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Review Article

Epidemiology of malnutrition among under-five children in selected middle-belt states of India: a review

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ABSTRACT

Malnutrition among children under the age of five is a significant concern for health authorities in India. This review aims to evaluate the burden of stunting, wasting and undernutrition, identify their determinants, and outline strategies needed to address malnutrition in under 5 years old children age group. Recent data was sourced from platforms such as Google search, Medline, PubMed, Research scholars and others, and the retrieved information was analyzed for inconsistencies. Researches shows that the prevalence of stunting, wasting and undernutrition remains high, with considerable variation based on the assessment methodology used. To plan effective control measures, it is essential to analyze the distribution of various risk factors and their influence on the nutritional status of children in specific settings. The WHO has identified PEM as one of the major problems among the children round the world. Also, over the years it has been found that developing countries like India have been facing the issue of PEM among children particularly at the most crucial stage of their development. This paper is a review on the status of malnutrition among young children (under the age of five) in middle line states of India. The study is based on analysis the secondary sources of relevant literature and the inferences.

Keywords: Malnutrition, Stunting, Wasting, Underweight, Nutritional Status

INTRODUCTION

Malnutrition among children under the age of five is a critical public health issue in India. The prevalence of underweight children in the country ranks among the highest globally and is nearly twice as high as in Sub-Saharan Africa. Additionally, malnutrition in India is highly concentrated, with a significant portion of the burden localized in a few areas. Just five states and half of the villages contribute to approximately 80% of the total malnutrition cases.[1] India is one of the fastest-growing nations in South Asia in terms of economy, education, and technology. However, despite this economic progress, the country continues to struggle with malnutrition, which significantly hinders its socio-economic development.[2] India is home to over one-third of the world's malnourished children, with half of the world's undernourished children concentrated in just three countries: Bangladesh, India, and Pakistan. According to the Global Hunger Index 2017, India ranks 100th out of 119 countries.[3]

The prevalence of malnutrition among children in India is nearly twice as high as in Sub-Saharan Africa, impacting child mortality rates, productivity, and overall economic growth. Each year, almost half of India's children are malnourished, and nearly one million newborns die within their first month of life. Additionally, 43% of children under five in India are underweight, and 48% are stunted due to severe malnutrition, with three out of every ten children experiencing stunting.[4]

Malnutrition remains a significant issue in several Indian states, despite high education levels and population

density. In Uttar Pradesh, which is the most densely populated state, a large number of children under the age of five suffer from stunting due to malnutrition.

Tamil Nadu also faces a notable child malnutrition problem, with 23% of children being underweight and 25% moderately stunted, according to the National Family Health Survey.

Madhya Pradesh has the highest number of malnourished children in India, with 74.1% of children under 6 affected by anaemia and 60% suffering from malnutrition. Jharkhand and Bihar also report alarmingly high rates of malnutrition, with Bihar's prevalence standing at 55.9%.[28] Millennium Development Goal 1 (Target 2) aimed to reduce by half the proportion of people suffering from hunger between 1990 and 2015, as indicated by the prevalence of underweight children under the age of five.

However, the burden of under-nutrition among under-five children in India has shown little improvement, despite the implementation of various intervention programs. Additionally, shifting dietary patterns are impacting the nutritional status of young children, contributing to a rise in adult non-communicable diseases such as obesity, diabetes, hypertension, and coronary heart disease later in life.[5]

The Sustainable Development Goals (SDGs) (2015-2030), particularly SDG 2 (Zero Hunger), play a central role in guiding India's strategies to reduce malnutrition among children under five years of age. SDG 2 explicitly targets ending all forms of malnutrition, including stunting, wasting, and underweight, while related goals such as SDG 1 (No Poverty), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), and SDG 6 (Clean Water and Sanitation) address the broader determinants of child nutrition (United Nations, 2015).[33]

India's commitment to the SDGs has led to policy alignment, measurable national targets, and multisectoral convergence across programs such as the Integrated Child Development Services (ICDS) and the National Nutrition Mission (POSHAN Abhiyaan), aimed at improving maternal and child nutrition outcomes (Ministry of Women and Child Development, 2021).[34]

National Family Health Survey-5 (NFHS-5) data indicate some improvements compared to NFHS-4; however, stunting (35.5%), wasting (19.3%), and underweight prevalence (32.1%) remain high (International Institute for Population Sciences [IIPS] and ICF, 2021).[35]

Classification of malnutrition

The World Health Organization (WHO) defines malnutrition as a condition resulting from deficiencies, excesses, or imbalances in a person's energy and/or nutrient intake. Malnutrition can manifest as either undernutrition or overnutrition. Common signs of malnutrition include physical and mental fatigue, low weight relative to height (wasting), short stature for age (stunting), reduced skin folds, pronounced skeletal outlines, and loss of skin elasticity. The WHO global database on child growth and malnutrition classifies malnutrition using Z-scores.

A Z-score below−2 SD indicates moderate to severe undernutrition for weight-for-age, height-for-age, and weight-for-height, while a Z-score below −3 SD signifies severe undernutrition. In contrast, a Z-score above +2 SD categorizes high weight-for-height as overweight in children.[6]

The prevalence of malnutrition was only observed in the middle line state of India. The information was collected from the google search engine, Medline, PubMed, research scholars and others resources. The keywords used for the search included: malnutrition, wasting, stunting, underweight, under 5 years old children, determinants, nutritional status, strategies, India. The search since 2005 Until date.

This data is collected from the 30 research papers and the government data of the 7 states (Maharashtra, Madhya Pradesh, Gujrat, Chhattisgarh, Jharkhand, West Bengal, Odisha). The review of state-level studies across India highlights a high burden of malnutrition among children under five-year-old middle states of India. In Chhattisgarh, stunting ranged from 35.5% to 48.4%, wasting from 6.7% to 50.5%, and underweight from 25.3% to 44.3%.[7-11]

In Gujarat, the prevalence of stunting was reported between 19.5% and 52.8%, wasting from 8.9% to 47.2%, and underweight from 5.9% to 44%.[12-17] In Jharkhand, children showed 25.3% stunting, 12% wasting, and 31.8% underweight.[18]

In Madhya Pradesh, stunting varied between 41.4% and 59.5%, wasting between 19.7% and 24.7%, and underweight between 35.8% and 53.1%.[19-21] In Maharashtra, stunting ranged from 29% to 59%, wasting from 12.4% to 33%, and underweight from 33.5% to 53%.[22-25] In Odisha, studies reported stunting rates between 38.4% and 42%, wasting between 18.9% and 75%, and underweight between 21% and 55.3%.[26-28] In West Bengal, stunting varied from 14.1% to 54.2%, wasting from 9.4% to 20.1%, and underweight from 9.7% to 65.2%.[29-31]

Combining these studies the highest stunting rates were observed in Madhya Pradesh (41.4-59.5%), wasting was most pronounced in Odisha (18.9-75%), and the highest burden of underweight children was reported in West Bengal (9.7-65.2%).

Overall, these findings reflect regional disparities but consistently indicate that malnutrition remains a major

public health concern among Indian children, with stunting and underweight being highly prevalent. Table 1 shows the studies of prevalence of malnutrition among under five-year-old children in middle line state of India.

Table 1: Prevalence of malnutrition among under five-year-old children in middle line state of India.

Authors	Year	Age group	Sample size	Findings
Chhattisgarh				
Nutritional status of children under 5 years in tribal villages of Bastar Chhattisgarh India.[7]	2019	Less than 5 years	140	40.7% stunted, 29.3% wasting, 44.3% underweight
Nutritional status of 1-5 years children in the urban slum area of Jagdalpur city, Bastar region, Chhattisgarh.[8]	2018	12 months to less than 5 years	225	41.3% stunted, 19.1% wasting, 28.4% underweight
Protein energy malnutrition among preschool tribe's children of Chhattisgarh, India.[9]	2015	Less than 6 years	449	45.8% stunted, 6.68% wasting, 25.3% wasted and stunted
Dimensions and causes of child malnutrition: a study of preschool children of Raipur, Chhattisgarh, India.[10]	2004	2-year-old to 5-year-old	121	48.38% stunted, 50.51% wasting
Nutritional status of pre-school children (1-5 years) in rural area of Chhattisgarh state.[11]	2018	1 - 5 years	400	35.5% stunted, 28.5% wasting, 36% underweight
Gujarat				
Prevalence of under nutrition in 0–5-year children of Junagadh district, Gujarat.[12]	2021	0-5 years	459	49% stunted, 10.7% wasting, 26.4% underweight
Prevalence and predictors of undernutrition among children under two years in Narmada district, Gujarat state, Western India: a community-based cross-sectional study.[13]	2020	Less than 2 years	400	34.5% stunted, 32.2% wasting, 39.7% underweight
Nutritional status of children under two years of age in the Devbhumi Dwarka district, Gujarat: a descriptive cross-sectional study.[14]	2022	Less than 2 years	1200	32% stunted, 14% wasting, 17% underweight
Malnutrition among under five children in peri-tribal areas: a study on prevalence and factors associated in Vadodara district of Gujarat state in India.[15]	2022	Less than 5 years	370	19.5% stunted, 8.9% wasting, 5.94% underweight and stunting, 22.16% stunting and wasting, 10.5% wasting and underweight
Prevalence of under nutrition and its predictors among under 5-year children in Surat region, Gujarat, India.[16]	2016	Less than 5 years	3133	39% stunted, 22.5% wasting, 44% underweight
Nutritional status of rural children aged six months to five years in Vadodara district of Gujarat.[17]	2014	6 month - 5 years	250	52.8% stunted, 47.2% wasting
Jharkhand				
Prevalence of stunting, wasting and underweight among santal children of Galudih, Purbi Singbhum district, Jharkhand, India.[18]	2023	3 year - 5 years	400	25.3% stunted, 12% wasting, 31.8% underweight
Madhya Pradesh				
A study on malnutrition among children under the age of 5 in Mandla district of Madhya Pradesh.[19]	2023	Less than 5 years	276	46.74% stunted, 24.72% wasting, 51.81% underweight

Continued.

Authors	Year	Age group	Sample size	Findings
A study of malnutrition and associated risk factors among children of age 6- 59 months in rural area of Jabalpur district, Madhya Pradesh.[20]	2018	6 month - 5 years	517	41.4% stunted, 19.7% wasting, 35.8% underweight
Malnutrition prevailing trend study among under five children of urban slum area of Gwalior city Madhya Pradesh.[21]	2021	2 year - 5 years	550	59.45% stunted, 22.18% wasting, 53.09% underweight
Maharashtra				
Undernutrition among under-five children in Western Maharashtra.[22]	2021	Less than 5 years	307	35.5% stunted, 12.4% wasting, 33.5% underweight
Undernutrition among tribal children in Palghar district, Maharashtra, India.[23]	2019	Less than 5 years	375	59% stunted, 20% wasting, 53% underweight
Prevalence and determinants of undernutrition among under-five children residing in urban slums and rural area, Maharashtra, India: a community-based cross-sectional study.[24]	2020	Less than 5 years	3671	45.9% stunted, 17.1% wasting, 35.4% underweight
Prevalence and determinants of undernutrition and its trends among pre-school tribal children of Maharashtra state, India.[25]	2011	0 - 12 months	5453	29% stunted, 33% wasting, 41% underweight
Odisha				
Prevalence of malnutrition among under five children of urban slums of Berhampur, Odisha, India: a community based cross-sectional study.[26]	2017	6 months - 5 years	300	42% stunted, 75% wasting, 55.3% underweight
Prevalence of protein energy malnutrition among under-five children in Odisha: a review.[27]	2021	Less than 5 years		38.4% stunted, 35.8% wasting, 21% underweight
Prevalence of child malnutrition (0-5)-a study on Boudh district, Odisha.[28]	2021	Less than 5 years	200	41.5% stunted, 18.9% wasting, 34.3% underweight
West Bengal				
Prevalence of under nutrition and its risk factors among children below two years of age in a tertiary health centre in West Bengal.[29]	2022	Less than 2 years	135	14.1% stunted, 18.5% wasting, 9.7% underweight
Stunting, underweight and wasting among integrated child development services (ICDS) scheme children aged 3–5 years of Chapra, Nadia district, West Bengal, India.[30]	2007	3 - 5 years	545	23.9% stunted, 9.4% wasting, 31% underweight
Prevalence of undernutrition among santal tribal preschool children of Paschim Medinipur district, West Bengal, India.[31]	2014	Less than 5 years	299	54.2% stunted, 20.1% wasting, 65.2% underweight

CONCLUSION

One of the major causes for malnutrition in India is economic inequality because of the low economic status among the population, their diet often lacks in both quality and quantity of nutritious food. Those women who are malnourished have a less chance to produce a healthy baby. Other reasons are regional gaps, weak grassroots-level convergence, limited coverage of essential services, and inadequate maternal education, poor sanitation, and limited access to reasonably priced, nutrient-dense foods are some of the issues that still exist

despite advancements (NITI Aayog, 2023).[36] Compared with their better-fed children, nutrition-deficient individuals are more likely to have infectious diseases such as pneumonia and tuberculosis, which lead to a higher mortality rate. Besides, nutrition-deficient individuals are less productive at work but also suffered from the health effects such as weakened immunity with higher infection risk, delayed cognitive and motor development, long-term increased risk of chronic disease and poorer academic performance outcomes.[32]

Protein-energy malnutrition (PEM) remains a significant issue among preschool children in tribal communities across our country. To address this pressing concern, a comprehensive approach is essential. This should include regular monitoring of growth, providing nutritional supplements to those in need, and conducting nutrition education programs to raise awareness. By implementing these strategies, we can help alleviate the impact of PEM and improve the overall health and development of children in these communities.

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