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Determinants of nutrition among children aged 1-5 years attending a Taluk Hospital in Bengaluru Urban District – a Cross-sectional study

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Abstract

Undernutrition is a common cause of morbidity and mortality among children under-5 in developing countries. Undernutrition includes underweight, stunting, and wasting. Prevalence of stunting, underweight, and wasting was 35.5%, 32.1%, and 27.0% respectively in India (NFHS-5). Factors contributing to undernutrition include socio-demographic factors, insufficient diet, and recurrent infections. This study aims to determine the prevalence of undernutrition and explore the socio-demographic factors impacting nutrition in children under five years old among under-5 children in a taluk hospital in Bengaluru Urban district. This study was conducted among 250 under-5 children attending the Anekal Taluk Hospital, Bengaluru Urban district from June 2023 to August 2023. A structured questionnaire consisting of socio-demographic and nutritional details was administered, and anthropometric measurements were recorded. The median age of the children was 2.0 years (IQR:1.0-3.0). Overall prevalence of stunting, underweight, and wasting among children was found to be 42.0%, 28.8%, and 17.6% respectively. A significantly higher proportion of vegetarian children [OR 1.827(1.017-3.284)] were underweight. Junk food consumption among children [OR 1.991(1.007-3.935)] was found to be significantly associated with stunting. Undernutrition was significantly higher in children born with low birth weight ($p<0.05$). This study revealed that low birth weight of the child, maternal dietary habits, and educational levels were significant factors contributing to undernutrition. It is imperative to ensure reinforcing corrective measures are reinforced to fulfil improvement in child nutrition.

Introduction

In 2022, an estimated 149 million children under five were stunted, 45 million were wasted, and 37 million were overweight or living with obesity worldwide. Undernutrition remains a critical concern, contributing to nearly half of all deaths among children in this age group, particularly in low and middle-income countries (World Health Organization (WHO), 2025). Malnutrition is a common cause of morbidity and mortality in children under five especially in developing countries (Sahu, 2015). Malnutrition includes undernutrition (wasting, stunting, and underweight), insufficient vitamins and minerals, overweight, obesity, and the ensuing noncommunicable diseases linked to diet. There are a lot of changes in demography and epidemiology due to urbanisation, modernization, and technological

advancement, along with changes in food, physical activity, and body composition (Nasreddine et al., 2018). According to NFHS 5 data, the prevalence of children with malnutrition in terms of stunting was 35.5%, wasting was 19.3%, severely wasted were 7.7%, underweight were 32.1%, and overweight were 3.4% (NFHS, 2024). Insufficient diet, recurrent infections, poor nursing habits, delayed introduction of supplementary meals, and insufficient protein in the diet were listed by UNICEF as the causes of childhood malnutrition. Health state, taboos around certain foods, development, and individual dietary preferences are other factors that affect food consumption. Malnutrition can also arise from neglect, irregular mealtimes, insufficient food portions, and inadequate parental education (Alshammari et al., 2017). In India, undernutrition in children under the age of five is a serious public health issue. Despite India's expanding economy, both urban and rural regions still have significant rates of undernutrition-related child mortality. 7 improving nutrition reduces morbidity and death in children under the age of five (Surve et al., 2022). Malnutrition is a common cause of morbidity and mortality in children under five especially in developing countries. Prevalence of malnutrition in terms of stunting, wasting, underweight and overweight is increasing in the recent past. There is also an increase in childhood infections. This study is to assess the prevalence of underweight, stunting, and wasting in children under 5 years and to determine the demographic and socioeconomic factors influencing their nutrition.

Methods

This hospital-based cross-sectional study was conducted among children under-5 attending Anekal Taluk Hospital in Bangalore, Karnataka, India. The study was carried out in the field practice area of the Department of Community Medicine at St. John's Medical College and Hospital, Bangalore. The study population included children under-5 years of age attending the outpatient department of Anekal Taluk Hospital. Children aged 1-5 years whose parents provided consent were included, while those whose parents or guardians did not give consent, as well as severely ill children, were excluded. A sample size of 250 was determined using the formula $n = z^2(pq)/d^2$, where z is the relative deviate at a 95% confidence level (1.96), p is the prevalence of stunting among under-five children (35.5%) (NFHS, 2024) , q is 100 - p, and d is an absolute precision of 6.0% of p. The study protocol received approval from the institutional Ethics Committee, and a convenience sampling method was used. Informed consent was obtained, followed by a detailed interview with caregivers, which was recorded in a predesigned schedule. This schedule consisted of three sections: sociodemographic details of the child and parents, a detailed history of the child's health and nutritional status, and anthropometric measurements. The schedule's validity was assessed by experts. Standard methods were used to collect anthropometric data, including weight (measured to the nearest 0.1 kg. using an electronic weighing machine), recumbent length (for children under 24 months, measured with an infant measuring board), and height (for children above 24 months, measured with a stadiometer). Mid-upper arm circumference of the left arm was measured using a non-stretchable tape at the midpoint between the acromion and olecranon processes. Socioeconomic status was determined using the modified B.G. Prasad classification. The height and weight of each child were compared with the World Health Organization child growth charts, and children falling below two standard deviations (SD) of the reference median on any indices were classified as undernourished and categorized as underweight, stunted, or wasted accordingly (World Health Organization (WHO), 2025). The data were collected using software called Epicollect5 and were imported into a Microsoft Excel sheet. The data were rechecked and analysed using the Statistical Package for Social Sciences (SPSS Version 21). The baseline characteristics of the study subjects were explained in terms of frequency and percentage. Bivariate analysis was done to find out the association between diabetes control and various other factors using Pearson's Chi-square test, and Fisher's Exact test was used when the expected count was less than 5. The level of significance was estimated with 95% confidence interval and p value < 0.05.

Operational definitions:

Underweight is defined as low weight-for-age and

it reflects past (chronic) and present (acute) undernutrition. Children with z-scores < -2 are said to be underweight.

Stunting is defined as a low height-for-age in children, and it measures the past (chronic) child undernutrition. Children with z-scores <-2 are said to be stunted.

Wasting is defined as low weight-for-height for children, and it is a measure of current or acute undernutrition. Children with z-scores < - 2 are said to be wasted.

Discussion

A study was done among 250 participants where 131 (52.4%) were males and 119 (47.6%) were females. Most of the children belonged to the 13–36-month age group (65.2%). Females were comparatively more malnourished than males.

Table 1: Shows age and gender distribution among study population

Variables (n = 250)		Frequency (%)
Age (months)	13 - 36	163 (65.2)
	37 - 60	87 (34.8)
Gender	Male	131 (52.4)
	Female	119 (47.6)

Modified B.G. Prasad's classification (2022) was used to classify the socioeconomic status. The majority of the children who were malnourished belonged to class II (44%). Among malnourished, 45% belonged to class III, IV and V. Here association of socioeconomic class with malnutrition was not found statistically significant.

Table 2: Shows education of mothers of children under 5

Variables (n = 250)		Frequency (%)
Mother's education	≤ secondary education	133 (53.2)
	>Secondary education	117 (46.8)

The table shows the education levels of mothers of 250 children. A majority, 53.2% have secondary education or less, while 46.8% have education beyond secondary school.

Table 3: Dietary characteristics of children under 5

Variables (n = 250)		Frequency (%)
Diet	Non- veg	179 (71.6)
	Veg	71 (28.4)
Junk food consumption	Yes	202 (80.8)
	No	48 (19.2)

The table provides dietary information for 250 participants. A majority, 71.6% follow a non-vegetarian diet, while 28.4% are vegetarian. Additionally, 80.8% consume junk food, whereas only 19.2% do not. A significant association was observed, that participants having non- vegetarian diet will be less likely to be malnourished.

Table 4: Birth weight of participants

Variables (n = 250)		Frequency (%)
Birth weight (grams)	Low birth weight	72 (28.8)
	Normal	178 (71.2)

As per Table 4, it was observed that among 250 participants, 28.8% had a low birth weight, while 71.2% had a normal birth weight. Significant association was observed that participants with normal birth weight are less likely to be malnourished.

Table 4: Prevalence of malnutrition among participants

Variables (n = 250)	Frequency (%)
Stunted	105 (42.0%)
Wasted	72 (28.8%)
Underweight	44 (17.6%)

Table 5 indicates that out of 250 participants aged 1–5 years, a total of 131 cases of malnutrition were identified. Thus, the estimated hospital outpatient-based prevalence of malnutrition in this age group was 52.4%. Among these children, 17.6% were classified as underweight, 42.0% as stunted, and 28.8% as wasted. Additionally, 28.8% of the undernourished children presented with more than one condition.

Discussion

Among participants majority belonged to the 13 – 36 months age group. The population consisted of 52.4% males and 47.6% females. Similar findings were seen in a study conducted in Singh et al. (2013) females were comparatively more malnourished than males. It was observed that 17.6% were underweight, 42.0% of children were stunted and 28.8% were wasted and a similar study in Uttar Pradesh by Katyal et al observed that among 450 children, 21.1% were underweight, 23.3% were stunted, and 7.3% were wasted (Singh et al., 2016). Wasting may result from inadequate food intake or a recent episode of illness-causing weight loss (Murarkar et al., 2020). The study revealed that the majority of mothers had an education level below secondary school. This aligns with findings from other research, which identify numerous factors contributing to child malnutrition. These factors can be broadly categorized into biological and non-biological influences. Biological factors include age, growth, gender, the presence of diseases, and genetic predispositions. Non-biological factors, such as poverty and low socio-economic status, characterized by limited education, inadequate housing, and lack of access to safe water, significantly affect nutritional intake and needs. Additionally, cultural and social influences, such as food taboos, poverty-related constraints on food purchases, and religious restrictions on consuming certain food items, further exacerbate nutritional deficiencies by limiting dietary choices and increasing nutrient requirements (Singh et al., 2016; Jackson, 2003; Sahu et al., 2015; Harris-Fry et al., 2017; Scaglioni et al., 2018). Conducting longitudinal studies to monitor nutritional changes over time is recommended, as this can provide valuable insights into growth patterns and the long-term effects of nutritional interventions. Additionally, qualitative studies examining parental attitudes toward nutrition can help identify key barriers, beliefs, and practices that influence child nutrition, ultimately supporting the development of more effective and culturally appropriate health programs.

Conclusion

The study, conducted among 250 children aged 1-5 years, revealed a malnutrition prevalence of 52.4%, with stunting 42.0%, wasting 28.8%, and underweight 17.6% as the key indicators. Females were found to be more malnourished than males. Most participants 65.2% were in the 13–36-month age group, and 53.2% of their mothers had education levels of secondary school or less. While socioeconomic class was not statistically associated with malnutrition, dietary patterns and birth weight showed significant links. Children with a non-vegetarian diet and normal birth weight were less likely to be malnourished. The findings emphasize the importance of maternal education, nutrition-focused interventions, and addressing low birth weight to reduce childhood malnutrition.

Recommendations

• Given that over one-third of the children suffered from some form of undernutrition, there is an urgent need to ensure corrective measures to achieve improvement in their nutritional status.

• It is required to educate parents of children aged 1–5 years to adopt healthy nutritional interventions and address undernutrition on a priority basis.

• Good antenatal practices need to be emphasised to address the issue of preventing low birth weight.

• As part of this study, mothers of children aged 1-5 were informed regarding various available government schemes and were encouraged to avail themselves of and optimally use the same.

• All children in the study who fulfilled the severe acute malnutrition (SAM) criteria, were referred to the nutritional rehabilitation centre (NRC) of the hospital.

Strengths

• The study utilized a robust sample size of 250 participants, providing reliable insights.

• Comprehensive analysis of multiple factors influencing malnutrition, including socio-economic status, maternal education, diet, and birth weight.

• Statistically significant associations were identified for key variables like birth weight and dietary patterns.

Limitations

• The study was limited to a hospital outpatient setting, which may not reflect the broader community.

• The use of convenience sampling might introduce selection bias.

• Lack of longitudinal data limits the ability to assess long-term trends or causal relationships.

• Non-dietary cultural factors influencing malnutrition were not deeply explored.

This study underscores the importance of maternal education, balanced diets, and improved birth out comes in tackling malnutrition. Broader community-based studies and targeted interventions are recommended to address this multifaceted issue.

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Conflicts of interest

There are no conflicts of interest.

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