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Frequency of Anaemia in Children Screened for it using Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy at the paediatric unit, Chandak Medical College, Larkana

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ABSTRACT

OBJECTIVE: To determine the frequency of anaemia in children screened through the Integrated Management of Neonatal and Childhood Illness criteria and to assess its relationship with demographic and clinical characteristics.

METHODOLOGY: A descriptive cross-sectional study was conducted at the Paediatric Unit of SMBBU Larkana, enrolling 188 children aged five years or younger with clinical features suggestive of anaemia. Screening was performed using the IMNCI strategy, and anaemia was confirmed by haemoglobin testing. Children with known haematological disorders or malnutrition were excluded. Data were analysed using SPSS with chi square testing at a significance level of 0.05.

RESULTS: The children had a mean age of 26.51 months, and 44.1% were male. Anaemia was present in 41% of participants. Age ($p = 0.802$) and gender ($p = 0.371$) showed no significant association with anaemia. Other demographic variables were also non-significant, while household income was the only factor significantly associated with anaemia ($p = 0.049$).

CONCLUSION: The study found that anaemia was common among children screened through the IMNCI strategy, with lower household income emerging as the only factor significantly associated with anaemia. Other demographic and clinical variables showed no meaningful relationships. These findings indicate that socioeconomic conditions play a central role in childhood anaemia and should be prioritized in future public health interventions.

KEYWORDS: Anaemia, Integrated Management of Childhood Illness, Neonatal and Childhood Illness, Paediatric Screening.

INTRODUCTION

Children who are presented to outpatient paediatric clinics often suffer from multiple overlapping health problems such as malnutrition, anaemia, feeding difficulties, micronutrient deficiencies, worm infestations, and incomplete immunization, which makes diagnosis and management challenging [1,2]. To address this complexity, the World Health Organization introduced the Integrated Management of Childhood Illness strategy. This approach promotes systematic assessment of children by using simple clinical signs, rational prescription practices, and caregiver counselling, while also aiming to reduce mortality in children under five years of age [3,4]. Implementation of this strategy in more than one hundred countries has contributed to a meaningful reduction in childhood mortality and improved overall child health [3,4].

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The original Integrated Management of Childhood Illness strategy focused on children between seven days of age and five years and relied mainly on clinical evaluation without laboratory investigations [5]. Recognizing the importance of newborn care and the need to reach children outside healthcare facilities, Pakistan adopted the Integrated Management of Neonatal and Childhood Illness strategy. This expanded approach strengthens newborn care and places emphasis on community-based health workers who can identify common childhood illnesses at an early stage [6,7,8,9]. The structure of this strategy allows timely detection of childhood conditions including anaemia through assessment of clinical features such as pallor, fatigue, poor feeding, and difficulty in breathing.

Anaemia continues to be a widespread public health concern throughout the world. More than forty percent of children under five years of age are affected, and the burden is greatest in countries with limited health and nutrition resources [1,10,11]. In Pakistan the prevalence of anaemia in children has remained high, with national surveys reporting rates of 58.8% in the year two thousand sixteen, despite gradual improvement from earlier decades [10,11]. Childhood anaemia is associated with impaired cognitive development, delayed growth, increased susceptibility to infections, and higher morbidity, which highlights the urgent need for early recognition and appropriate management.

The Integrated Management of Neonatal and Childhood Illness approach offers an important opportunity to detect anaemia in children through structured evaluation. Evidence from local studies supports this strategy. A study conducted by Hanif and colleagues found an anaemia prevalence of 39.7% among children screened using this method in an outpatient setting [12]. However, further research from different regions is needed to understand the local burden of anaemia and to support public health planning.

Given the high frequency of childhood anaemia and the potential of the Integrated Management of Neonatal and Childhood Illness strategy for early identification, this study aims to determine the frequency of anaemia in children screened with this strategy at the Paediatric Unit of Chandka Medical College in Larkana**.**

METHODOLOGY

This descriptive cross-sectional study was conducted at the Paediatric Unit of SMBBU Larkana and included a total of 188 children aged five years or younger who were enrolled through a non-probability consecutive sampling technique. Children presenting with clinical features suggestive of anaemia such as fatigue, pallor, poor feeding or difficulty in breathing were assessed using the Integrated Management of Neonatal and Childhood Illness IMNCI strategy. Anaemia was confirmed through haemoglobin testing using the World Health Organization cut off value of eleven grams per decilitre. Standardised definitions were applied for all symptoms. Fatigue was identified as reduced physical activity or excessive sleep as reported by caregivers. Pallor was assessed by examining the conjunctiva palms and nail beds. Poor feeding was defined as a noticeable reduction in appetite or refusal to feed for more than forty-eight hours. Shortness of breath was assessed using age specific respiratory rate thresholds which included sixty breaths per minute in infants younger than two months, more than fifty breaths per minute in children aged two to twelve months, and more than forty breaths per minute in children aged one to five years. Children were excluded if they had a previously diagnosed anaemia, haemoglobin disorders, blood malignancies, visible signs of malnutrition or if parental consent was not provided. After completing the IMNCI assessment a trained phlebotomist collected a venous blood sample from each child using aseptic technique and demographic as well as socioeconomic information was recorded on a structured questionnaire. Data were entered and analysed using SPSS version 26.0 with descriptive statistics used to

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summarise participant characteristics and chi square testing applied to examine associations between anaemia and categorical variables with significance set at a p value of 0.05.

RESULTS

Table I presents the baseline demographic and clinical profile of the study participants (n=188). The mean age of the participants was 26.51 ± 17.03 months, with a 95% confidence interval of 24.05 to 28.96 months. The mean body mass index (BMI) was 11.67 ± 1.93 kg/m², with a 95% confidence interval of 11.39 to 11.94 kg/m². Among the participants, 44.1% were male and 55.9% were female. The majority resided in urban areas (51.1%), while 48.9% lived in rural regions. Regarding socioeconomic status, 44.7% of families had a monthly income of ≤50,000 PKR, whereas 55.3% reported income above 50,000 PKR. In terms of educational status, 33.0% of mothers were illiterate, 25.5% had primary education, 19.1% had secondary education, and 22.3% had higher education. Employment status of mothers revealed that 35.1% were employed, while 64.9% were unemployed.

Table I: Baseline Demographic and Clinical Profile of Study Participants (n=188)		
Mean ± Standard Deviation		**95% Confidence Interval**
Age in months = **26.51 ± 17.03**		24.05----28.96
Body Mass Index in kg/m^2 = **11.67 ± 1.93**		11.39----11.94
Frequency (%)		
Gender	Male	83 (44.1)
	Female	105 (55.9)
Residential Status	Urban	96 (51.1)
	Rural	92 (48.9)
Family Monthly Income	≤50,000 PKR	84 (44.7)
	>50,000 PKR	107 (55.3)
Educational Status	Illiterate	62 (33.0)
	Primary	48 (25.5)
	Secondary	36 (19.1)
	Higher	42 (22.3)
Employment Status of Mother	Employed	66 (35.1)
	Unemployed	122 (64.9)

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Table II: Comparison of Demographic and Socioeconomic Characteristics with Anaemia Status among Children (n=188)

Characteristics of Participants		Anaemia		95% Confidence Interval	P-Value
		Yes (n=77)	No (n=111)		
Age in months		26.13 ± 17.15	26.77 ± 17.02	-5.632----4.360	0.802
Body Mass Index in kg/m²		11.55 ± 1.93	11.75 ± 1.93	-0.768----0.363	0.481
Gender	Male	31 (40.3)	52 (46.8)	0.424----1.377	0.371
	Female	46 (59.7)	59 (53.2)		
Residential Status	Urban	44 (57.1)	52 (46.8)	0.842----2.717	0.165
	Rural	33 (42.9)	59 (53.2)		
Monthly Income	≤50,000 PKR	41 (53.2)	43 (38.7)	1.000----3.244	0.049
	>50,000 PKR	36 (46.8)	68 (61.3)		
Educational Status	Illiterate	19 (24.7)	43 (38.7)	0.401----1.869	0.091
	Primary	18 (23.4)	30 (27.0)		
	Secondary	19 (24.7)	17 (15.3)		
	Higher	21 (27.3)	21 (18.9)		
Employment Status of Mother	Employed	28 (36.4)	38 (34.2)	0.598----2.016	0.764
	Unemployed	49 (63.9)	73 (65.8)		

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Table II compares the demographic and socioeconomic characteristics of children with and without anaemia (n=188). Among the study participants, 77 children (41.0%) were anaemic, while 111 (59.0%) had no anaemia. The mean age of anaemic children was 26.13 ± 17.15 months, compared to 26.77 ± 17.02 months in the non-anaemic group, showing no significant difference (p=0.802). Similarly, the mean body mass index was comparable between the two groups (11.55 ± 1.93 vs. 11.75 ± 1.93 kg/m²; p=0.481). Among anaemic children, 40.3% were male and 59.7% were female, while in the non-anaemic group, 46.8% were male and 53.2% were female, indicating no significant association between gender and anaemia status (p=0.371). Urban residence was slightly more common among anaemic children (57.1%) compared to non-anaemic ones (46.8%), though the difference was not statistically significant (p=0.165). A significant association was found between family monthly income and anaemia (p=0.049), with a higher proportion of anaemic children belonging to families earning ≤50,000 PKR (53.2%) compared to those with higher income (46.8%). Educational status of mothers showed that anaemia was more prevalent among children of mothers with lower education levels, but the difference was not statistically significant (p=0.091). Similarly, maternal employment status showed no significant association with anaemia (p=0.764), as 36.4% of anaemic children had employed mothers compared to 34.2% in the non-anaemic group.

DISCUSSION

This study identified a 41% prevalence of anaemia among children under five years of age screened through the Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy in a paediatric unit in Larkana, Pakistan, with a statistically significant association between anaemia and lower family income (p = 0.049), highlighting the influence of socioeconomic disparities on child health outcomes. These findings are consistent with earlier national surveys that reported anaemia prevalence rates of 33.2% in 2011–2012 and 53% in 2018, placing Pakistan among the countries with the highest anaemia burden in South Asia [13]. The results also align with a recent study from Lahore, which emphasized the complex interplay of nutritional and socioeconomic factors contributing to anaemia and its detrimental effects on child growth and development [14]. Similarly, regional data from Bangladesh demonstrated strong associations between anaemia and indicators such as low household income and limited maternal education [15]. The IMNCI strategy, developed by WHO and UNICEF, has been widely adopted as a systematic approach to address major childhood illnesses and has demonstrated utility in resource-constrained settings by relying on clinical signs for early diagnosis and referral [2,4]. However, limitations in its implementation have been noted, including inconsistent application, variable adherence to protocols, and challenges in clinical skill assessment, often linked to insufficient training and supervision [6,7,16,17].

These limitations suggest the need for strengthened training programs and potentially the incorporation of decision support tools, such as the e-IMNCI system, which has shown promise in improving diagnostic accuracy and adherence to guidelines [18]. Although some reviews have found mixed effects of IMNCI on child nutrition and immunization outcomes, its structured framework still offers an opportunity for integrated care when supplemented with broader social and public health interventions [7]. The statistically significant link between lower household income and anaemia in this study is consistent with a broad body of literature identifying poverty as a major determinant of paediatric anaemia, largely through pathways involving dietary inadequacy, limited access to healthcare, and increased exposure to

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infections [19,20]. Studies from sub-Saharan Africa and South Asia have similarly reported elevated anaemia rates among children from economically disadvantaged households [21,22]. While this study did not find significant associations between anaemia and other demographic variables such as gender, age, residential location, or maternal employment, previous literature has shown younger children and those living in rural areas to be at higher risk [19,23]. Additionally, although maternal education was not significantly associated with anaemia in this cohort, multiple studies have underscored its protective effect through improved health-seeking behaviour, feeding practices, and home hygiene [24,25].

The lack of association in the present study may be due to sample-specific dynamics or unmeasured confounding factors, warranting further exploration in future studies. One of the strengths of this study is its integration of IMNCI screening into real-world clinical practice, providing insights into its applicability in the local context. However, the cross-sectional design limits causal interpretation, and the exclusion of children with malnutrition or haematological disorders may have underestimated the overall anaemia burden. Future research should adopt longitudinal designs to monitor anaemia trends and assess the long-term effects of community-based and facility-level interventions. Expanding the assessment to include dietary patterns, micronutrient supplementation coverage, and barriers to IMNCI implementation would further enrich understanding. Public health programs aiming to reduce childhood anaemia in Pakistan should integrate nutritional support with poverty alleviation strategies and emphasize maternal education and health system strengthening to achieve sustainable impact.

CONCLUSION

The study found that anaemia was common among children screened through the IMNCI strategy, with lower household income emerging as the only factor significantly associated with anaemia. Other demographic and clinical variables showed no meaningful relationships. These findings indicate that socioeconomic conditions play a central role in childhood anaemia and should be prioritized in future public health interventions.

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