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PREVALENCE AND RISK FACTORS OF MALNUTRITION IN CHILDREN BETWEEN 6 MONTHS TO 5 YEARS OF AGE IN PEDIATRIC EMERGENCY AND OUTPATIENT DEPARTMENT OF CHAUDHRY MUHAMMAD AKRAM TEACHING AND RESEARCH HOSPITAL LAHORE

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Abstract

Objective: *To determine the prevalence of malnutrition in children between 6 months to 5 year of age in the pediatric emergency (ER) and outpatient department (OPD) and to determine frequency of various risk factors in SAM children screened in our study.*

Study Design: *Cross sectional study.*

Study Setting: *Department of Pediatric Emergency and Outpatient, Chaudhry Muhammad Akram Teaching & Research Hospital, Lahore.*

Study Duration: *Five Months (February to June, 2025).*

Methodology: *340 children aged 6 months to 5 years of either gender were enrolled. Children with congenital heart disease, chronic illnesses, major surgical history, intensive care admission, or those accompanied by non-parental attendants were excluded. Data were collected through a semi-structured questionnaire including demographic characteristics, anthropometric measurements, and risk factors for malnutrition. Anthropometric assessment included weight, height, and mid-upper arm circumference measured using standard techniques.*

Results: *More than half of the participants were aged 6–36 months (54.4%), with a slight female predominance (52.9%). Most children presented through the outpatient department (60.0%). The mean age was 32.97 ± 16.09 months, mean mid-upper arm circumference was 126.60 ± 14.26 mm, mean weight was 11.59 ± 2.53 kg, and mean height was 86.20 ± 10.06 cm. Malnutrition was identified in 107 children, yielding a prevalence of 31.5%.*

Conclusion: *Malnutrition remains highly prevalent among children under five years of age in tertiary care settings. The strong association with preventable and modifiable factors emphasizes the need for integrated, multi-sectoral strategies focusing on maternal education, immunization coverage, optimal feeding practices, and perinatal care.*

INTRODUCTION

Malnutrition is a pathological state with a broad variety of clinical signs that arises from a lack of one or more nutrients. [1,3] The state of a nation's children's nutrition is crucial to its overall human development. Since preschoolers are still in the developmental (or functional) period of life, any stunting of their growth would limit their potential on the mental, physical, and intellectual levels. [4] The leading cause of sickness and death among children under five is malnutrition. Overall prevalence estimates of underweight, wasting, and stunting were 17.8%, 7.4%, and 10.9% based on the NCHS/WHO reference, as opposed to 11.3%, 7.6%, and 13% computed based on the WHO 2006 reference. [5] It was reported in 2001 that 54% of children in underdeveloped nations died from starvation.[6]

Through the Millennium Development Goal, the World Health Organization has acknowledged the critical role that better nutrition plays in lowering the death rate among children under five, particularly in poor nations. Malnutrition affects 50–60% of children in Pakistan.[7] The National Health Survey of Pakistan (NHSP) found that underweight children were 29.7% of the population and that stunting was 16.7%.5 A number of risk factors for under nutrition have been identified by studies carried out in developing nations. [8] These include a lack of food, poor infant feeding practices, poverty, low maternal intelligence, low parental education, maternal depression, living in a rural residential area, having many children under five years old, older infant age, low socioeconomic status of the household, and not having received vaccinations. One major factor contributing to growth faltering is low mother nutritional knowledge. [9]

In a study by Ahmad S, et al, [10] 200 patients were accessed in total, with average mid upper arm circumference (MUAC) of 130 mm; 33% were severely malnourished. Of the severely-malnourished children, 54.2% were female, and 45.8% were male. Males were 115(57.5%) whereas females were 85(42.5%). Mean age of the patients was 28.65±15.34 months, mean weight was 12.05±2.57kg and mean for percentile of weight for age was 32.20±27.05. When the frequencies of various risk factors were evaluated it was found that delayed weaning (> 6 months later) was present in 77(38.5%) of the patients. Low maternal education where mother was not even primary was present in 82(41%) of the patients. There was lack of proper vaccination in 52(26%) of the patients. Larger family size with > 2 kids younger than 5 years was identified in 97(48.5%) and under-feeding with < 2 bottles per day feeding was identified in 147(73.5%) of the patients. No significant effect of age or gender was found on the frequencies of various risk factors of malnutrition in the study population. [10]

The rationale of this study is that malnutrition is a common condition and little data is available in this regard. Hence, the present study is to determine the prevalence of malnutrition presenting in our tertiary care hospital. Considering the fact that there were only a few previous studies been conducted on the prevalence and risk factors of the malnutrition of children 6 months to 5 years (7). With early diagnosis of malnutrition significant morbidity related can be prevented or treated beforehand. The main purpose of our study is to determine the degree and type of malnutrition in children less than 5 year of age in tertiary care hospitals of Lahore and identify the risk factors associated with it.

METHODOLOGY:

This cross-sectional study was conducted in the Pediatric Emergency and Outpatient Department of Chaudhry Muhammad Akram Teaching and Research Hospital, Lahore. The study duration was Five months from February to June, 2025 following formal approval of the study synopsis. A non-probability consecutive sampling technique was employed to enroll eligible participants during the study period.

The study population comprised children of either gender aged between 6 months and 5 years who presented to the pediatric emergency or outpatient department. Children were enrolled after obtaining written informed consent from their parents or legal guardians. Children with congenital heart diseases, chronic medical conditions, significant surgical history, those admitted to the intensive care unit for treatment, or those accompanied by relatives other than their parents were excluded from the study. All exclusions were determined based on history and

clinical examination performed by a senior registrar in paediatrics who was blinded to the study objectives. The sample size was calculated using the World Health Organization (WHO) sample size calculator, taking an expected prevalence of severe acute malnutrition (SAM) of 33%, with an absolute precision of 5% and a confidence level of 95%. The calculated sample size was 340 participants.

Data were collected using a semi-structured questionnaire specifically designed to record demographic details, anthropometric measurements, nutritional status, and potential risk factors associated with malnutrition. Anthropometric assessment included measurement of mid-upper arm circumference (MUAC), weight, and height using standard techniques. Severe acute malnutrition was operationally defined as a weight-for-height z-score equal to or exceeding three standard deviations below the mean and/or a mid-upper arm circumference measuring less than 110 mm. Risk factors were assessed based on predefined operational definitions. Delayed weaning was defined as failure to introduce solid foods after six months of age or continued predominant breastfeeding or formula feeding beyond 12 months of age. Low maternal education was labeled when the mother had not attained primary level education. Lack of vaccination was defined as non-receipt of age-appropriate recommended vaccines or non-availability of vaccination records. Large family size was defined as having more than two children under five years of age in the household. Under-feeding was defined as consumption of fewer than two feeding bottles within a 24-hour period. Prematurity was defined as a history of birth before 37 completed weeks of gestation, while low birth weight was defined as a birth weight of less than 2.5 kg.

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 23. Quantitative variables such as age were expressed as mean and standard deviation, while qualitative variables including gender, nutritional status, delayed weaning, low maternal education, lack of vaccination, large family size, under-feeding, prematurity, and low birth weight were expressed as frequencies and percentages. The outcome variable, malnutrition status, was stratified with respect to age, gender, and place of presentation (OPD or emergency). Post-stratification chi-square test was applied to assess associations, and a p-value of less than 0.05 was considered statistically significant.

RESULTS:

Table 1 presents the demographic characteristics of the 340 study participants. More than half of the children, 185 (54.4%), were aged between 6 and 36 months, while 155 (45.6%) belonged to the 37–60 months age group. Female children constituted a slightly higher proportion of the study population, accounting for 180 (52.9%) participants, whereas 160 (47.1%) were males. Regarding the place of presentation, the majority of children, 204 (60.0%), were seen in the outpatient department, while 136 (40.0%) presented to the emergency department.

Table 2 summarizes the anthropometric measurements of the study participants. The mean age of the children was 32.97 ± 16.09 months. The mean mid-upper arm circumference (MUAC) was 126.60 ± 14.26 mm. The mean body weight of the participants was 11.59 ± 2.53 kg, while the mean height was recorded as 86.20 ± 10.06 cm.

Table 3 shows the prevalence of malnutrition among the enrolled children. Out of the total 340 participants, 107 children (31.5%) were identified as having malnutrition, whereas 233 children (68.5%) were found to be non-malnourished.

Table 4 describes the frequency of various risk factors among the study participants. Delayed weaning was observed in 144 children (42.4%), while 196 (57.6%) did not have delayed weaning. Low maternal education was present in 141 children (41.5%). Lack of vaccination was identified in 99 children (29.1%). A large family size was noted in 172 participants (50.6%). Under-feeding was the most frequently observed risk factor, present in 264 children (77.6%). Prematurity was reported in 69 children (20.3%), and low birth weight was observed in 80 children (23.5%).

A total of 340 children were included in the analysis. No statistically significant association was observed between malnutrition and age group, as children aged 6–36 months and 37–60 months showed comparable proportions of malnutrition (p = 0.450). Similarly, gender did not demonstrate a significant relationship with malnutrition, with nearly equal distribution among males and females (p = 0.700).

The study setting showed a borderline association, with a relatively higher proportion of malnourished children presenting through the emergency department compared to outpatient services ($p = 0.051$).

In contrast, several modifiable risk factors were found to be significantly associated with malnutrition. Lack of vaccination demonstrated a strong association, as malnutrition was markedly more common among unvaccinated children compared to vaccinated children ($p < 0.001$). Children belonging to large family sizes had a significantly higher frequency of malnutrition than those from smaller families ($p = 0.021$). Under-feeding was the most prominent associated factor, with a substantially higher proportion of malnourished children reported among those who were under-fed ($p = 0.012$). Prematurity was also significantly linked with malnutrition, as premature children showed higher malnutrition rates compared to full-term children ($p = 0.007$). Additionally, low birth weight exhibited a strong and statistically significant association with malnutrition ($p < 0.001$).

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS (N = 340)

Variable	Category	n	%
Age Group	6–36 months	185	54.4
	37–60 months	155	45.6
Gender	Male	160	47.1
	Female	180	52.9
Setting	OPD	204	60.0
	Emergency	136	40.0

TABLE 2: ANTHROPOMETRIC MEASUREMENTS OF STUDY PARTICIPANTS

Variable	Mean ± SD
Age (months)	32.97 ± 16.09
MUAC (mm)	126.60 ± 14.26
Weight (kg)	11.59 ± 2.53
Height (cm)	86.20 ± 10.06

TABLE 3: PREVALENCE OF MALNUTRITION (N = 340)

Malnutrition Status	n	%
Yes	107	31.5
No	233	68.5

TABLE 4: FREQUENCY OF RISK FACTORS AMONG STUDY PARTICIPANTS (N = 340)

Risk Factor	Yes n (%)	No n (%)
Delayed weaning	139 (40.8)	201(59.2)
Low maternal education	141 (41.5)	199 (58.5)
Lack of vaccination	99 (29.1)	241 (70.9)
Large family size	172 (50.6)	168 (49.4)
Under-feeding	264 (77.6)	76 (22.4)
Prematurity	69 (20.3)	271 (79.7)

Low birth weight	80 (23.5)	260 (76.5)

TABLE 5: ASSOCIATION OF MALNUTRITION WITH DEMOGRAPHIC VARIABLES AND RISK FACTORS (N = 340)

Risk Factor	Category	Malnutrition Yes n (%)	Malnutrition No n (%)	Total (n)	p-value
Age Group	6–36 months	55 (51.4)	130 (55.8)	185	0.450
	37–60 months	52 (48.6)	103 (44.2)	155	
Gender	Male	52 (48.6)	108 (46.4)	160	0.700
	Female	55 (51.4)	125 (53.6)	180	
Setting	OPD	56 (52.3)	148 (63.5)	204	0.051
	Emergency	51 (47.7)	85 (36.5)	136	
Lack of Vaccination	Yes	66 (61.7)	33 (14.2)	99	<0.001
	No	41 (38.3)	200 (85.8)	241	
Large Family Size	Yes	64 (59.8)	108 (46.4)	172	0.021
	No	43 (40.2)	125 (53.6)	168	
Under-Feeding	Yes	92 (86.0)	172 (73.8)	264	0.012
	No	15 (14.0)	61 (26.2)	76	
Prematurity	Yes	31 (29.0)	38 (16.3)	69	0.007
	No	76 (71.0)	195 (83.7)	271	
Low Birth Weight	Yes	41 (38.3)	39 (16.7)	80	<0.001
	No	66 (61.7)	194 (83.3)	260	

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DISCUSSION:

The present study highlights a substantial burden of malnutrition among children aged 6 months to 5 years presenting to a tertiary care hospital, with an overall prevalence of 31.5%. This finding reinforces malnutrition as a persistent public health concern in low- and middle-income countries, particularly within hospital-attending pediatric populations. Although age group and gender did not show a statistically significant association with malnutrition in our cohort, several modifiable risk factors demonstrated strong and significant relationships, underscoring the preventable nature of this condition.

International evidence from China by Zhang et al.[11] reported comparatively lower rates of stunting, wasting, and underweight among children aged 6–24 months, with prevalence figures below 5%. The lower burden observed in that population may be attributed to structured poverty-alleviation strategies and targeted nutritional interventions, including supplementary feeding programs. In contrast, the higher prevalence observed in our study likely reflects differences in socioeconomic context, healthcare access, and nutritional support systems. Nevertheless, both studies consistently emphasize the influence of parental education and family structure on childhood nutritional outcomes, supporting the role of social determinants in malnutrition.

Local Pakistani data further corroborate our findings. Wamiq et al. [12] reported a very high prevalence of malnutrition among children under five, with nearly one-third of participants classified as severely malnourished. Similar to our study, poor maternal education emerged as a significant risk factor, highlighting the crucial role of maternal awareness and feeding practices in child nutrition. However, unlike their findings, increasing age was not significantly associated with malnutrition in our

cohort, suggesting possible regional or population-specific variations in vulnerability patterns.

The association between malnutrition and lack of vaccination observed in our study aligns strongly with findings from Rathore et al.[13] in Azad Kashmir, where incomplete immunization was identified as one of the most powerful predictors of severe acute malnutrition. This relationship likely reflects the bidirectional interaction between malnutrition and infectious diseases, whereby undernourished children are more susceptible to infections, and recurrent infections further exacerbate nutritional deficiencies. The consistency of this finding across multiple Pakistani studies emphasizes immunization coverage as a critical intervention point.

Large family size was another significant determinant in our study, a finding echoed by both Rathore et al.[13] and Zhang et al.[11], who reported higher malnutrition rates among children from households with multiple siblings. Resource dilution within large families may compromise adequate feeding, healthcare access, and parental attention, particularly in economically constrained settings. These findings underscore the importance of family planning and household-level nutritional education in malnutrition prevention strategies.

Under-feeding emerged as the most prevalent and significantly associated risk factor in our population. This observation is consistent with previous Pakistani studies, including those conducted in Multan and Rawalpindi. In particular, Ahmed et al.[14], in a hospital-based study from Rawalpindi, reported a high prevalence of severe acute malnutrition but did not observe statistically significant associations with specific feeding variables. Nevertheless, trends toward higher malnutrition among children with suboptimal feeding practices were evident, suggesting that feeding behaviors remain a critical but complex determinant influenced by cultural and socioeconomic factors.

Prematurity and low birth weight were also significantly associated with malnutrition in the present study, findings that are in agreement with Rathore et al.[13], who reported strong links between low birth weight, maternal health indicators, and severe acute malnutrition. These associations highlight the importance of maternal nutrition, adequate antenatal care, and optimized perinatal health in breaking the intergenerational cycle of malnutrition.

Evidence from a prospective observational study conducted in Nawabshah by Langah et al.[15] further reinforces the gravity of severe acute malnutrition, demonstrating notable morbidity and mortality among affected children. Although the present study focused on overall malnutrition rather than exclusively severe acute malnutrition, the shared risk factors and clinical implications emphasize the continuum of nutritional vulnerability and the need for early identification before progression to severe disease.

Collectively, these findings indicate that malnutrition in under-five children is driven by a complex interplay of nutritional, maternal, socioeconomic, and healthcare-related factors. The consistency of key determinants such as maternal education, feeding practices, immunization status, family size, prematurity, and birth weight across both national and international studies highlights the universal relevance of these factors, despite contextual differences in prevalence.

The identification of modifiable risk factors in this study provides valuable opportunities for targeted interventions. Strengthening routine immunization programs, promoting appropriate infant and young child feeding practices, enhancing maternal education, improving antenatal care, and addressing household-level socioeconomic constraints could substantially reduce the burden of childhood malnutrition. Hospital-based screening, particularly in emergency settings, may serve as a critical entry point for early detection and referral to nutritional support services.

The present study is limited by its single-center, hospital-based design, which may restrict generalizability to the broader community. Additionally, reliance on caregiver recall for feeding practices may introduce reporting bias. Despite these limitations, the relatively large sample size and standardized anthropometric assessment strengthen the validity of the findings.

CONCLUSION:

Malnutrition remains highly prevalent among children under five years of age in tertiary care

settings. The strong association with preventable and modifiable factors emphasizes the need for integrated, multi-sectoral strategies focusing on maternal education, immunization coverage, optimal feeding practices, and perinatal care. Early identification and timely interventions are essential to reduce morbidity, mortality, and long-term developmental consequences associated with childhood malnutrition.

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