Original Research Article

# Study of Nutritional Status and Socio-Demographic Determinant of Malnutrition in Children Between Age Group of 6 Month to 5 Yrs

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**Abstract:**

**Objective:** To study the nutritional status and socio-demographic determinant of malnutrition in children between age group of 6 month to 5 yrs and to determine the prevalence of malnutrition among the study population.

**Methods**: This community-based, descriptive cross-sectional study Participants were recruited from surrounding communities within the catchment area of the institution, ensuring a representative sample reflective of varied socio-economic and demographic backgrounds. A total of 330 children, along with their guardians, were enrolled in the study using a stratified simple random sampling technique. Data were collected through structured interviews and direct anthropometric measurements following standardized protocols. Variables such as gender, maternal education, occupation, socio-economic status, birth history, dietary practices, and immunization status were recorded and analyzed to understand their association with indicators of malnutrition, including stunting, wasting, and underweight.

**Results:** The study found that while 80% of children had no form of acute malnutrition, 13.3% had moderate acute malnutrition and 6.7% had severe acute malnutrition. Stunting affected over one-third of the children, with 20.6% moderately and 14.5% severely stunted, indicating widespread chronic undernutrition. Nearly 18% of children suffered from acute on chronic malnutrition. Inadequate protein intake was significantly associated with higher rates of all forms of malnutrition. Socio-demographic factors such as female gender, lower socio-economic status, low maternal education, lack of exclusive breastfeeding, delayed complementary feeding, and low birth weight were found to be significantly linked with poor nutritional outcomes.

**Conclusion:** These findings underscore the multifactorial nature of childhood malnutrition, with both dietary and socio-demographic determinants playing a critical role. The results highlight the need for targeted public health interventions focusing on maternal education, improved infant and young child feeding practices, and enhanced dietary protein intake. Strengthening antenatal and early childhood nutrition programs, especially among low-income households, is essential to reduce the burden of undernutrition and promote optimal growth and development in children.

**Keywords**: Malnutrition, Stunting, Wasting, Underweight.

## Introduction

Malnutrition, a critical global health challenge, continues to significantly impact child health, development, and overall societal well-being. It encompasses a spectrum of conditions resulting from deficiencies, excesses, or imbalances in the intake of energy or nutrients. Globally, malnutrition remains a leading cause of morbidity and mortality in children under five years of age, particularly in low- and middle-income countries. Both undernutrition and overnutrition can have far-reaching consequences on health, including impaired cognitive development, reduced immunity, and increased susceptibility to diseases.

According to the World Health Organization (WHO), in 2022, approximately 149 million children under five years were estimated to be stunted, which means they were too short for their age due to chronic malnutrition. In India, malnutrition remains a pervasive public health issue, particularly among children. According to the National Family Health Survey, 35.5% of children under five years of age are stunted, 19.3% are wasted, and 32.1% are underweight. These statistics underscore the severe malnutrition burden faced by the country, with rural areas being disproportionately affected. In Madhya Pradesh, the situation is even more alarming, with 35.7% of children stunted, 19.0% wasted, and

33.0% underweight. Despite numerous governmental and non-governmental interventions, malnutrition in India continues to be a pressing concern, highlighting the need for focused studies and interventions targeting the most vulnerable populations.

Malnutrition, particularly during the early years of life, has profound short-term and long-term effects on child health and development. The consequences of malnutrition extend far beyond immediate physical health issues, impacting nearly every aspect of a child's future. In the short term, malnourished children are more susceptible to infections due to weakened immune systems. Conditions such as diarrhea, respiratory infections, and measles are more severe and frequent among undernourished children, leading to higher morbidity and mortality rates. Children who experience malnutrition in their early years are at a higher risk of developmental delays, which can affect their ability to learn, their performance in school, and their overall intellectual potential.

The effects of malnutrition on physical development are well-documented. Malnourished children tend to perform poorly in school due to the cognitive deficits and developmental delays caused by nutrient deficiencies. This leads to lower academic achievement, decreased likelihood of continuing education, and reduced earning potential in adulthood. The link between malnutrition and academic underachievement contributes to a cycle of poverty, as individuals who cannot attain proper education and employment are less able to break free from the socio-economic factors that contribute to malnutrition. Moreover, the economic burden of malnutrition on families and societies is considerable. Health care costs rise due to increased illness and hospitalizations, and the workforce suffers from lower productivity. Investing in nutrition during early childhood is not only crucial for individual health but also for fostering human capital and promoting economic growth. Socioeconomic status (SES) is one of the most critical determinants of malnutrition. Families with low incomes often face food insecurity, limited access to healthcare, and poor living conditions, all of which contribute to malnutrition in children. The education level of the mother is a strong predictor of a child's nutritional status. Maternal employment also impacts child nutrition. While working mothers may have more financial resources, they may have less time to dedicate to childcare, including feeding and health monitoring.

## Materials and Methods

**Study Design:** A single center, community-based, descriptive cross-sectional study aimed at assessing the nutritional status and socio-demographic determinants of malnutrition among children aged 6 months to 5 years.

**Study Setting:** The study was conducted in the Department of Pediatrics at RKDF Medical College Hospital and Research Centre, Bhopal, Madhya Pradesh. The participants were recruited from the associated communities, ensuring a representative sample of children aged 6 months to 5 years.

**Study Duration:** The total duration of the present study is 18 months.

**Primary Outcome:** The prevalence of malnutrition among children aged 6 months to 5 years, measured using anthropometric indicators: weight-for-age, height-for-age, and weight-for-height. These outcomes were assessed at the time of data collection using WHO growth charts.

**Secondary Outcomes:** Factors such as parental age, household size, and access to healthcare were considered as potential confounders and accounted for during analysis.

**Inclusion Criteria:**

- Children aged between 6 months and 5 years.
- Accompanied by a reliable informant (parent or guardian) capable of providing accurate information.
- Residing in the study area.
- Parents or guardians who provided written informed consent.

**Exclusion Criteria:**

- Children younger than 6 months or older than 5 years.
- Children with congenital anomalies (e.g., Down syndrome) or chronic illnesses affecting growth.
- Children admitted to a National Rehabilitation Centre for more than 14–21 days.
- Parents or guardians who refused to give consent.

**Observation Chart**

| Table 1: Kuppuswamy SES Class (N= 330) | | |
|---|---|---|
| **Kuppuswamy SES Class** | **n** | **%** |
| Lower | 89 | 27 |
| Upper Lower | 84 | 25.5 |
| Lower Middle | 78 | 23.6 |
| Upper Middle | 79 | 23.9 |

| Table 2: Exclusive Breastfeeding (N= 330) | | |
|---|---|---|
| Exclusive Breastfeeding | n | % |
| No | 111 | 33.6 |
| Yes | 219 | 66.4 |

| Table 3: Age of Complementary Feeding (N= 330) | | |
|---|---|---|
| Age of Complementary Feeding (months) | n | % |
| 4 months | 37 | 11.2 |
| 5 months | 33 | 10 |
| 6 months | 127 | 38.5 |
| 7 months | 74 | 22.4 |
| 8 months | 59 | 17.9 |

| Table 4:  Birthweight (N= 330) | | |
|---|---|---|
| Birthweight | n | % |
| Normal (>2.5kg) | 235 | 71.2 |
| LBW (<2.5kg) | 95 | 28.8 |

| Table 5: Prevalence of Malnutrition (N= 330) | | |
|---|---|---|
| Malnutrition | N | % |
| None | 264 | 80 |
| Moderate Acute Malnutrition | 44 | 13.3 |
| Severe Acute Malnutrition | 22 | 6.67 |

| Table 6: Prevalence of Stunting (Low Height/Age) (N= 330) | | |
|---|---|---|
| Stunting | N | % |
| None | 214 | 64.8 |
| Moderate | 68 | 20.6 |
| Severe | 48 | 14.5 |

| Table 7: Prevalence of Underweight (Low WT /Age) (N= 330) | | |
|---|---|---|
| Underweight | N | % |
| None | 264 | 80.0 |
| Moderate | 44 | 13.33 |
| Severe | 22 | 6.67 |

| Table 8: Prevalence of Wasting (LOW WT /HT) (N= 330) | | |
|---|---|---|
| Wasting | N | % |
| None | 235 | 71.2 |
| Moderate | 63 | 19.1 |
| Severe | 32 | 9.7 |

## Results

- The study population included children from all age groups between 6 months and 5 years, with the highest representation in the 24–35month group, suggesting a balanced age distribution for assessing nutritional outcomes. There was a slight male predominance among the participants. Most mothers were not employed, reflecting limited maternal economic engagement, which may influence household food security and caregiving patterns.

- Among working mothers, only a small proportion worked more than 8 hours a day, indicating that time constraints due to employment were not a major factor for most mothers. Over half of the families belonged to lower and upper lower socio-economic classes, underlining the need to address poverty-related nutritional challenges. Although two-thirds of children were exclusively breastfed, a significant one-third were not, highlighting a gap in adherence to recommended infant feeding practices. While most children received complementary feeding at 6

months as per WHO guidelines, many experienced delays.

- Immunization coverage was high, with over 85% of children fully immunized, suggesting good access to basic child health services in the study area. Nearly one-third of the children were born with low birth weight, indicating ongoing maternal and perinatal health challenges that can impact long-term growth and development. One in five children in the study suffered from some degree of acute malnutrition, emphasizing the continued burden of undernutrition in early childhood. Over one-third of the children were stunted, indicating a significant prevalence of chronic undernutrition and impaired linear growth in the population. About 20% of the children were underweight, reflecting a combination of both acute and chronic forms of undernutrition. Nearly 18% of children exhibited acute on chronic malnutrition, highlighting the coexistence of long-term and recent nutritional deficiencies.

- Over one-third of children had inadequate protein intake, pointing to poor dietary quality and the need for improved protein-rich food accessibility. Children with inadequate protein intake were significantly more likely to be stunted, wasted, and acutely malnourished, indicating a strong link between dietary protein sufficiency and nutritional status. Stunting was significantly associated with female gender, lower socio-economic status, lack of exclusive breastfeeding, delayed complementary feeding, inadequate protein intake, low maternal education, and higher birth order. Underweight status was significantly associated with delayed complementary feeding and inadequate protein intake, suggesting that early nutritional interventions are crucial for maintaining healthy body weight. Malnutrition was significantly linked to female gender, lower socio-economic status, delayed complementary feeding, inadequate protein intake, and low birth weight, indicating both social and biological determinants.

**Statistical Analysis:** All statistical and graphical analyses for this study were undertaken using Stata software version 17.0. Descriptive statistics were used to summarize the socio-demographic characteristics of the participants and the prevalence of malnutrition. Categorical variables (e.g., maternal education, socio-economic status, and maternal occupation) were presented as frequencies and percentages. Continuous variables (e.g., anthropometric measurements like weight-for-age, height-for-age, and weight-for-height) were summarized as means and standard deviations. A p-value of $<0.05$ was considered statistically significant for all analyses

## Discussion

Obasohan PE et al study seeks to evaluate the prevalence, the individual and contextual predictors of malnutrition among children aged 6–59 months across Nigeria and its states. Two separates, independently collected, nationally representative cross-sectional surveys, the National Human Development Report (NHDR 2018) and the 2018 Nigeria Demographic and Health Survey (2018 NDHS) were linked for this study. Child's gender, age, birth size, preceding birth order, anaemia status, maternal education, work status, body weight, household wealth status, number of bedrooms were among individual/household predictors of malnutrition. On the community level, being from community with high wealth index, distance to nearest health facilities is no big problem. Regional variations and gender inequality index were the state level predictors of malnutrition among children in Nigeria. This study has shown that two-third of children aged 6–59 months in Nigeria were poorly nourished, an indication of a growing concern of double burden of malnutrition.

Ndemwa M et al study aimed at determining nutritional status and association of demographic characteristics with malnutrition among children aged 1 day to 24 months in Kwale County, Kenya. Nutrition status was determined using anthropometric measurements. Data was analysed using descriptive statistics and associations were determined by univariate logistic regression. The prevalence of stunting, underweight and global acute malnutrition rates was high among the children. Male children were associated with a significantly higher prevalence of stunting than the females. The prevalence of underweight and stunting significantly increased with increasing age.

Hossain A et al studied maternal profiles and social determinants of severe acute malnutrition among children under-five years of age: a case-control study in Nepal. The authors conducted a hospital-based unmatched case-control study with 256 under-five children. The children aged 6–59 months were taken. In order to reduce the children's SAM, it is necessary to scale up services to improve the socio-economic status which includes the education, occupation, and monthly income of the mother. Girls of age group 6–24 months were more likely to develop SAM. Two contributing factors to decrease SAM are the importance of exclusive breastfeeding practices and the availability and usage of soap in hand washing, which are ideal for low-cost interventions. To reduce SAM in Nepal, a focus on enhancing complementary feeding through increased affordability of nutritious foods is also needed

As compared to above foreign studies, few Indian studies also had similar observations and results. Suri et al and Jena P et al who studied the various

social and demographic determinants of severe acute malnutrition in children aged 6 months to 59 months in a tertiary care centre of Odisha, India. Study revealed a prevalence of severe acute malnutrition as 2.8%. Males (54.2%) were more affected than females (45.8%). Most common age group affected was 6-12 months (37.4%). Most of the children were from low socioeconomic status (96.4%) and from rural areas (84.8%).63.7% of the study population were unimmunised. Only 12.6% of the participants were exclusively breast fed.100% of the children in the study population received top feeding with cow's milk. The prevalence of malnutrition is high in Odisha but most of the causative factors are preventable. Adequate education regarding exclusive breastfeeding, complementary feeding, immunisation, promotion of proper referral and health care services can help to improve nutritional status.

The research by Cheruiyot DK et al employed a cross-sectional analytical design, targeting children attending outpatient child welfare clinics. Key findings revealed that stunting affected 25% of the children, while wasting and underweight were prevalent in 23.8%. Dietary practices showed that only 39.2% of children aged 6 to 23 months met the minimum dietary diversity, and 39.2% received a minimum acceptable diet. Moreover, 45.3% of children experienced illness in the past month. This study underscores the critical role of caregiver education in shaping child nutritional outcomes and highlights the need for targeted interventions to improve caregiver knowledge and practices.

Makamto Sobgui C et al studied predictors of poor nutritional status among children aged 6–24 months in agricultural regions of Mali. This study aims to assess the magnitude and the predictors of undernutrition in children aged 6–24 months in the poor rural regions of Mali. A structured interviewer administered a questionnaire that was used to collect data from the mothers living in 1764 households. Anthropometric measurements were performed using standardized methods to identify the factors associated with children suffering from undernutrition (stunting and wasting). The factors significantly associated with acute malnutrition were male sex (p < 0.01), preterm birth (p < 0.03), lower child age (0.001), a high number of siblings (p < 0.03), and living in a household with more months of inadequate food provisioning (p < 0.03). Child undernutrition is a critical public health problem in the agricultural regions of Mali. Future efforts should be directed at addressing the food insecurity and at improving the yearlong household availability and accessibility of nutritious food, as well as taking diseases prevention into account

Tackling malnutrition is a major health priority for a developing country like Bangladesh. The study by Chowdhury MR et al explored the differences in prevalence of having only one form, and multiple forms, of severe malnutrition (stunting, wasting and underweight) among under-5 children in Bangladesh, and aimed to identify the important factors affecting these. Children with an uneducated mother of poor socioeconomic class had a higher risk of severe malnutrition. Children of fathers with a professional occupation were at lower risk of having multiple forms of severe malnutrition. The proportions of children aged under 5 years with one or multiple forms of severe malnutrition were shown to be high in Bangladesh. The prevention of malnutrition in the country should be seen as a significant public health issue and given top priority

Severe acute malnutrition is a major problem among developing countries and it is one of the major causes of mortality and morbidity in Ethiopia. The impact is more severe among children aged 6–23 months. Severely malnourished children are nine times more likely to die than healthy children. Identification of the determinants of severe acute malnutrition under the age of two years can significantly reduce the burden of child morbidity and mortality. Therefore, study by Gebremaryam T et al was aimed to assess determinants of severe acute malnutrition. In this study, dietary diversity, family size, perceived birth weight, and initiation of complementary feeding were significantly associated with severe acute malnutrition. Therefore, emphasis should be given to improving infant and young child feeding practices, especially timely initiation of complementary feeding and dietary diversity.

Like above, another ethopian study by Dessie ZB et al did further analysis of demographic and health survey of maternal characteristics and nutritional status among 6–59 months of children.Maternal education, nutritional status, and anemia were associated with child stunting. Also, maternal nutritional status, place of delivery, and preceding birth interval were associated with wasting. Therefore, there is needed to enhance the nutritional status of children by improving maternal underweight nutritional status, maternal educational and maternal anemia status, prolonging birth interval, and promoting health facility delivery.

**Conclusion**

These findings underscore the multifactorial nature of childhood malnutrition, with both dietary and socio-demographic determinants playing a critical role. The results highlight the need for targeted public health interventions focusing on maternal education, improved infant and young child feeding practices, and enhanced dietary protein intake. Strengthening antenatal and early childhood nutrition programs, especially among low-income households, is essential to reduce the burden of undernutrition and promote optimal growth and development in children.

**Declarations:**

**Funding**: None

**Availability of data and material**: RKDF Medical College Hospital and Research Centre Bhopal

**Code availability**: Not applicable

**Consent to participate**: Consent taken

**Ethical Consideration**: There are no ethical conflicts related to this study.

**Consent for publication**: Consent taken

**References**

1. Obasohan PE, Walters SJ, Jacques R, Khatab K. Socio-economic, demographic, and World Health Organization. WHO Guideline for complementary feeding of infants and young children 6-23 months of age. World Health Organization; 2023 Oct 13.
2. European Society for Paediatric Gastroenterology, Hepatology & Nutrition (ESPGHAN), Fewtrell M, Baumann U, Bronsky J, Haiden N, Hill S, Kivelä L, de Koenig B, Köglmeier J, Luque V, Moltu SJ. World Health Organization (WHO) guideline on the complementary feeding of infants and young children aged 6− 23 months 2023: A multisociety response. Journal of Pediatric Gastroenterology and Nutrition. 2024 Jul;79(1):181-8.
3. Contextual predictors of malnutrition among children aged 6–59 months in Nigeria. BMC nutrition. 2024 Jan 2;10(1):1.
4. Ndemwa M, Wanyua S, Kaneko S, Karama M, Anselimo M. Nutritional status and association of demographic characteristics with malnutrition among children less than 24 months in Kwale County, Kenya. The Pan African Medical Journal. 2017 Nov 24; 28:265.
5. Hossain A, Niroula B, Duwal S, Ahmed S, Kibria MG. Maternal profiles and social determinants of severe acute malnutrition among children under-five years of age: a case-control study in Nepal. Heliyon. 2020 May 1;6(5).
6. Suri S, Dutta A, Raghuvanshi RS, Singh A, Shahi NC, Chopra CS. Study on Dietary Pattern, Nutritional Status and Socio-Demographic Determinants of the Preschool Children Aged 3-6 Years. Ecology of food and Nutrition. 2022 Mar 4;61(2):144-61.
7. Jena P, Rath S, Nayak MK, Satapathy D. Study of social and demographic determinants of severe acute malnutrition in children aged 6-59 months in a tertiary care centre of Odisha, India. International Journal of Contemporary Pediatrics. 2019 Jan;6(1):46-51.
8. Cheruiyot DK. Socio-economic and Demographic Characteristics of Caregivers as a Determinant of Nutritional Status of Children Aged 6-59 Months in Kericho County, Kenya. Asian Journal of Medicine and Health. 2024 Dec 7;22(12):116-33.
9. Makamto Sobgui C, Kamedjie Fezeu L, Diawara F, Diarra H, Afari-Sefa V, Tenkouano A. Predictors of poor nutritional status among children aged 6–24 months in agricultural regions of Mali: a cross-sectional study. BMC nutrition. 2018 Apr 18;4(1):18.
10. Chowdhury MR, Khan HT, Mondal MN, Kabir R. Socio-demographic risk factors for severe malnutrition in children aged under five among various birth cohorts in Bangladesh. Journal of biosocial science. 2021 Jul;53(4):590-605.
11. Gebremaryam T, Amare D, Ayalew T, Tigabu A, Menshaw T. Determinants of severe acute malnutrition among children aged 6—23 months in bahir dar city public hospitals, Northwest Ethiopia, 2020: a case control study. BMC pediatrics. 2022 May 20;22(1):296.
12. Dessie ZB, Fentie M, Abebe Z, Ayele TA, Muchie KF. Maternal characteristics and nutritional status among 6–59 months of children in Ethiopia: further analysis of demographic and health survey. BMC pediatrics. 2019 Mar 20;19(1):83.