

Assessment of Determinants of Undernutrition in Children Aged One to Five Years: A Hospital-Based Study

Urja Dipakbhai Ladani¹, Khush Jitendrabhai Viramgama², Drashti Chandrakantbhai Patel³

¹DCH, Diamond Hospital and Medical Research Centre, Surat, Gujarat, India

²MBBS, GMERS Medical College, Junagadh, Gujarat, India

³MBBS, Pramukhswami Medical College, Karamsad, Gujarat, India

Received: 25-05-2025 / Revised: 23-06-2025 / Accepted: 26-07-2025

Corresponding Author: Dr. Drashti Chandrakantbhai Patel

Conflict of interest: Nil

Abstract:

Background: Undernutrition remains a major public health challenge, particularly among children under five years of age in low- and middle-income countries like India. Despite numerous government programs, a significant proportion of children continue to suffer from stunting, wasting, and underweight due to a complex interplay of dietary, social, and environmental risk factors. Understanding these determinants at the institutional level is crucial for designing targeted interventions to reduce childhood malnutrition.

Material and Methods: A hospital-based cross-sectional observational study was conducted over a period of one year in the Pediatric Outpatient Department of a tertiary care teaching hospital. A total of 500 children aged 1 to 5 years were enrolled. Data regarding sociodemographic profile, parental education, socioeconomic status, feeding practices, and environmental conditions were collected through a semi-structured, pre-tested questionnaire. Anthropometric measurements were taken using standard protocols, and nutritional status was assessed using WHO Child Growth Standards (2006). Z-scores were calculated to classify children as underweight, stunted, or wasted. Statistical analysis was performed using Chi-square test, and a p-value < 0.05 was considered significant.

Results: Out of the 500 children, 52% were males and 48% females. The majority (36%) belonged to the 1–2 year age group, and 62% were from low-income households. The prevalence of underweight, stunting, and wasting was 34.2%, 41.8%, and 17.6%, respectively. Significant associations were observed between undernutrition and factors such as low maternal and paternal education (p < 0.001), poor socioeconomic status (p < 0.001), and paternal alcohol use (p < 0.001). Exclusive breastfeeding showed a protective trend, though not statistically significant (p = 0.085). Overcrowding and poor environmental conditions were also linked to increased risk of undernutrition.

Conclusion: The study highlights the multifactorial etiology of undernutrition among under-five children, emphasizing the critical role of parental education, household income, and behavioral factors. Addressing these determinants through community-based education, nutritional counseling, and socioeconomic development programs is essential for improving child health outcomes.

Keywords: Undernutrition, Children aged 1–5 years, Risk factors, socioeconomic status, and Parental education.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Undernutrition continues to pose a significant public health challenge globally, especially among children under the age of five in low- and middle-income countries like India. [1] The World Health Organization reports that undernutrition contributes to nearly 45% of all deaths among children in this age group. [2] In India, despite several national programs and health interventions, malnutrition remains highly prevalent. [3] The National Family Health Survey-5 (NFHS-5) highlights that 35.5% of children under five years are stunted, 19.3% are wasted, and 32.1% are underweight, reflecting both

chronic and acute forms of nutritional deficiency. [4] The causes of undernutrition in early childhood are multifactorial, ranging from inadequate dietary intake and poor infant feeding practices to repeated infections, low parental education, poverty, and suboptimal sanitation. [5] Various studies have emphasized the need to identify modifiable risk factors to effectively reduce the burden of malnutrition. [6] For instance, it was observed that factors such as parental education, alcohol abuse, overcrowding, poverty, and lack of exclusive breastfeeding were significantly associated with undernu-

trition in under-five children. [7] Similarly, other community-based and institution-based studies from different parts of India have underlined the persistent impact of social and environmental determinants on child nutrition outcomes. [8] Despite the growing body of evidence, the patterns and contributors to undernutrition remain poorly documented in many institution-based settings, especially in semi-urban and rural catchment areas. [9] Healthcare providers in such regions are often the first point of contact for growth monitoring and nutrition counselling, making it essential to understand local epidemiology. [10] Evaluating risk factors in such contexts can offer insight into actionable preventive strategies tailored to regional needs. [11] Therefore, the present study aims to evaluate the risk factors associated with undernutrition among one to five-year-old children attending a tertiary care institution. The objectives include assessing the nutritional status using WHO standards and identifying key sociodemographic, dietary, and environmental determinants contributing to undernutrition in this age group.

Material and Methods

This hospital-based cross-sectional observational study was conducted over a period of one year in the Pediatric Outpatient Department of a tertiary care teaching hospital, with the aim of evaluating the risk factors associated with undernutrition among children aged one to five years. A total of 500 children in the age group of 12 to 60 months who attended the pediatric OPD for routine check-up, minor ailments, immunization, or growth monitoring were enrolled after obtaining written informed consent from their parents or guardians. Children with chronic illnesses, congenital anomalies, or those already undergoing nutritional rehabilitation were excluded from the study. Data were collected using a pre-tested, semi-structured questionnaire administered to caregivers, which included information on the child's age, sex, birth order,

parental education and occupation, type of family, socioeconomic status (as per the modified Kuppuswamy scale), feeding practices including breast-feeding duration and complementary feeding, immunization status, recent history of illness, and environmental factors such as drinking water source, sanitation, and overcrowding. Anthropometric measurements were taken following standard procedures. Nutritional status was assessed using the WHO Child Growth Standards (2006), and Z-scores were calculated using WHO Anthro software. Children with Z-scores below -2 standard deviations for weight-for-age, height-for-age, or weight-for-height were classified as underweight, stunted, or wasted respectively. Ethical clearance for the study was obtained from the Institutional Ethics Committee, and confidentiality was maintained throughout the study. The collected data were compiled in Microsoft Excel and analyzed using standard statistical methods. Frequencies and percentages were calculated for categorical variables, and comparisons between groups were made using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 500 children aged 1 to 5 years were enrolled in the study. Of these, 260 (52%) were males and 240 (48%) were females. The majority of participants, 180 (36%), belonged to the 1–2 year age group, followed by 145 (29%) aged 2–3 years, 105 (21%) aged 3–4 years, and 70 (14%) in the 4–5 year group. Most children belonged to nuclear families (78%), and 62% were from urban poor or low-income households, as per the modified Kuppuswamy scale. Anthropometric analysis based on WHO growth standards revealed that: Underweight (Weight-for-Age Z-score < -2 SD) was present in 34.2% (n = 171) of the children. Stunting (Height-for-Age Z-score < -2 SD) was seen in 41.8% (n = 209). Wasting (Weight-for-Height Z-score < -2 SD) was observed in 17.6% (n = 88).

Table 1:

Sociocultural factors	Weight for age \leq 2SD (n=171)	Weight for age \geq 2SD (n=329)	Chi-square test, P value
Gender			
Male	90 (34.6)	170 (65.4)	1.584, 0.21
Female	81 (33.8)	159 (66.2)	
Mother's education			
\leq Primary	67 (46.5)	77 (53.5)	25.24, <0.001
> Secondary	39 (22.8)	132 (77.2)	
Father's education			
\leq Secondary	65 (43.3)	85 (56.7)	31.97, <0.001
> Secondary	35 (20.5)	136 (79.5)	
Socioeconomic status			
Below poverty line	81 (55.1)	66 (44.9)	16.74, <0.001
Above poverty line	90 (28.3)	228 (71.7)	
Overcrowding			

Present	66 (41.5)	93 (58.5)	2.4, 0.121
Absent	63 (30.5)	144 (69.5)	
Father alcohol abuse			
Yes	49 (57.6)	36 (42.4)	22.56, <0.001
No	52 (30.2)	120 (69.8)	
Exclusive breastfeeding for 6 months			
Present	35 (27.9)	91 (72.1)	2.98, 0.085
Absent	136 (42.3)	186 (57.7)	

Undernutrition in children was significantly associated with low parental education and poverty. Children of mothers with only primary education had higher underweight rates (46.5%) compared to those with better-educated mothers (22.8%). Underweight and stunting were also more common in below poverty line families. Exclusive breastfeeding for 6 months appeared protective, though not statistically significant. Overcrowding and paternal alcohol use were strongly linked to higher undernutrition. Environmental factors like unsafe water and lack of sanitation also contributed to increase stunting.

Discussion

In our study, 52% were males and 48% females, showing near-equal gender distribution. Patel et al. (2025) [12] observed a slight female predominance, while Murarkar et al. (2020) [13] found higher undernutrition in males in urban slums. No consistent gender-based nutritional disparity was noted across studies. [14] Most children (36%) were aged 1–2 years, marking early childhood as a critical period. Prashanth et al. (2017) [15] and Pal et al. (2021) [16] also reported higher undernutrition in this age group. Nutritional vulnerability peaks during weaning and complementary feeding transitions.

A majority belonged to nuclear families (78%) and low-income households (62%). Similar economic vulnerability was noted by Patel et al. (2025)[12], and Murarkar et al. (2020) [13]. Dabar et al. [17] confirmed poverty as a major risk factor, contributing significantly to undernutrition in Indian children.

In our study, underweight, stunting, and wasting were observed in 34.2%, 41.8%, and 17.6% of children, respectively. Similar findings were reported by Chawla et al. (2020) [18], with underweight at 38.3%, stunting at 41.3%, and wasting at 18.4% in rural Haryana. Murarkar et al. (2020) [13] found comparable prevalence in Maharashtra, especially in urban slums. These consistent trends reaffirm undernutrition as a widespread concern across diverse Indian settings.

In the present study, several sociodemographic and environmental factors showed a significant association with undernutrition among children aged one to five years. Children from families where fathers had education up to the secondary level had a nota-

bly higher prevalence of underweight (43.3%) compared to those with more educated fathers (20.5%), indicating the influential role of paternal literacy in ensuring proper nutrition—a finding that aligns with Pal et al. (2021) [16], who reported a similar link between paternal education and child malnutrition. Another important determinant observed was alcohol abuse by the father, with 57.6% of such children being underweight, a statistically significant association ($p < 0.001$), consistent with the findings of Patel et al. (2025) [12], where adverse household behaviors correlated strongly with nutritional deficits. Socioeconomic vulnerability also emerged as a major contributor, with 55.1% of children from below poverty line households being underweight, reinforcing results from Dabar et al. (2020) [17], who identified household wealth as one of the most influential predictors of child undernutrition in India.

Overcrowding, though not statistically significant in this study ($p = 0.121$), showed a higher burden of undernutrition (41.5%) and has been recognized by Murarkar et al. (2020) [13] as a contributing factor in urban slums. Exclusive breastfeeding showed a trend toward protection against underweight, but the association did not reach statistical significance ($p = 0.085$).

These findings collectively suggest that both parental factors—especially education and behavioral habits—and broader socioeconomic and environmental conditions play critical roles in determining child nutrition outcomes. Interventions must therefore address not just dietary intake, but also parental education, substance abuse, and living conditions to effectively combat undernutrition.

Limitations: Single-center, hospital-based setting: Since the study was conducted in a tertiary care hospital, the findings may not be fully generalizable to the broader community, particularly rural or tribal populations who may have different nutritional and socio-environmental profiles.

Conclusion

Undernutrition among children aged one to five years remains a significant public health concern, even in urban healthcare settings. In this study,

factors such as low parental education, poor socioeconomic status, paternal alcohol abuse, and lack of exclusive breastfeeding were found to be significantly associated with underweight and stunting. These findings highlight the multifactorial nature of childhood undernutrition, emphasizing the need for integrated interventions targeting not only dietary practices but also parental awareness, household environment, and socioeconomic upliftment.

Strengthening community-based education, promoting exclusive breastfeeding, and improving living conditions can play a crucial role in reducing the burden of undernutrition among under-five children. Sustained efforts through coordinated public health strategies are essential to address these determinants and improve child health outcomes.

Bibliography

1. Victora CG, Christian P, Vidaletti LP, Gatica-Domínguez G, Menon P, Black RE. Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. *The Lancet*. 2021; 397(10282):1388–99.
2. World Health Organization, United Nations Children's Fund. Levels and trends in child malnutrition: key findings of the 2020 edition. UNICEF/WHO/World Bank Group joint child malnutrition estimates. World Health Organization; 2020.
3. Narayan J, John D, Ramadas N. Malnutrition in India: status and government initiatives. *J Public Health Policy*. 2019; 40(1):126–41.
4. Pandey S, Sharma J, Ali M. Associated factors of child wasting among children aged 0–23 months in India: Analysis of the National Family Health Survey-5. *Int J Popul Stud*. 2024; 10(3):60–8.
5. Dassie GA, Chala Fantaye T, Charkos TG, Sento Erba M, Balcha Tolosa F. Factors influencing concurrent wasting, stunting, and underweight among children under five who suffered from severe acute malnutrition in low- and middle-income countries: a systematic review. *Front Nutr*. 2024; 11:1452963.
6. Kiosia A, Dagbasi A, Berkley JA, Wilding JP, Prendergast AJ, Li JV, et al. The double burden of malnutrition in individuals: Identifying key challenges and re-thinking research focus. *Nutr Bull*. 2024; 49(2):132–45.
7. Sharma A, Yadav A, Baig V, Swarnkar M, Singh R, Kumar S. Malnutrition & associated risk factors among under five children. *Indian J Community Health*. 2015; 27(3):311–9.
8. Mishra S. Examining the Role of Accredited Social Health Activists (ASHAs) in Improving Uptake of Essential Primary Health Care Services for Mothers and Children in India. 2025;
9. Wells JC, Sawaya AL, Wibaek R, Mwangome M, Poullas MS, Yajnik CS, et al. The double burden of malnutrition: aetiological pathways and consequences for health. *The Lancet*. 2020; 395(10217):75–88.
10. Tesfa M, Gonete KA, Chane Y, Yohannes S. Growth monitoring practice and associated factors among health professionals at public health facilities of Bahir Dar Health Centers, Northwest Ethiopia, 2021. *Pediatr Health Med Ther*. 2022; 195–215.
11. Siddiqui MZ, Donato R. Undernutrition among adults in India: the significance of individual-level and contextual factors impacting on the likelihood of underweight across sub-populations. *Public Health Nutr*. 2017; 20(1):130–41.
12. Patel BU, Patel HK, Uikey R, Maheta GV. Evaluation of Risk Factors For Undernutrition Among One To Five Years Aged Children: An Institutional Based Study. *Int J Acad Med Pharm*. 2025; 7(2):18–21.
13. Murarkar S, Gothankar J, Doke P, Pore P, Lalwani S, Dhumale G, et al. Prevalence and determinants of undernutrition among under-five children residing in urban slums and rural area, Maharashtra, India: a community-based cross-sectional study. *BMC Public Health*. 2020; 20(1):1559.
14. Basit A, Nair S, Chakraborty K, and Darshan B, Kamath A. Risk factors for under-nutrition among children aged one to five years in Udupi taluk of Karnataka, India: A case control study. *Australas Med J*. 2012; 5(3):163.
15. Prashanth M, Savitha M, Prashantha B. Risk factors for severe acute malnutrition in under-five children attending nutritional rehabilitation centre of tertiary teaching hospital in Karnataka: a case control study. *Int J Contemp Pediatr*. 2017; 4(5):1721.
16. Pal A, Manna S, Dalui R, Mukhopadhyay R, Dhara PC. Undernutrition and associated factors among children aged 5–10 years in West Bengal, India: a community-based cross-sectional study. *Egypt Pediatr Assoc Gaz*. 2021; 69(1):40.
17. Dabar D, Yadav V, Goel AD, Mangal A, Prasad P, Singh M. Risk factors for undernutrition in under-five children living in a migrant populated area of South Delhi. *J Fam Med Prim Care*. 2020; 9(4):2022–7.
18. Chawla S, Gupta V, Singh A, Grover K, Panika RK, Kaushal P, et al. Undernutrition and associated factors among children 1-5 years of age in rural area of Haryana, India: a community based cross-sectional study. *J Fam Med Prim Care*. 2020; 9(8):4240–6.

