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Original Research Article

Study of risk factors associated with malnutrition in children admitted to a sub-district hospital

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ABSTRACT

Background: Malnutrition remains a significant public health concern among children, particularly in resource-limited settings. Identifying the underlying risk factors is essential for targeted interventions. This study aims to assess the risk factors associated with malnutrition in children admitted to a sub-district hospital.
Methods: A cross-sectional study was conducted among children aged 6 months to 5 years admitted to the paediatric ward of a sub-district hospital over a 6-month period. Nutritional status was assessed using World Health Organization (WHO) growth standards. Data on socio-demographic variables, feeding practices, maternal education, socioeconomic status, birth weight, and presence of infections were collected through structured interviews with caregivers and review of medical records. Statistical analysis was performed to identify significant associations between these factors and malnutrition.
Results: Out of 100 children assessed, 15% were severely malnourished, 32% were moderately malnourished, and 53% had normal nutritional status based on mid-upper arm circumference (MUAC). Low birth weight, lack of exclusive breastfeeding, low maternal education, and poor socioeconomic status were all significantly associated with higher rates of malnutrition. Children with low birth weight were 3.7 times, non-exclusively breastfed children 5.6 times, and those from low socioeconomic backgrounds 4.6 times more likely to be malnourished. Anaemia showed no significant association with malnutrition, possibly due to the small sample size. Overall, the findings highlight the multifactorial nature of childhood malnutrition, influenced by perinatal, maternal, and socioeconomic factors.
Conclusion: The present study revealed that a considerable proportion of children suffer from varying degrees of malnutrition. Low birth weight, non-exclusive breastfeeding, low maternal education, and poor socioeconomic conditions were found to be significant risk factors. Anaemia, although prevalent, did not show a significant association. These findings emphasize the need for early preventive strategies focusing on maternal and child health, breastfeeding promotion, and social empowerment to combat childhood malnutrition effectively.

Keywords: Malnutrition, Children, Risk factors, sub-district hospital, Infections, Feeding practices, Maternal education

INTRODUCTION

Malnutrition remains a major public health concern in India, especially among children under five years of age, and is associated with increased morbidity, mortality, growth faltering, and cognitive impairment.[1] According to the National Family Health Survey (NFHS-5), 35.5% of children under five are stunted, 19.3% are wasted, and 32.1% are underweight, indicating persistent nutritional challenges despite modest improvements from NFHS-4.[2] In Gujarat, a similar burden is observed, highlighting the state's need for strengthened nutritional strategies.[3]

Child malnutrition in India is multifactorial, influenced not only by inadequate dietary intake but also by maternal undernutrition, low birth weight, frequent infections, household poverty, and poor sanitation and hygiene practices.[4,5]

The Comprehensive National Nutrition Survey (CNNS) further emphasizes that micronutrient deficiencies and anaemia remain widespread among young children, indicating the need for integrated nutrition interventions focused on dietary diversity and supplementation.[6,7]

Hospital-based studies across India have consistently identified socio-economic disadvantage, poor feeding practices, maternal education level, and recurrent childhood illness as significant determinants of undernutrition.[8,9] Evidence also suggests that maternal nutritional status, antenatal care utilization, and early initiation of breastfeeding are key contributors to child growth outcomes.[10]

Given this background, hospitals catering to low-income communities such as Rukshmaniben General Hospital in Khokhara provide a valuable setting to assess nutritional status and determine associated risk factors among vulnerable child populations.

Therefore, this study aims to estimate the prevalence of malnutrition among children aged 6 months to 5 years attending the paediatric department and to examine socio-demographic, maternal, feeding, morbidity, and hygiene-related risk factors.

Findings from this study will support focused nutrition counselling and help strengthen local public health and community-linked interventions.[11]

METHODS

A hospital-based, cross-sectional observational study was conducted to assess the risk factors associated with malnutrition among children.

The study was carried out at Rukshmaniben General Hospital, located in Khokhara, Ahmedabad, Gujarat. This hospital serves as a primary care and referral center for the local population, including a significant pediatric demographic.

Study duration

The study was conducted over a period of 6 months, from April to September 2025.

Study population

The study included 100 children, aged 6 months to 5 years, who were admitted to the pediatric ward during the study period. Children were selected irrespective of gender or socio-economic background.

Inclusion criteria

Children aged 6 months to 5 years, admitted to Rukshmaniben General Hospital during the study period with consent obtained from parents or guardians.

Exclusion criteria

Children with known chronic illnesses or congenital anomalies, children who were critically ill or whose parents/guardians refused to give consent were excluded from the study.

Data collection

Data was collected using a pre-designed, semi-structured questionnaire administered to the parents or guardians. The questionnaire included the following sections.

Demographic information (age, gender, family size, parental education, socio-economic status), feeding practices (breastfeeding, weaning, diet diversity), immunization status, history of infections or recent illnesses, anthropometric measurements, including: weight (measured using a digital pediatric scale), height/length (measured using a stadiometer or infantometer as appropriate), mid-upper arm circumference (MUAC).

Nutritional status was assessed based on World Health Organization (WHO) growth standards using Z-scores for weight-for-age, height-for-age, and weight-for-height.[12]

Data analysis

Data was entered and analyzed using Microsoft Excel and statistical package for the social sciences (SPSS) software (version XX). Descriptive statistics were used to summarize demographic and clinical variables. The prevalence of malnutrition was calculated, and chi-square tests or logistic regression analysis were used to identify associations between potential risk factors and malnutrition status. A $p<0.05$ was considered statistically significant.

RESULTS

Among the total 100 children assessed, 15% were severely malnourished (SAM), 32% were moderately malnourished (MAM), and 53% had normal MUAC (Table 1). Out of a total of 47 malnourished children studied, 15 (31.9%) were diagnosed with severe acute malnutrition (SAM) and 32 (68.1%) with moderate acute malnutrition (MAM). Among the SAM group, 9 (60%) were females and 6 (40%) were males, while in the MAM group, 18 (56.3%) were females and 14 (43.7%) were males, indicating a slightly higher prevalence of malnutrition among female children (Table 1).

Table 1: Demographic characteristics.

Nutritional status	Male	Female	Total
Normal	30	23	53
MAM	14	18	32
SAM	6	9	15

Table 2 shows that among 49 children with low birth weight, 63% were malnourished at the time of admission. Whereas among 51 children with normal birth weight only 31% were malnourished at the time of admission. So LBW children are 3.7 times more prone to be malnourished in their lifetime (Table 2).

Table 2: Association between low birth weight and malnutrition.

Parameters	Malnourished	Normal	Total
LBW (<2.5 kg) at birth	31	18	49
>2.5 kg at birth	16	35	51
Total	47	53	100
χ^2=8.964, df=1, p=0.0027			

χ2=8.964, df=1, p value=0.0027

There is statistically significant association between low birth weight and malnutrition (χ^2=8.964, p=0.0027).

Table 3 shows that among 47 children who were exclusively breastfed for 6 months, 25% were malnourished at the time of admission. Whereas among 51 children who were not exclusively breastfed 68% were malnourished at the time of admission. Top fed children are 5.6 times more prone to be malnourished in childhood (Table 3).

Table 3: Association between exclusive breastfeeding and malnutrition.

Parameters	Malnourished	Normal	Total
EBF (exclusively breastfed)	12	35	47
Top fed	35	18	51
Total	47	53	100

χ2=14.8, df=1, p=0.000118

From the findings it can be concluded that there is statistically significant association between lack of exclusive breastfeeding and malnutrition later in childhood (χ^2=14.8, p=0.000118).

Table 4: Association between low maternal education and malnutrition.

Maternal education status	Malnou-rished	Normal	Total
Uneducated/basic school	35	24	59
High school/ graduate	12	29	41
Total	47	53	100

χ2=7.60, df=1, p=0.005817

Table 4 shows that among 59 children of uneducated/basic schooled mothers 59% were malnourished at the time of admission. Whereas among 41 children of high schooled and graduate mothers only 29% were malnourished at the time of admission. So, children of mothers with low maternal education are 3.5 times more prone to be malnourished in childhood (Table 4).

Association between low maternal education and malnutrition was found to be statistically significant (χ^2=7.60, df=1, p=0.005817).

Families were classified based on modified Kuppuswamy scale. Based on total score families were classified as upper class, upper middle class, lower middle class, upper lower class and lower class.

Table 5 shows that among 53 children of upper lower and lower socioeconomic class, 64% were malnourished at the time of admission. Whereas among 47 children of upper middle and lower middle socioeconomic status only 27% were malnourished at the time of admission. So, children belonging to upper lower and lower socioeconomic class are 4.6 times more prone to be malnourished in childhood (Table 5).

Table 5: Association between socioeconomic status (SES) of family and malnutrition.

Socioeconomic status	Malnou-rished	Normal	Total
Upper lower and lower SES	34	19	53
Upper middle and lower middle SES	13	34	47
Total	47	53	100

χ2=11.8, df=1, p=0.000564

Association between socioeconomic status (SES) of family and malnutrition was found to be statistically significant (χ2=11.8, p=0.000564).

Table 6: Association of anaemia with malnutrition.

HB cate-gory (g/dl)	SAM children	MAM count	Normal count	% within HB
<7	1	3	6	10
7–9	8	15	20	43
9–11	4	11	15	30
>11	2	3	12	17

Observations

Severe malnutrition (SAM) is most common in the 7–9 g/dl and 9–11 g/dl groups. Normal MUAC is more common in higher HB categories (>11 g/dl). Very low HB (<7 g/dl) still has 60% of children with normal MUAC, but numbers are very small (n=10), so percentages are unstable (Table 6). Pearson Chi-square: p=0.729 → not significant, Fisher's exact/Monte Carlo: p=0.773/0.748 → not significant, linear-by-linear association: p=0.401 → no linear trend.

All these tests indicate that the observed pattern is not statistically significant.

DISCUSSION

This study aimed to assess the prevalence of malnutrition and its associated factors among children using MUAC as a key anthropometric measure. Nearly half of the children assessed showed some form of malnutrition, indicating that undernutrition remains a major public health problem in this population.

A strong and statistically significant association was observed between low birth weight and malnutrition. Children born with a birth weight below 2.5 kg were 3.7 times more likely to be malnourished compared to those with normal birth weight. This finding is consistent with the study by Rahman et al, which demonstrated that low birth weight significantly increases the risk of stunting, wasting, and underweight among children under five years of age.[13]

Low birth weight is a key risk factor for malnutrition as it reflects poor fetal growth and limited nutrient reserves. Such children have higher metabolic needs, weaker immunity, and greater infection risk, making them more vulnerable to growth failure and undernutrition.

Exclusive breastfeeding (EBF) emerged as a major protective factor. Children who were exclusively breastfed for six months had significantly lower rates of malnutrition compared to those who were top-fed. non-exclusively breastfed children were 5.6 times more likely to be malnourished. This finding aligns with Khaliq et al, who reported that complete weaning before six months nearly doubled the odds of concurrent underweight and wasting.[14]

Lack of exclusive breastfeeding leads to malnutrition as top-fed infants miss vital nutrients and immunity from breast milk, face higher infection risks, and have poorer digestion and growth.

Maternal education was another key determinant of child nutritional status. Children of uneducated or basically educated mothers were 3.5 times more prone to malnutrition. Educated mothers are more likely to adopt appropriate feeding practices, maintain hygiene, and seek timely medical care for their children. This finding corresponds with the results of Tariq et al, who found a lower risk of stunting among children of literate mothers. Improving maternal education could thus have intergenerational benefits for child health.[15]

Socioeconomic status (SES) showed a significant impact on nutritional outcomes. Children from lower and upper-lower SES families were 4.6 times more likely to be malnourished compared to those from middle or higher SES families. Poor living conditions, inadequate sanitation, low dietary diversity, and limited access to healthcare contribute to this disparity. Similar conclusions were drawn by Prasad et al, who found higher risks of stunting and underweight among children from economically deprived families.[16]

Addressing poverty and social inequality is therefore central to reducing malnutrition. Children from lower socioeconomic classes are more prone to malnutrition due to factors such as poor household income, inadequate access to nutritious food, lack of health education, unhygienic living conditions, and limited access to healthcare services.

In contrast, anaemia did not show a statistically significant association with malnutrition in this study. Although mild trends were observed, the limited sample size and uneven distribution may have hindered the detection of significant relationships. Larger studies are required to further explore the interaction between anaemia and malnutrition.

The study by Yang et al concluded that anaemia and malnutrition were highly prevalent among infants in rural Shaanxi, China, and were strongly associated with poor feeding practices and lower socioeconomic conditions. Strengthening maternal education and improving infant nutrition could help reduce these health issues.[17]

Overall, the findings reinforce that child malnutrition is multifactorial shaped by biological, social, and economic determinants. Interventions must therefore be multisectoral, targeting maternal health, education, infant feeding practices, and socioeconomic upliftment.

The present study has some limitations. It was conducted on a relatively small sample size (n=100), which may restrict the generalizability of the findings. The cross-sectional study design limits the ability to establish causal relationships between the identified risk factors and malnutrition. Recall bias may have influenced the accuracy of information regarding breastfeeding practices and birth weight. Furthermore, anaemia assessment was based only on available haemoglobin values without accounting for other micronutrient deficiencies. Lastly, the socioeconomic status was classified using a single scale (modified Kuppuswamy), which may not adequately reflect income variability, especially in rural populations.

CONCLUSION

The present study revealed that a considerable proportion of children suffer from varying degrees of malnutrition. Low birth weight, non-exclusive breastfeeding, low maternal education, and poor socioeconomic conditions were found to be significant risk factors. Anaemia, although prevalent, did not show a significant association. These findings emphasize the need for early preventive strategies focusing on maternal and child health, breastfeeding promotion, and social empowerment to combat childhood malnutrition effectively.

Recommendations

Promotion of exclusive breastfeeding through community-based education and counselling should be prioritized. Strengthening maternal education, antenatal care, and nutritional support is essential to prevent low birth weight and improve child health outcomes. Addressing the socioeconomic determinants of malnutrition through poverty alleviation and social welfare interventions is equally important. Integration of routine nutrition assessment and counselling into maternal and child health services, along with larger multicentric studies, is recommended to validate current findings and identify additional contributing factors.

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