrition. Approximately in the urban setting, 12% of the population open defecate and rural areas that number is 72%. Open defecation leads to polluted water; up to 75% of India’s surface water is polluted.

*Poor hand hygiene:* role of hand hygiene is quite important in prevention of infections and thereby malnutrition. Availability of soap and water is an important



**Figure 8.**  
*Underlying drivers of malnutrition (source: Reproduced from the Global Nutrition Report 2016. International Food Policy Research Institute. 2016. Global Nutrition Report 2016: From promise to impact: Ending malnutrition by 2030. Washington, DC).*

determinant. Hand washing before preparation, serving and eating meals and after going to toilets can prevent malnutrition to a great extent.

*Diarrhoeal disease:* diarrhoea is a leading cause of malnutrition in children under 5 years old. Poor sanitation, lack of access to clean water and inadequate personal hygiene are responsible for an estimated 88% of childhood diarrhoea in India. Based on current evidence, washing hands with soap can reduce the risk of diarrheal diseases by 42–47%. A survey conducted by UNICEF in 2005 on well-being of children and women had shown that only 47% of rural children in the age-group 5–14 wash hands after defecation [28].

**Figure 8** depicts the underlying drivers of malnutrition. They are complex and multidimensional which include inter alia poverty, inequality and discrimination. Control of malnutrition will require a comprehensive approach targeting all these causes and contributors across sectors and stakeholders.

## 11. The life-course approach on malnutrition

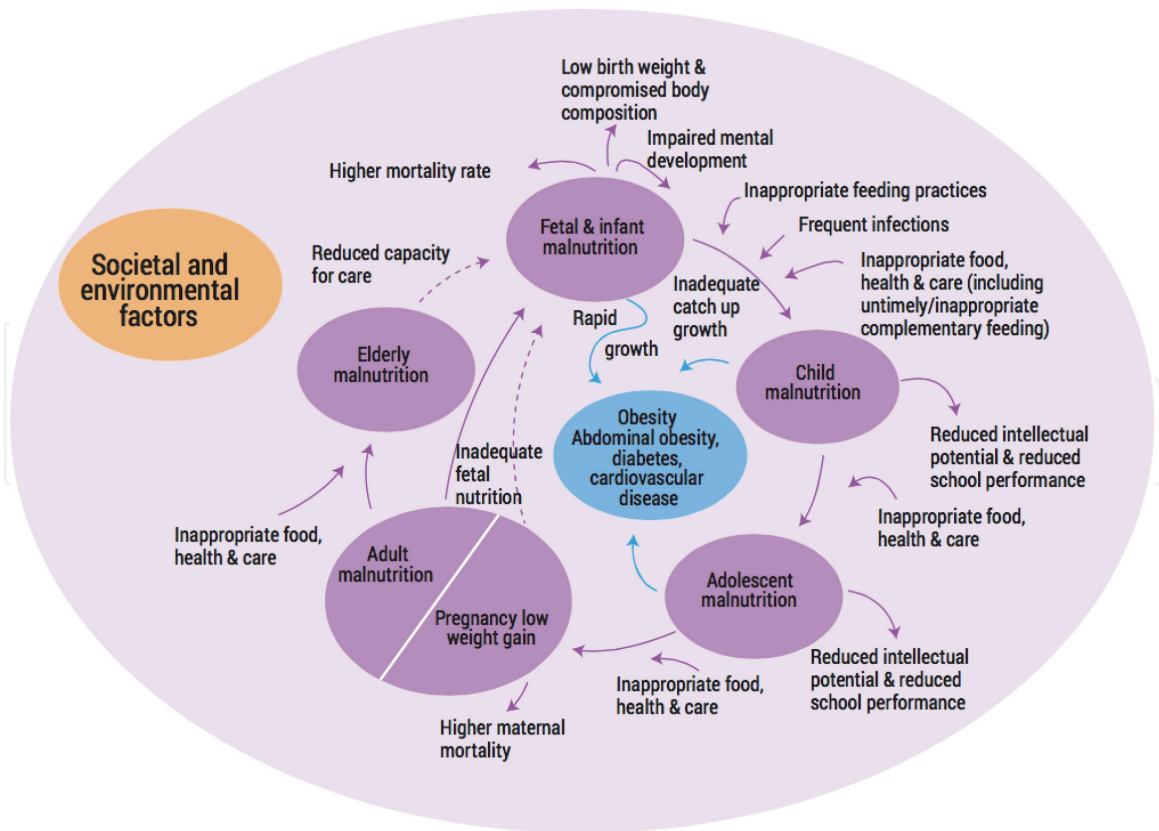
The challenge of malnutrition calls for a multidisciplinary approach that targets multiple underlying factors. Crucial stages in people's lives have particular relevance for their health, and the life-course approach recognizes the same. Taking a life-course perspective to tackle malnutrition emphasizes its intergenerational effects.

Intervening in the preconception period is fundamental to improve nutritional status and health behaviours in young people and adolescents and to prevent the transmission of risk to the next generation. Adopting a combination of top-down approaches through policy initiatives and bottom-up engagement of key stakeholders such as young people is recommended to prevent malnutrition over the first 1000 days of life. Targeting pregnancy and preconception periods increases nutrition awareness and influences dietary habits.

It is an established fact that preventing undernutrition during the first 1000 days of a child's life, i.e. from conception to the second birthday is quite important. This time period is very precious because child may not be able to grow to her or his full potential in the future and even irreversible damage may occur, if foundation for good nutrition is not properly established during this time period. However it does not mean that there are no other entry points to improve nutrition. Moreover, even with coverage of 90% of direct nutrition interventions, only 20% of stunting deficits would be addressed [29]. It is essential that preconception services are incorporated into a continuum from childhood to antenatal care, involving both partners and linked to interventions to promote school attendance in young girls, and the planning of first and subsequent pregnancies [30].

The life course approach underlines the dynamic nutritional needs at different stages of life, this holds true especially with women. It also explains that at each stage of life, nutrition can and should be addressed in order to break the cross-generational cycle of malnutrition [31].

**Figure 9** depicts the life course approach which explains how the first 1000 days are critically important. Investments in nutrition must extend as per the changing needs and risks at later stages in life, such as adolescent girls and women of reproductive age. It also points towards underlying causes of malnutrition and the need to address them. Underlying causes can only be satisfactorily addressed with intersectoral co-ordination and involvement like health, agriculture, water and sanitation, social protection and education. These sectors should be involved taking into account the specific needs and roles of women in order to work towards sustainable and inclusive solutions.



**Figure 9.**  
*The life-course approach on malnutrition.*

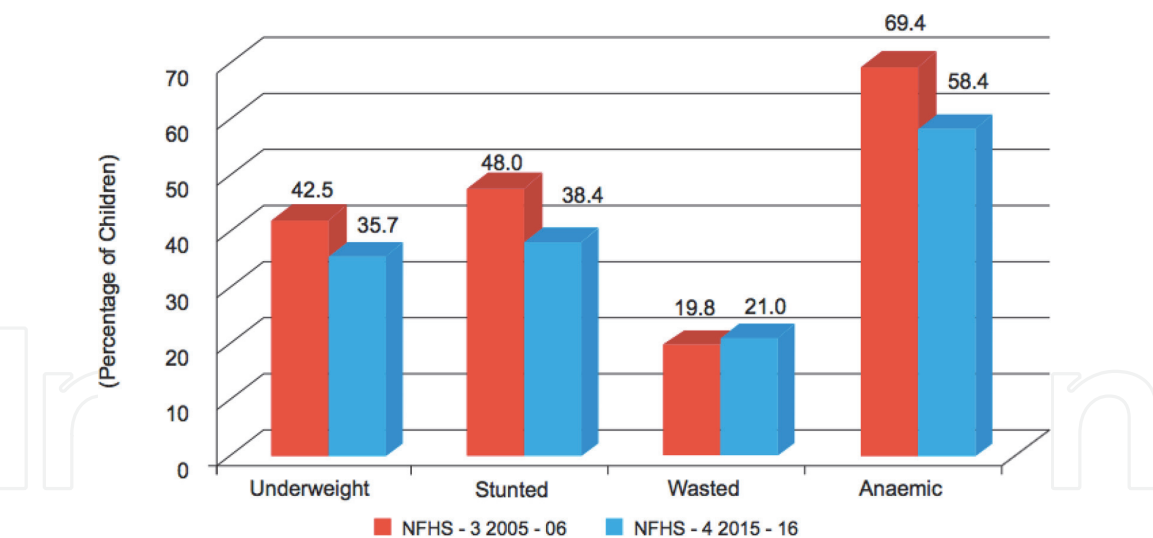
## 12. The fight against malnutrition

Massive and strategic investments have been made to combat malnutrition by governments of various countries, India being one of them. Recently (in April 2016), the United Nations General Assembly adopted a resolution proclaiming the UN Decade of Action on Nutrition from 2016 to 2025. The Decade aims to catalyse policy commitments that result in measurable action to address all forms of malnutrition. The aim is to ensure all people have access to healthier and more sustainable diets to eradicate all forms of malnutrition worldwide. Sustained and concrete results can only be achieved only if determinants of malnutrition are addressed with holistic approach [32].

Outcomes of these nutritional interventions are evident in the declining patterns in some of the India's key health variables as reported by National Family Health Surveys NFHS-3 (2005–2006) and NFHS-4 (2015–2016) data.

## 12.1 Data on nutrition indicators as per the last available national survey (NFHS 4)

- 38% of children below 5 years (urban: 31%, rural: 41%) are stunted (low height for age).
- 21% (urban: 20%, rural: 22%) are wasted (low weight for height).
- 36% (urban: 29%, rural: 38%) are underweight (low weight for age).
- More importantly, 7.5% of children are suffering from severe acute malnutrition, as per the last available national survey.



**Figure 10.**  
*Comparison of nutrition indicators as per NFHS-3 and NFHS-4 (source: NFHS-4, 2015–2016. Note: data on anaemia pertain to children aged 6–59 months).*

12.2 Related indicators

- Only 41.6% newborns initiated on breastfeeding within 1 hour of birth while 54.9% children breastfed exclusively till 6 months of age.
- Complementary feeding started for only 42.7% children on time (more than 6 months of age).
- 58.4% of children in age group 6–59 months are anaemic.

**Figure 10** shows the comparison of nutrition indicators as per NFHS-3 and NFHS-4.

12.3 Status of child mortality in India

- The U5MR has declined at a faster pace in the period 2008–2016, registering a compound annual decline of 6.7% per year, compared to 3.3% compound annual decline observed over 1990–2007 [33].
- As per latest Sample Registration System, 2016 Report; The U5MR in India is 39/1000 live births, IMR is 34/1000 live births and NMR is 24/1000 live births. This translates into an estimated 9.6 lakh under-5 child deaths annually.
- Four States together contribute to 56% of all child deaths in the country, namely-Uttar Pradesh (2.45 lakhs), Bihar (1.2 lakhs), Madhya Pradesh (1.0 lakh) and Rajasthan (0.75 lakh).
- About 46% of under-five deaths take place within the first 7 days of birth, 62% within first 1 month of birth.

The state of malnutrition in India is alarming and disturbing. A lot of work has been done, progress has been made but definitely pace of improvement is too slow. Following table shows the current status of important child health indicators and time bound targets to be achieved under National Health policy and Sustainable Development Goals (SDGs).



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 2.**  
*Targets for child mortality in India.*

Sustainable Development Goals (SDGs) were released by the UN in 2016 (till 2030) showing unfinished agenda of Millennium Development Goals (MDGs) ended in 2015. SDG 2 calls to end hunger, achieve food security and improved nutrition and promote sustainable agriculture whereas SDG 3 calls to ensure healthy lives and promote well-being for all at all ages (Table 2).

**13. Policy level nutritional interventions to fight against malnutrition**

Based on understanding towards a wide range of factors responsible for malnutrition among children, the policy called for the adoption of a multi-sectoral approach along with multiple measures to achieve the goal of optimum nutrition for all. Important government led policy level interventions and programmes to combat malnutrition are as follows:

**13.1 Direct policy measures**

- a. Inclusion of all vulnerable groups (children, adolescent girls, mothers, expectant women) under the safety cover of ICDS.
- b. Fortification of essential food items with legal provisions (e.g. twin fortification of salt with both iodine and iron).
- c. Popularize low cost nutritious food.
- d. Control of micro-nutrient deficiencies with special focus on vulnerable groups.

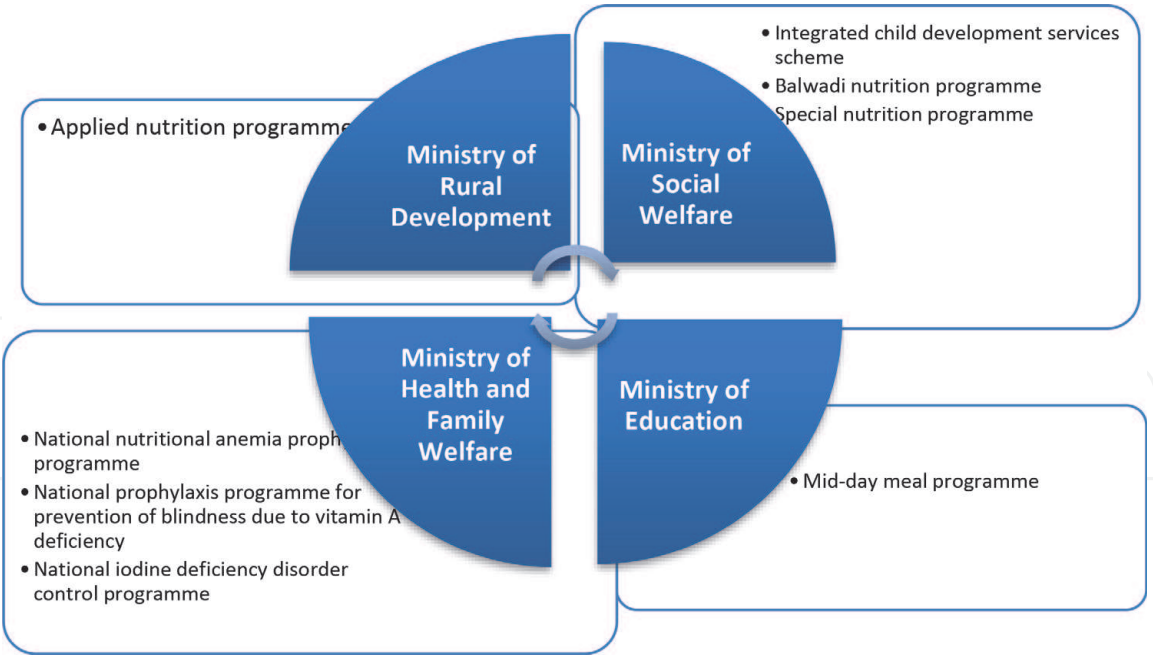
**13.2 Indirect policy measures**

- a. Guarantee of food security to citizens by increasing production of food grains.
- b. Improve dietary pattern by promoting production and increasing per capita availability of nutritionally rich food.
- c. Prevention of food adulteration by law.
- d. Strengthening nutrition surveillance.
- e. Improving purchasing power of landless, rural and urban poor.
- f. Improving public distribution system (PDS).

The Government of India enacted the National Food Security Act (NFSA) in 2013 to enable food and nutritional security by ensuring access to adequate quantity of quality food at affordable prices to people to live a life with dignity. This legal provision has put the onus on the state to guarantee basic entitlements.

### **13.3 Plans, programmes and missions**

- a. Mid-day Meal Programme, 1962–1963
- b. Goiter Control Programme, 1962 (now known as National Iodine Deficiency Disorders Control Programme)
- c. Special Nutrition Programme, 1970–1971
- d. Balwadi Nutrition Programme, 1970–1971
- e. Nutritional Anaemia Prophylaxis Programme, 1970
- f. Prophylaxis Programme against Blindness due to Vitamin A Deficiency, 1970
- g. Integrated Child Development Services (ICDS), 1975
- h. National Diarrhoeal Diseases Control Programme, 1981
- i. Wheat-based Supplementary Nutrition Programme, 1986
- j. National Plan of Action on Nutrition, 1995
- k. Public Distribution System, 1997
- l. The National Population Policy (NPP) 2000
- m. The National Health Policy 2002
- n. National Nutrition Mission, 2003
- o. National Health Mission (NRHM—2005–2017)
- p. National Health Mission, 2013 (subsumes former Rural and Urban Health Missions) National Iron+ Initiative, 2013
- q. Promotion of Infant and Young Child Feeding Practices Guidelines, 2013
- r. Weekly Iron and Folic Acid Supplementation, 2015
- s. National Deworming Day, 2015
- t. Sustainable Development Goals (2016–2030)
- u. New National Health Policy, 2017
- v. Establishment of: Nutritional Rehabilitation Centres; Village Health Sanitation & Nutrition Committee



**Figure 11.**  
*Multi ministerial involvement showing political commitment and intersectoral approach to end malnutrition.*

- w. Bi-annual Vitamin-A Supplementation
- x. Village Health & Nutrition Days (at Anganwadi centres)
- y. Reproductive, Maternal, Newborn, Child and Adolescent (RMNCH+A) Strategy

**Figure 11** depicts multi ministerial involvement showing political commitment and intersectoral approach to end malnutrition.

**14. Strategic nutrition related interventions rolled out by government of India**

Various community nutritional programmes are running in India to combat child malnutrition and to get nutrition on track. These are based on strategic nutrition related interventions. A few of them are discussed below.

*Promotion of Infant and Young Child feeding practices (IYCF):* exclusive breastfeeding for first 6 months, complementary feeding beginning at 6 months and appropriate infant and young child feeding practices (IYCF) are being promoted. Mother’s Absolute Affection (MAA) programme was launched in 2016 to promote breastfeeding and infant feeding practices by building the capacity of frontline health workers and comprehensive IEC campaign.

*Establishment of Nutritional Rehabilitation Centres (NRCs):* NRCs have been set up at facility level to provide medical and nutritional care to Severe Acute Malnourished (SAM) children under 5 years of age who have medical complications. In addition, the mothers are also imparted skills on child care and feeding practices so that the child continues to receive adequate care at home.

*Anaemia Mukh Bharat (AMB):* to address anaemia, NIPI has been launched which includes provision of supervised bi-weekly Iron Folic Acid (IFA) supplementation by ASHA for all under-5 children, weekly IFA supplementation for 5–10 years old children and annual/biannual De-worming. The AMB strategy—Intensified Iron Plus Initiative—aims to strengthen the existing mechanisms and foster

newer strategies of tackle anaemia, focused on six target beneficiary groups, through six interventions and six institutional mechanisms; to achieve the envisaged target under the POSHAN Abhiyaan. The strategy focuses on testing & treatment of anaemia in school going adolescents and pregnant women using newer technologies, establishing institutional mechanisms for advanced research in anaemia, and a comprehensive communication strategy including mass/mid media communication material.

*National De-worming Day (NDD)*: recognising worm infestation as an important cause of anaemia, National Deworming Day (NDD) is being observed annually on 10th February targeting all children in the age group of 1–19 years (both school enrolled and non-enrolled).

*Biannual Vitamin A Supplementation* is being done for all children below 5 years of age.

*Village Health and Nutrition Days (VHNDs)* are also being organized for imparting nutritional counselling to mothers and to improve child care practices.

A few schemes and services rendered by them are tabulated (**Table 3**) below as per target group.

#### 14.1 NGO's working to combat malnutrition

- Akshaya Patra—the world's largest NGO-run mid-day meal programme serving wholesome school lunch to over 1.76 million children in 15,668 schools across 12 states in India.
- Avantha Foundation Fighting malnutrition in Bihar
- Nutrition CINI India
- Salaam Baalak Trust Health and Nutrition
- The Hunger Project India—The Hunger Project
- Cry NGO in India to Support Child Rights
- CARE India
- Save the Children India
- Feeding India works to eradicate hunger, malnutrition and food wastage in India
- Yashoda Foundation
- SNEHA—Society for nutrition
- Freedom From hunger India trust
- FMCH India—Foundation for Mother and Child Health
- Real Medicine Foundation
- *Indian Impact*—It offers individuals and corporations an easy way to help improve their nearest Anganwadi centre, and supports NGOs that are working to reduce malnutrition.



Target group	Schemes	Major services from schemes
Children (0–3 years)	ICDS	ICDS: supplementary nutrition, growth monitoring, counselling health education of mothers on child care, promotion of infant and young child feeding, home based counselling for early childhood stimulation, referral and follow up of undernourished and sick children.
	RCH-II, NRHM	NRHM: home-based new born care, immunization, micronutrient supplementation, deworming, health check-up, management of childhood illness and severe under-nutrition, referral and cashless treatment for first month of life. Care of sick newborns, facility-based management of severe acute malnutrition and follow up.
	Rajiv Gandhi National Creche Scheme	Rajiv Gandhi National Creche Scheme: support for the care of children of working mothers.
Children (3–6 years)	ICDS	ICDS: non-formal preschool education, growth monitoring, supplementary nutrition, referral, health education and counselling for care givers.
	RCH-II, NRHM	NRHM: immunization micronutrient supplementation, deworming, health check-up, management of illnesses and severe undernutrition
	Rajiv Gandhi National Creche Scheme	Rajiv Gandhi Creche Scheme: support for care of children of working mothers
	Total Sanitation Campaign (TSC)/Nirmal Bharat Abhiyan (NBA)	TSC/NBA: household-level sanitation facilities
	National Rural Drinking Water Programme (NRDWP)	NRDWP: availability of safe drinking water
School going children (6–14 years)	Mid-Day Meals (MDM),	Mid-day meal: hot cooked meal to children attending school.
	Sarva Shiksha Abhiyan (SSA)	SSA: support knowledge dissemination on nutrition by inclusion of Nutrition related topics in syllabus and curriculums for formal education, school health check-up, mid-day meal.

**Table 3.**  
*Selected nutritional schemes and services rendered as per target group.*

15. Case study

The following case study from Tamil Nadu, a southern state of India focuses on the complex challenges faced and the progress made so far as part of efforts towards combating malnutrition. It also demonstrates how lessons are being learned along the way.

15.1 The Tamil Nadu integrated nutrition project (TINP)

The Tamil Nadu Integrated Nutrition Project (TINP), a World Bank assisted intervention program in rural south India, offered nutrition and health services to children under-5 and pregnant and lactating women. TINP-I (1980–1989) eventually covered 174 blocks. It was a forerunner of the Bangladesh Integrated Nutrition

Project (BINP). TINP-II (1991–1997) covered all non-ICDS blocks in the Tamil Nadu state. TINP-II was replaced by World Bank assisted ICDS III (WB-ICDS III) from 1998.

Since 1975, Indian government is providing a package of services to combat child hunger and malnutrition under Integrated Child Development Services (ICDS) program through Anganwadi centres (AWCs). Anganwadi means 'courtyard shelter' in local language.

### 15.2 TINP I (1980–1989)

Approximately 1.25–2.40% points per year (ppt/year) drop in underweight prevalence was noted among beneficiaries. On comparing drop in underweight prevalence between TINP areas and non-TINP areas, it was noticed that drop was approximately 0.83–1.12 ppt/year in TINP areas whereas reduction in underweight prevalence was approximately 0.26–1.12 ppt/year in non-TINP areas.

At the same duration, reduction in the underweight prevalence was estimated as 0.7 ppt/year for the whole of India. Therefore it can be stated that quarter to half of the reduction in underweight prevalence was attributable to the TINP project.

Having achieved a significant reduction in severe early childhood malnutrition, TINP-1 became inspiration for others as a 'success story' during the 1980s. Evaluations indicated a decrease in underweight prevalence of about 1.5% points per year in participating districts, twice the rate in non-participating districts. Several factors contributed in the success story of TINP I viz. selective feeding (the careful focus on supplementing the dietary intake of young children when their growth faltered and until their growth resumed), clarity in job responsibilities and description, positive worker-supervisor ratio and robust monitoring system.

### 15.3 TINP II (1990–1997)

TINP II was rolled out to move beyond reducing severe malnutrition and with a more ambitious objective to significantly reduce the burden of moderate malnutrition. In other words, it shifted towards a more preventive focus. Core strategies adopted in TINP II were regular growth monitoring, nutrition education, health check-ups, supplementary feeding of malnourished children and growth-faltering children, high-risk pregnant and lactating women.

Approximately 6.0 ppt/year drop in underweight prevalence was noted among TINP II beneficiaries. It was also noticed that drop was approximately 1.1 ppt/year in TINP areas. As per estimates of World Bank, the current underlying trend in the state was to be 5.0–7.0 ppt/year, which is most certainly an overestimate.

In the nutshell, TINP II achieved its objective to decrease severe malnutrition but failed to achieve its objective for moderate malnutrition.

A few lessons were learned from TINP II before planning a next phase nutritional intervention. For example, need to work on localized capacity building, improved home-based care by intensifying community mobilization and targeted interpersonal communications, and feeding of 6–24 months old children. Next phase of nutritional programme must incorporate improved service delivery, supportive counselling of caregivers, social mobilization and participatory learning.

Take home message from TINP I was, interventions that are targeted using nutritional criteria, integrated within a broader health system and effectively supervised and managed can significantly reduce severe malnutrition. TINP II

taught us that going further and preventing children from becoming moderately malnourished is in many ways a tougher task, and demands a significant shift in strategy [34, 35].

## 16. Conclusion

The facts and discussion presented above, highlights the worrying unacceptably high prevalence and universality of malnutrition in all its forms in Indian communities, but it is both preventable and treatable. Beyond health, malnutrition is also impacting the social and economic development. In Indian context, poverty, maternal health illiteracy, LBW, diseases like diarrhoea, home environment, dietary practices, hand washing and poor hygiene practices are few important factors responsible for very high prevalence of malnutrition. Government of India has rolled out various community nutritional programmes to combat malnutrition and to get nutrition on track. Despite enormous challenges, India has made considerable progress in tackling hunger and undernutrition in the past two decades, yet this pace of change has been unacceptably slow, uneven and many have been left behind. But with sustained prioritization, increased resource allocation, adopting comprehensive, coordinated and holistic approach with good governance and help of civil society, India has the potential to end malnutrition in all its forms and turn the ambition of the Sustainable Development Goals into a reality for everyone.

### Author details

Abhishek Singh  
Department of Community Medicine, SHKM Government Medical College,  
Haryana, India

\*Address all correspondence to: [abhishekparleg@gmail.com](mailto:abhishekparleg@gmail.com)

### IntechOpen

© 2020 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] Blössner M, de Onis M. Malnutrition: Quantifying the Health Impact at National and Local Levels. WHO Environmental Burden of Disease Series, No. 12. Geneva: World Health Organization; 2005
- [2] Thang NM, Popkin BM. In an era of economic growth, is inequity holding back reductions in child malnutrition in Vietnam? *Asia Pacific Journal of Clinical Nutrition*. 2003;12:405-410
- [3] HUNGaMA: Fighting hunger and malnutrition: The HUNGaMA Survey Report. 2011. Available from: <https://www.eldis.org/document/A72128>
- [4] World Bank. India's Undernourished Children: A Call for Reform and Action. 2019. Available from: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,contentMDK:20916955~pagePK:146736~piPK:146830~theSitePK:223547,00.html> [Accessed: 05 March 2019]
- [5] Global Panel. The Cost of Malnutrition: Why Policy Action is Urgent. 2016. Available from: <https://glopan.org/sites/default/files/pictures/CostOfMalnutrition.pdf>
- [6] Rice AL, Sacco L, Hyder A, Black RE. Malnutrition as an underlying cause of childhood deaths associated with infectious diseases in developing countries. *Bulletin of the World Health Organization*. 2000;78:1207-1221
- [7] Sengupta P, Philip N, Benjamin AI. Epidemiological correlates of under-nutrition in under-5 years children in an urban slum of Ludhiana. *Health and Population; Perspectives and Issues*. 2010;33(1):1-9
- [8] UNICEF-WHO-World Bank: Joint Child Malnutrition Estimates – 2019 edition. Available from: <https://data.unicef.org/topic/nutrition/malnutrition/>
- [9] Nelson GC, Rosegrant MW, Koo J, Robertson R, Sulser T, Zhu T, et al. Impact on Agriculture and Costs of Adaptation. Washington DC: International Food Policy Research Institute (IFPRI); 2009
- [10] Global Nutrition Report. 2018. Available from: <https://globalnutritionreport.org/reports/global-nutrition-report-2018/>
- [11] National Family Health Survey IV. 2015-2016. Available from: <http://rchiips.org/NFHS/NFHS-4Reports/India.pdf>
- [12] The Global Hunger Index. 2018. Available from: <https://www.globalhungerindex.org/about/>
- [13] Gragnolati M, Shekar M, Gupta MD, Bredenkamp C, Lee YK. India's Undernourished Children: A Call for Reform and Action. Washington DC: The International Bank for Reconstruction and Development/The World Bank; 2005
- [14] Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, et al. Maternal and child Undernutrition study group. Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet*. 2008;371(9608):243-260
- [15] Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition study group. maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet*. 2008;371(9609):340-357
- [16] Harvard TH. Chan School of Public Health. Top Risk Factors for Child Undernutrition in India identified. 2017. Available from: <https://www.hsph.harvard.edu/news/press-releases/top-risk-factors-for-child-undernutrition-in-india-identified/>



- [17] Leakage and Corruption in India's Public Distribution System. 2016. Available from: <https://www.isid.ac.in/~epu/acegd2016/papers/DanielOverbeck.pdf>
- [18] Mishra VK, Retherford RD. Women's education can improve child nutrition in India. National Family Health Survey Bulletin. 2000;**15**:1-4
- [19] Rapid Assessment of RKS and VHSNC in Sikkim. Available from: [http://www.rrcnes.gov.in/study\\_report/Final%20RKS%20-%20VHSNC%20Assessment%20Report%20130217.pdf](http://www.rrcnes.gov.in/study_report/Final%20RKS%20-%20VHSNC%20Assessment%20Report%20130217.pdf)
- [20] Preventing Hunger and Malnutrition in India. 2017. Available from: <https://www.orfonline.org/research/preventing-hunger-and-malnutrition-in-india/>
- [21] UNICEF. Child-Marriage. 2019. Available from: <https://unicef.in/Whatwedo/30/Child-Marriage>
- [22] Swachh Bharat Survey. Swachhta Status in India, July–December 2017. Available from: [http://www.mospi.gov.in/sites/default/files/publication\\_reports/Final\\_Report\\_Swachha\\_Status\\_India\\_16oct18.pdf](http://www.mospi.gov.in/sites/default/files/publication_reports/Final_Report_Swachha_Status_India_16oct18.pdf)
- [23] Swachhta Status Report. Most of Rural India Still Opt for Open Defecation: National Sample Survey (NSS) Report. 2016. Available from: [http://upsccivilservices.com/news\\_update/662/Most\\_of\\_rural\\_India\\_still\\_opts\\_for\\_open\\_defecation\\_NSS\\_report](http://upsccivilservices.com/news_update/662/Most_of_rural_India_still_opts_for_open_defecation_NSS_report)
- [24] Caulfield LE, de Onis M, Blossner M, Black RE. Under nutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria and measles. The American Journal of Clinical Nutrition. 2004;**80**:193-198
- [25] Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E, et al. What works? Interventions for maternal and child undernutrition and survival. The Lancet. 2008;**371**(9610):417-440
- [26] Griffiths P, Matthews Z, Hinde A. Gender, family, and the nutritional status of children in three culturally contrasting states of India. Social Science and Medicine. 2002;**55**:775-790
- [27] Victora CG, Bahl R, Barros AJ, França GV, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong effect. The Lancet. 2016;**387**(10017):475-490
- [28] Lakshminarayanan S, Jayalakshmy R. Diarrheal diseases among children in India: Current scenario and future perspectives. Journal of Natural Science, Biology, and Medicine. 2015;**6**(1):24
- [29] Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, et al. Maternal and child nutrition study group. Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? The Lancet. 2013;**382**(9890):452-477
- [30] Kuruvilla S, Sadana R, Montesinos EV, et al. A life-course approach to health: Synergy with sustainable development goals. Bulletin of the World Health Organization. 2018;**96**(1):42-50
- [31] Jacob CM, Hanson M. A life-course approach for influencing policies to prevent childhood malnutrition. Crisis and Opportunity of the Double Burden. 2018;**2016**(2025):18
- [32] de Onis M, Blössner M. The World Health Organization global database on child growth and malnutrition: Methodology and applications. International Journal of Epidemiology. 2003;**32**:518-526
- [33] SRS Statistical Report 2016. Office of the Registrar General and Census Commissioner, India. Ministry of Home Affairs, Government of India. 2016.

Available from: [http://www.censusindia.gov.in/vital\\_statistics/SRS\\_Reports\\_\\_2016.html](http://www.censusindia.gov.in/vital_statistics/SRS_Reports__2016.html)

[34] Gillespie S, Haddad L. The Double Burden of Malnutrition in Asia: Causes, Consequences, and Solutions. New Delhi: Sage Publications India; 2003

[35] Essential Nutrition Actions: Improving Maternal, Newborn, Infant and Young Child Health and Nutrition. Geneva: World Health Organization; 2013. Annex 3, Nutrition Programme Case Studies. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK258728/>

[36] Mohseni M, Aryankhesal A, Kalantari N. Factors associated with malnutrition among under five-year-old children in Iran: A systematic review. *Annals of Tropical Medicine and Public Health*. 2017;**10**:1147-1158