



Research Paper

## A Review on the Nutritional Status of Under Five-Year-Old Children in India and its Influencing factors

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**ABSTRACT:** Children are the backbone of any country. An excellent nutritional status must support optimal growth and development. Children under the age of five are a crucial period of growth and development, further influencing an individual's future overall well-being. The nutritional status of a child is determined by multifactorial determinants. In this paper, we review the different types of malnutrition and the factors and determinants that influence the nutritional status of a child under five years of age.

**KEYWORDS:** Factors, Malnutrition, Nutritional Status, Under five-year-old children.

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### I. INTRODUCTION

The health of a nation depends on the health of its citizens. A healthy child develops into a healthy adult. Appropriate nutrition during the first 1000 days of life starting from conception of the child to the second birthday is critical to the future health, wellbeing, and success of any child. India has not overcome the problems of poverty, undernutrition, and communicable diseases yet; it is facing increasingly additional challenges related to prosperity resulting from industrialization, urbanization, and economic betterment. Overnutrition and obesity have emerged over the last two decades which causes India to face the challenge of double burden of malnutrition. Since malnutrition has multiple effects on a child's development optimum nutrition is a necessity for every child [1].

Malnutrition in developing countries remains a major health problem detrimental to both children and the nation and it accounts for 50 percent of the 10 to 11 million deaths of children under five years of age [2]. Malnutrition not only affects the health of a child but also hinders their motor, sensory, cognitive, and social development [3].

Apart from food intake and good health the survival, growth and development of a child is dependent on the care and behaviour of a caregiver. Feeding young children is one of such components the caregiver's behaviour must possess [4]. Poverty, low levels of education, and poor access to health services remain the underlying cause of malnutrition. Optimum feeding of infants and young children is one of the essential determinants of the child's growth and survival. The nutritional status of children under two years of age is directly affected by their feeding practices which ultimately impact the child's survival. The recommendation for healthy and optimum child growth is to breastfeed the infant immediately within one hour after delivery, exclusive breastfeeding for the first six months of life with no pre-lacteal feeds, and complementary foods from six months of age with continued breastfeeding up to two years of age [5].

A high prevalence of malnutrition may result if exclusive breastfeeding of an infant is not done for six months. Also, there is an association of delayed complementary feeding beyond 26 weeks of age with an increased risk of nutritional deficiency and increased risk of immune system disorder particularly in low-income populations [4]. Nutritional status can also be determined by the quality of nutrients consumed by an individual and the body's ability to utilize the nutrients for its metabolic needs [5]. Anthropometric indices signify the collective effect of access to food, nutritional practices, health and education of parents and environmental health conditions. The nutritional status is a sensitive indicator for preschool children since children are most vulnerable to nutritional imbalances [6]. This paper reviewed the nutritional status of under-five-year old children in India and its influencing factors.

## II. MALNUTRITION- DEFINITION AND CLASSIFICATION.

Malnutrition is defined as deficiencies or excesses of nutrient intake and imbalance or impaired nutrient utilization [7]. Malnutrition consists of both undernutrition and overnutrition. Undernutrition can further be divided into four broad forms:

**2.1 Wasting-** Wasting or acute malnutrition is defined as low weight for height. It usually occurs when there is insufficient food intake or when there is a frequent or prolonged illness, the incidence of infectious diseases especially diarrhoea. Wasting impairs the functioning of the immune system, increases severity, duration, and susceptibility to infectious diseases, and increases the risk of death [7]. Children affected by wasting also suffer from nutritional oedema, which is characterized by swollen faces, feet, and limbs. There is evidence that wasting occurs very early in life and disproportionately affects children under 2 years of age [8]. Severely wasting is the most lethal form of undernutrition wherein the child is too thin for height. The immune system is weakened and there is an increased risk of death among children under 5 by up to 11 times compared to well-nourished children [9].

1. Moderate Acute Malnutrition (MAM) or moderate wasting is weight-for-height  $< -2$  z-score and  $\geq -3$  z-score for children 0-59 months (or children 6-59 months, MUAC  $< 125$ mm and  $\geq 115$ mm) [10]
2. Severe Acute Malnutrition (SAM) or severe wasting is weight-for-height  $< -3$  z-score for children 0-59 months (or for children 6-59 months, MUAC  $< 115$ mm) or the presence of bilateral pitting oedema [10].
3. Global Acute Malnutrition (GAM) is defined as the presence of both MAM and SAM in a population. It is a measurement of nutritional status at the population level and GAM of more than 10% signifies an emergency [10].

Protein-energy undernutrition (PEU) which was previously known as protein-energy malnutrition (PEM) is due to deficiency of all macronutrients. PEU can be sudden or gradual. Globally PEU occurs mostly in children and older people who lack access to nutrients. In children, PEU has 2 common forms: Marasmus and Kwashiorkor [11].

Marasmus is also called the dry form of PEU and it is common in countries with high rates of food insecurity [11]. Marasmus is a form of malnutrition that occurs when there is insufficient consumption of protein and calories. The symptoms of marasmus include wasting or loss of body fat and tissue leading to low BMI, stunted growth, dry skin, brittle hair, persistent dizziness, sunken eyes, and lack of energy [12].

Kwashiorkor the wet, swollen, or edematous form of severe protein-energy malnutrition is caused by the deficiency of protein. In kwashiorkor the body retains fluid in the lower legs, feet, arms, and hands leading to a swollen appearance and a distended or bulging abdomen. Other symptoms include lack of appetite and energy, irritability, changes in hair colour to yellow or orange, patches of skin usually turning light or dark, skin shedding or ulcers, or skin lesions beginning to leak or bleed [12].

Marasmic kwashiorkor, the third form of PEM combines features of both marasmus and kwashiorkor. A person with marasmic kwashiorkor may be extremely thin or show signs of wasting in one area of the body and excessive fluid buildup in other parts. A child with marasmic kwashiorkor will weigh less than 60 percent of the standard weight for their age [12].

In both marasmus and kwashiorkor there is impairment of cell-mediated immunity increasing susceptibility to infections like pneumonia, gastroenteritis, otitis media, urinary tract infections, and sepsis. There is a marked decrease in serum albumin due to infections. Infections cause the release of cytokines which cause anorexia and worsen muscle wasting [11].

**2.2 Stunting-** Stunting is defined as low height for age. It can occur in the first 1000 days after conception, and many factors related to stunting are low socioeconomic status, dietary intake, maternal nutritional status, infectious diseases, and when there is chronic or recurrent undernutrition.

It can also be defined as a height-for-age that is more than two standard deviations below the WHO child growth standards median. Long-term effects of stunting include diminished cognitive development, diminished physical development, reduced productive capacity, and an increased risk of degenerative diseases such as diabetes [13].

**2.3 Underweight-** Underweight is defined as low weight for age. Children whose weight-for-age less than minus two standard deviations ( $-2SD$ ) from the median of the reference population are regarded as underweight and children with weight-for-age less than minus three standard deviations ( $-3SD$ ) are regarded as severely underweight [14].

**2.4 Micronutrient deficiencies-** Also known as hidden hunger is defined as a lack of essential vitamins and minerals such as iron, folic acid, vitamin A, zinc, and iodine [7]. Almost one-third of children aged 6-59 months

(children <5 years) in low and middle-income countries suffer from Vitamin A deficiencies and 18% of children <5 years have iron deficiency anaemia. Likewise, insufficient iodine intake can be seen in 30% of the population globally and 17% in inadequate zinc intake [15].

**2.5 The double burden of malnutrition-** The double burden of malnutrition is a form of malnutrition characterized by the coexistence of malnutrition along with overweight, obesity, or diet-related non-communicable diseases (NCDs). It can manifest within individual, household, and population levels. On an individual level, it can develop through the simultaneous development of two or more types of malnutrition, eg, obesity with nutritional anaemia or vitamin or mineral deficiencies or insufficiencies. At the household level it can occur in a mother with nutritional anaemia with a child or grandparent who is overweight or has type-2 diabetes. The double burden of malnutrition in the household is more common in middle-income countries undergoing rapid transition in nutrition. Also at the population level, it can be observed with undernutrition and overweight, obesity, or NCDs. The drivers or determinants of the double burden of malnutrition are related to the sequence of epidemiological changes such as nutrition transition, epidemiological transition, and demographic transition. The nutrition transition relates to globalization and urbanization where there is shift in the dietary pattern, consumption and energy expenditure which is associated with economic development. The epidemiological transition is associated with economic prosperity and an increase in the disease burden of the population. Demographic transition describes a population with a shift in the structure and expansion of lifespan with high birth and death rates. There is the transformation of the population with high proportions of younger people and an increasing proportion of older people (increasing age being a risk factor for NCDs) [16].

### **III. DETERMINANTS OF MALNUTRITION-**

Malnutrition is multifaceted. There are various determinants that directly or indirectly cause malnutrition in children. These are birth size, maternal education, maternal nutrition, maternal low body mass index ( $BMI < 18.5\text{kg/m}^2$ ), maternal anaemia, child's birth order and birth weight, maternal age, antenatal care (ANC), child sex and size at birth, toilet facility, stool disposal system, a short period of breastfeeding and household income level [17].

**3.1 Maternal education-** Various studies and hypotheses have been attempted to link maternal education with infant and child mortality. The incidence of malnutrition in children significantly decreases with an increase in maternal educational level from primary to secondary and higher level. These linking probabilities may be through socioeconomic status, health knowledge, modern attitudes towards health, female autonomy, and reproductive behaviour that comes along with education [18]. Maternal education is an important factor in maintaining proper child care. A mother who is educated is likely to have more knowledge about child nutrition, and childcare practices, have a higher awareness of the utilization of childcare services, and can provide a healthy environment for her child [17]. The z-score for height-for-age of a child increases significantly with an increase in the level of maternal education. Stunting is inversely proportional to the mother's level of education [19].

**3.2 Maternal nutrition-** Maternal nutrition is the nutritional needs of the mother during the antenatal, and postnatal periods and the period even before the conception of a child. A mother who is undernourished during pregnancy has a greater chance of reproductive risk including death during or after childbirth. Undernutrition in pregnant women can also cause intrauterine growth retardation resulting in low birth weight of the child, pre-mortality, and low nutrient stores in infants [17]. The BMI (body mass index) of a mother significantly affects wasting and Children born to an underweight mother are more likely to be wasted than a child born to a normal or obese mother. shows the intergenerational cycle of malnutrition in India [19].

**3.3 Household income-** Household income affects the nutritional status of a child by affecting the ability to purchase food, provide child health care services, and acquire the capital for the improvement of hygiene standards. A child who belongs to a low-income family is more likely to be malnourished than a child belonging to the high-income family. Household with low income tends to spend less money on health services, and have a lower capacity to provide better quality housing including clean water and appropriate sanitation. All these results in low nutritional status of mothers during pregnancy, lack of proper knowledge of child feeding practices, lack of immunization and vitamins in children, increased susceptibility to infection, impairment in child development, and increased mortality rate [17]. Children born in a poor family are more likely to be stunted than children born into a rich family [19].

**3.4 Age of the child-** The prevalence of undernutrition and risk of malnutrition in a child increases with increase in the age of a child [17]. The age of the child significantly affects their height-for age which is observed from a study where the prevalence of stunting is higher at age 12 to 23 months compared to infants 0-11 months [19]. The nutritional status of children and level of food requirements vary with varying in age group. With the increase in the age of a child, there is a probability that new infant will be there in the household. The following new infant needs more thorough attention and a larger budget of the household than the child before. Young children may suffer nutritionally if their mothers are too busy feeding the infant and do not have time to feed them since they are unable to get adequate food and care for themselves [18].

**3.5 Sanitation facility-** The type of sanitation facility is an important factor that influences malnutrition in children. Proper sanitation facility decreases the chance of infection in children [17]. A child born into a household where drinking water is not piped into the dwelling, not from public tap, or is not from a well-protected spring, or well has more chances to take up childhood diseases such as diarrhoea that can cause wasting [19].

**3.6 Child's birth order and family size-** The prevalence of malnutrition increases with the increase in birth order and family size. Children's birth order and family size is an important factor in determining the nutritional status of a child. There is also evidence of growth retardation in a child with large family size. With the increase in the family size, less attention is paid to the nutritional requirements of the child and ultimately the chance of malnourishment in the child increases [17]. There is a significant relationship between multiple births and the weight-for-age of the child. Underweight is higher in a household where there are multiple child births than in a household with singleton children [19]. There are higher endowments of allocations and investments in earlier-born children because they are more likely to have earlier returns. This shows the discrimination in the distribution of resources in households' childbirth orders [18].

**3.7 Birth interval-** A longer birth interval between two births results in the good health status of the mother as well as the child. When the birth interval between two children is more than 24 months it enhances the reproductive strength of the mother, since the mother might not physically recover from the previous birth if she conceives the next child shortly subsequently leading to adverse outcomes. Malnutrition is assumed to be inversely related to birth interval of the child. The larger the birth interval between two births there is better the use of resources for child welfare which eventually improves the child's nutritional status. The risk of malnutrition in children declines in both urban and rural areas when the birth interval is greater than 24 months [18].

**3.8 Breastfeeding-** The duration of breastfeeding has a positive as well as negative effect on the nutritional status of a child. Breastfeeding is good for the nutritional status of infants but not for older children. The positive impact is that breastfeeding protects infants from infectious and chronic diseases including both diarrhoea and acute respiratory diseases. The optimal feeding practice is to include complimentary feeding at about 6 months of the child's age. Only breast milk is no longer sufficient to satisfy the developing infant's energy, protein and micronutrient needs after 6 months of age. Children who were breastfed till they were more than 37 months old are more likely to be malnourished [18].

**3.9 Culture-** In all human societies, foods have both cultural and nutritional importance. Culture may influence nutrition in two ways- culture may prohibit certain important and nutritious foods from the diet by defining them as non-food, irreligious, alien, lower or higher class food, taboo, and on the other hand culture may encourage certain foods by defining them as sacred, food medicine or as a sign of social, gender, age, religious or ethnic identity [20]. In tribal societies from time immemorial, there has always been a close association between plants and animals for various reasons such as ritual practices, healing diseases and illnesses, and complete well-being. Among the Kabui tribes of Manipur when children reach their third month, the weaning period is observed on one auspicious day and the child is fed with a beautiful and colourful bird locally known as "jaipu". This is believed that the child will be healthy, well bodied and beautiful as the bird itself. In the same community, it is also believed that overnutrition in a child is considered as healthy and an indication of a well-nourished child [21].

#### **IV. CONSEQUENCE OF MALNUTRITION-**

Malnutrition in childhood is a major health problem because it is associated with significant morbidity and mortality. Consequences of malnutrition in infants and children can be short-term and long-term; short-term consequences can be morbidity, mortality, and disability while the long-term consequences are impaired cognitive development, increased risk of diseases as a result of concurrent infections or metabolic disorders, and suboptimal economic productivity [22]. The lower the birth weight, the greater the chance of developmental delay at a later age. Developmental delay was significantly higher among children with malnutrition in the 0-3 years' age group [23]. Chronically malnourished children perform less well in school and have greater chances to repeat grades or school dropouts. Chronic malnutrition in childhood also increases the risk of obesity and developing non-communicable diseases such as diabetes in adulthood [24]. Malnutrition survivors had a lower probability of attaining a high level of education or high academic performance, a lower cognitive test, and less social disability [25].

## **V. PREVALENCE OF MALNUTRITION IN INDIA-**

In India, the National Family and Health Survey (NFHS) showed that malnutrition in children under 5 years has reduced, where the prevalence of stunting has decreased from 38.4% to 35.5%, wasting 21.0% to 19.3% and underweight 35.8% to 32.1% [26]. However, the number of children who are malnourished is almost double that in Sub-Saharan Africa, disturbing the mortality rate, productivity rates, and economic growth of the country [27]. Undernutrition such as stunting is higher among children in rural areas (37%) than urban areas (30%) with the highest rate in Meghalaya (47%) and lowest in Puducherry (20%). A prominent decrease in the rate of stunting was observed in Haryana, Uttarakhand, Rajasthan, Uttar Pradesh, and Sikkim by 7 % points each, Jharkhand, Madhya Pradesh, and Manipur by 6% points each, and Chandigarh and Bihar with 5% point each [28].

According to the Sample Registration System (2017), the infant mortality rate of the states of northeast India was lower than the country's average of 34 deaths per 1000 live births except Assam (44), Arunachal Pradesh (36) and Meghalaya (39) [29]. The northeastern states of India demonstrate a poor status of malnutrition and are lower than the country's average. There is an upsurge in stunting among children under 5, the highest in Meghalaya at 46.8%, followed by Nagaland (32.7%), Tripura (32.3%), and Mizoram (28.9%) but there is a drop in stunting levels in Assam, Manipur and Sikkim according to NFHS-5 data. All the north-eastern states show an increase in the number of overweight which increases the growing double burden of malnutrition. In Assam, stunting has decreased by almost one percentage point, even though rates of overweight increased from 2.3% to 4.9%, underweight increased from 29.8% to 32.8%, and rates of stunting increased from 17% to 21.7% while the rate of wasting and underweight has decreased by 2% in each case [30].

## **VI. KNOWLEDGE, ATTITUDE AND PRACTICES OF CAREGIVER-**

The first one thousand days of life of a child starting from conception to the second birthday is considered to be the most vital for the child's health, happiness, and survival. Nutrition knowledge is important for the maintenance of the nutritional status of the children. Not only knowledge but having a good attitude about nutrition is also important to put into good practice [1].

During the first five years of life, a mother is the sole provider of the principal care that her child needs. Nutritional awareness of a mother plays an important role in the type of care a mother provides to her child. Knowledge and understanding of the basic nutrition and healthcare of a mother also impact the nutritional status of a child. Maternal/caregiver knowledge, attitude, and practices (KAPs) can have an important role in influencing and maintaining the child's nutritional status and nutritional pattern. For a mother/caregiver, it is critical to have good nutritional knowledge of dietary practices for preventing malnutrition in children [31]. In developing countries maternal educational level, health, and nutritional status are fundamental to the quality of life and is a key indicator of the child's nutritional status, behavioural, and other aspects of child health and welfare [2]. There is a significant relationship between nutritional knowledge and education level where caregivers with secondary or higher education are likely to have better nutritional knowledge [32] and the prevalence of stunting decreases with increasing nutritional knowledge [33].

Proper knowledge of dietary needs is essential for overall good health and nutritional status amidst limited resources. Sometimes mothers do not know the importance of a certain variety of food, their balance in diet, and the right amount needed by children to meet these dietary needs. Even in households with adequate resources, food, and health services, malnutrition, and poor nutritional status can occur if they do not have proper nutritional knowledge. But this does not necessarily mean that all mothers of malnourished children are ignorant or all illiterate mothers whether their child is healthy or not, are ignorant but their knowledge level on child health and nutrition can have a major impact on the child's overall health [5]. A mother who has nutritional knowledge is more aware of the nutritional requirements during pregnancy, lactation, supplemental

foods, healthy eating habits, immunisation, and maintenance of personal hygiene. Not only health status, but education also gives mothers knowledge to aid in their child's academic success [34].

## VII. CONCLUSION

From the various literature reviews that were done, we can see that good nutritional status of a child is crucial as children are the future of a nation. Malnutrition in early childhood caused by poor feeding habits can in future cause many impairments in a child such as cognitive, social, a poor educational performance which in turn will reduce their productivity in the future. Malnutrition is multifaceted however; the caretaker of a child should have a good knowledge of dietary needs, the importance of a variety of food and food groups, and also a balanced diet to meet the nutritional requirements of the child. The need to raise awareness about malnutrition as a problem at the community level is imperative so that collective action can be taken to empower caregivers with knowledge and a facilitative environment with the involvement of the families and community as a whole.

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