

SEVERE ACUTE MALNUTRITION AND ITS ASSOCIATED SOCIOECONOMIC FACTORS AMONG CHILDREN UNDER FIVE YEARS

Bilal Ahmed Khan^{*1}, Bushra Rafique²

^{*1}Department of Pediatrics, Baqai Medical University

²Professor, Department of Pediatrics, Baqai Medical University

^{*1}ronaldorooneyberbatov@gmail.com, ²bushra.nadeem@yahoo.com

Corresponding Author: *

Bilal Ahmed Khan

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ABSTRACT

Background:

Severe acute malnutrition (SAM) is a major public health problem in developing countries and is influenced by socioeconomic, environmental, and feeding-related factors. This study aimed to identify the socioeconomic determinants associated with SAM in children aged 6–59 months.

Methods:

A cross-sectional study was conducted over six months at the WHO Nutritional Stabilization Center in the pediatric ward of a tertiary care hospital in Karachi. A total of 300 children aged 6–59 months meeting WHO criteria for SAM were enrolled through consecutive sampling. Data regarding demographics, anthropometric measurements, feeding practices, immunization status, and socioeconomic factors were collected using a structured questionnaire. Data were analyzed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Chi-square, Fisher's exact, independent t-test, and Mann–Whitney U tests were applied. A *p*-value <0.05 was considered significant.

Results:

The mean age of participants was 24.6 ± 14.2 months, with 54% males. Severe acute malnutrition was present in 42% of children. Delayed breastfeeding initiation ($p=0.02$), early complementary feeding ($p=0.01$), incomplete immunization ($p=0.001$), maternal illiteracy ($p<0.001$), low household income ($p<0.001$), unsafe drinking water ($p<0.001$), and poor hygiene practices ($p<0.001$) were significantly associated with SAM.

Conclusion:

Severe acute malnutrition remains highly prevalent among under-five children and is strongly linked to poor socioeconomic conditions and inappropriate feeding practices. Improving maternal education, nutrition awareness, immunization coverage, and sanitation may help reduce its burden.

Keywords: Malnutrition, Socioeconomic Factors, Developing Countries, Sanitation, Breast Feeding

INTRODUCTION

Severe acute malnutrition (SAM) in children 6–59 months old is characterized by presence of severe wasting (low weight-for-height/length) ($<3SD$),

mid-upper arm circumference (MUAC) measurement <11.5 cm or the presence of pitting edema [1]. Pediatric malnutrition is a major public health crisis in the developing countries, with high

prevalence in South East Asia and Africa. In poorer countries especially, more than 50% of the under-5-year-old deaths, occur due to malnutrition. Globally, approximately 50 million under 5 children are wasted (low weight for height) and 156 million are stunted (low height for age) [2].

In Pakistan, poor nutritional status can be seen with the statistics that approximately 1/3rd of children under five year of age are underweight, half are stunted and about 1/10 are wasted [3]. Pakistan is categorized as the highest stunted country in South Asia and is ranked 77 out of 113 countries affected by malnutrition. Statistics reveal that 17.7% children are wasted, 40.2% are stunted and 28.9% are underweight. Rural community is affected more than urban community and boys are seen to be affected more than girls. Baluchistan province has the highest prevalence of stunting, while Sindh province accounts for the highest prevalence of wasting and underweight [4].

Socio-economic variables responsible for SAM are poverty, literacy status of parents, gender inequality, clean water availability and sanitation [3]. Children from poorer backgrounds are more likely to suffer from malnutrition because of factors like their parents' education, income and jobs. In both rich and poor countries, issues such as gender inequality, low maternal schooling and poverty contribute to malnutrition. People with less money often struggle to afford food, leading to higher malnutrition rates. Mothers with more education know more about healthy habits, which benefits their children's nutrition. Likewise, fathers with better education also help by providing more income for the family [2].

Study from Pakistan by Mohammad et al. [3], observed that Socio-economic risk factors were significantly associated with malnutrition. Majority of the fathers (60.5%) and mothers (82%) of malnourished children were illiterate. (44.5%) families had a low income (i.e. Rs. 6000–10000).

Study from India by Lakhmawar et al. [7], observed that the highest incidence of SAM was seen in children aged 13–24 months (40%) and almost half (55%) of affected children had illiterate mothers. Another study from India by Ghimire et

al. [6], showed that almost 75% of children belonged to low-income households and 18.8% had no toilet facility in their household. In the multivariable logistic regression analysis, family size of five or more members was significantly related with SAM [adjusted odds ratio (AOR): 3.96]. Children of households undergoing severe food insecurity were four times more likely to be severely malnourished. Study from Nepal by Pravara et al. [5], showed that low socioeconomic status, mother's age at birth <20 or >35 years, birth interval <24 months, illiterate father, bottle feeding and not initiating complementary feeding at the age of 6 months were significantly associated with SAM (Adjusted Odds Ratio >1). A study from Bangladesh by Akther et al. [8], observed many factors to be present significantly lower in the case (SAM) group than the controls, including exclusive breast feeding (26.7%) compared to control group (67.8%) and appropriate weaning practice (17.8%) and in control group (58.9%). Less than 10% of mothers had more than 5 years of schooling, compared to control group with 72%. About 3 times more children in the case group (28.9%) came from low-income families, compared to 10 % in the control group.

As malnutrition is the cause for many diseases and in children, high amount of energy is required to meet the need of growth and development; malnourished children are unable to develop mentally and physically. Hence, it will be helpful to know the various socioeconomic and environmental risk factors for SAM in children under five years of age in our local population. This will help clinicians in diagnosis and timely treatment of these children.

Objectives: The objective of this study is to find the socioeconomic risk factors of severe acute malnutrition among children less than five years age.

Methods

This cross-sectional study was conducted at the WHO Nutritional Stabilization Center in the pediatric ward of a tertiary care hospital in Karachi. The center primarily serves patients from suburban and underserved areas, including Lyari

and surrounding localities. The study was carried out over six months, from January 2025 to July 2025, after approval from the College of Physicians and Surgeons Pakistan (CPSP) and ethical clearance from the Institutional Review Board/Ethical Committee.

A sample size of 276 participants was calculated using the OpenEpi sample size calculator with a 95% confidence interval, 5% margin of error, and an estimated prevalence of 23.39% for families belonging to the lowest household wealth quintile, based on a district-level Pakistani study [4]. Participants were recruited through non-probability consecutive sampling.

Mothers of children aged 6–59 months fulfilling the WHO criteria for severe acute malnutrition (SAM) were included. SAM was defined as mid-upper arm circumference (MUAC) <115 mm, weight-for-height below –3 standard deviation Z-score according to WHO growth standards, or presence of bilateral nutritional edema. Children with chronic illnesses such as HIV or tuberculosis, life-threatening conditions including cardiac or renal failure, and congenital anomalies affecting feeding were excluded.

Data were collected using a structured proforma developed after extensive literature review. Written informed consent was obtained from parents prior to enrollment. Information regarding demographics, anthropometric measurements, feeding practices, immunization status, and socioeconomic factors was recorded. Anthropometric assessment included weight, height/length, MUAC, and fronto-occipital circumference. Socioeconomic variables assessed included parental literacy, family size, family system, parental absence, birth spacing, household income, drug use within the family, water supply, sanitation, housing conditions, waste disposal, and maternal handwashing practices.

Data were entered and analyzed using SPSS version 26. Quantitative variables were presented as mean $\pm$ standard deviation or median with interquartile range according to data distribution. Normality was assessed using the Shapiro-Wilk test. Qualitative variables were expressed as frequencies and percentages. Stratification was performed to control potential effect modifiers

including age, gender, residence, gestational age, birth type, immunization status, and feeding practices. Chi-square and Fisher's exact tests were applied where appropriate, and a p-value <0.05 was considered statistically significant.

Results

A total of 300 children aged 1–59 months were enrolled in the study. The mean age was 24.6 ± 14.2 months, with males comprising 54% of the participants. Severe acute malnutrition (SAM) was identified in 42% of children.

Children with SAM had significantly lower anthropometric measurements compared to non-SAM children, including mean weight (8.6 ± 2.4 kg vs 11.8 ± 2.9 kg, $p < 0.001$), height (80.2 ± 13.7 cm vs 88.3 ± 15.1 cm, $p = 0.002$), MUAC (10.4 ± 0.7 cm vs 12.2 ± 0.9 cm, $p < 0.001$), and head circumference (42.8 ± 3.4 cm vs 44.6 ± 3.9 cm, $p = 0.01$).

Edema and dermatosis were observed more frequently among children with SAM, and the association was statistically significant ($p < 0.001$). Feeding-related factors such as delayed initiation of breastfeeding ($p = 0.02$), discontinuation of breastfeeding before two years ($p = 0.04$), and introduction of complementary feeding before six months of age ($p = 0.01$) were significantly associated with severe malnutrition.

Children with SAM also had lower rates of complete immunization compared to non-SAM children (23.8% vs 44.8%, $p = 0.001$).

Socioeconomic factors significantly associated with SAM included low parental education, particularly maternal illiteracy ($p < 0.001$), low household income ($p < 0.001$), maternal employment ($p = 0.02$), and larger family size ($p = 0.003$).

Environmental conditions such as unsafe drinking water, lack of latrine facilities, improper waste disposal, and inadequate handwashing practices were also significantly associated with severe acute malnutrition ($p < 0.05$).

Discussion

This study identified several socioeconomic, feeding, and environmental factors associated with severe acute malnutrition (SAM) among children

aged 1–59 months in a low-resource urban community of Karachi. The findings highlight the continued burden of childhood malnutrition in disadvantaged populations.

Low household income and poor parental education showed significant association with SAM. Similar findings have been reported in previous Pakistani studies, where poverty and parental illiteracy were identified as major contributors to undernutrition [10]. Maternal education plays an important role in appropriate feeding practices, healthcare seeking, and hygiene awareness.

Feeding practices were also significantly associated with malnutrition. Delayed initiation of breastfeeding and early introduction of complementary feeding were more common among malnourished children. Previous studies have shown that inappropriate infant feeding practices increase the risk of wasting and poor growth in children [11].

Environmental conditions including unsafe drinking water, poor sanitation, and inadequate handwashing practices were significantly associated with SAM. Recurrent infections related to poor hygiene and contaminated water may contribute to impaired nutrition and growth [12]. These findings emphasize the importance of improving water, sanitation, and hygiene measures in vulnerable communities.

The results of this study are comparable to findings from other South Asian countries, where poverty, low maternal education, poor sanitation, and inadequate feeding practices remain major determinants of childhood malnutrition [13].

Some limitations should be considered while interpreting the findings. The cross-sectional design limits assessment of causal relationships. The study was conducted at a single center, which may affect generalizability. In addition, information regarding feeding practices and household conditions was based on caregiver responses and may be subject to recall bias. Biochemical assessment and detailed dietary evaluation were also not included.

Further multicenter and longitudinal studies are recommended to better evaluate risk factors associated with childhood malnutrition and to

improve understanding of regional variations and nutritional deficiencies.

Conclusion

Severe acute malnutrition remains highly prevalent among under-five children in low-income urban communities. Factors significantly associated with SAM included low parental education, poor household income, delayed breastfeeding initiation, inappropriate complementary feeding, unsafe drinking water, and poor sanitation practices.

The findings suggest that childhood malnutrition is strongly influenced by socioeconomic and environmental conditions. Improving maternal education, feeding practices, sanitation, and access to safe water may help reduce the burden of malnutrition in vulnerable populations.

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