Section: Nutrition

Original Research Article

MALNUTRITION IN SCHOOL-AGE CHILDREN IN URBAN SLUMS: EXPLORING THE IMPACT OF SOCIO-DEMOGRAPHIC FACTORS

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ABSTRACT

Background: This study aims to estimate the prevalence of malnutrition among children aged 5–9 years in an urban slum and assess its association with various socio-demographic variables. The prevalence of malnutrition among school-age children is a significant public health concern, and urban slum children face compounded risks due to socio-economic challenges. Malnutrition in this age group often remains overlooked by nutrition programs, which tend to focus more on children under five and late adolescents.

Materials and Methods: A cross-sectional analytical study was conducted among 283 children aged 5–9 years in a Mumbai urban slum, selected using systematic random sampling. Data collection was carried out through a pre-tested semi-structured questionnaire, anthropometric measurements, and clinical assessments based on WHO growth standards and the Rashtriya Bal Swasthya Karyakram (RBSK) criteria. Statistical analysis was performed using SPSS version 21.0, with associations tested using Chi-square or Fisher's exact test. Logistic regression was applied to identify independent predictors of malnutrition, considering a significance level of $p<0.05$.

Results: The prevalence of malnutrition in the study population was 52.7%. Statistically significant associations were found between malnutrition and several socio-demographic variables, including male sex ($p=0.005$), father's elementary occupation ($p=0.002$), non-school enrollment ($p=0.003$), younger maternal age ($p<0.005$), and financial hardship ($p<0.005$). Logistic regression analysis identified male sex, non-enrollment in school, financial difficulties, a higher number of siblings, and not availing RCH services as significant independent predictors of malnutrition.

Conclusion: This study highlights the high burden of malnutrition among children aged 5–9 years in urban slums, with several socio-demographic factors significantly contributing to the risk. Targeted nutrition interventions and strengthened school and community health programs are urgently needed to address malnutrition in this vulnerable age group. These findings underscore the importance of extending public health services to include mid-childhood nutrition monitoring.

Keywords: Malnutrition, School-age children, Urban slums, Socio-demographic factors, Nutritional status.

INTRODUCTION

Middle childhood, spanning the ages of 5 to 9 years, marks a crucial transitional phase between early childhood and adolescence, characterized by rapid physical growth, cognitive development, and the establishment of lifelong dietary patterns.[1] According to the Census of India 2011, children aged 5–9 years constitute approximately 9.2% of the total population.[2] Proper nutrition during this period is critical not only for ensuring optimal growth and

development but also for shaping future health and educational outcomes.[1]

Malnutrition, defined as deficiencies, excesses, or imbalances in energy and/or nutrient intake, remains a significant public health concern in this age group.[3] Malnutrition encompasses both undernutrition (stunting, wasting, underweight, and micronutrient deficiencies) and overweight/obesity.[3] The Sustainable Development Goals (SDG 2) prioritize the eradication of hunger and promotion of better nutrition, highlighting the global significance of monitoring malnutrition.[3]

The Comprehensive National Nutrition Survey (CNNS) conducted in 2016–18 reported that among school-age children (5–9 years) in India, 22% were stunted, 10% were underweight, 23% were thin, and 4% were overweight or obese.[4] In Maharashtra, where this study was conducted, moderate stunting affected 24.7% of children, and severe wasting affected 5%.[4] Regional disparities were observed, with states like Meghalaya showing higher prevalence of stunting compared to states like Tamil Nadu.[4]

Multiple socio-demographic factors—including parental education, occupation, family size, socio-economic status, and affordability of nutritious food—have been consistently associated with the nutritional status of children.[5-7] Children residing in urban slums face additional challenges such as poor environmental conditions, limited access to health services, and economic hardships, all of which contribute to an increased risk of malnutrition.[6]

The COVID-19 pandemic further exacerbated vulnerabilities, with many families experiencing loss of income or the death of earning members, thereby affecting children's access to adequate nutrition.[8]

Malnutrition and poor dietary intake are major contributors to the global disease burden, with Africa and Asia losing 11% of their GDP annually. Investment in malnutrition prevention yields a $16 return for every $1 spent.[9]

Nutritional status of children under five is routinely monitored using growth charts, often linked to vaccination visits. However, after vaccination completion by five years, children aged 5–9 are rarely brought to health facilities unless ill, resulting in a lack of regular growth monitoring.[7]

Globally, malnutrition contributes to nearly 50% of deaths among school-age children and adolescents, yet data on nutritional status for the 5–19 years age group remain scarce. Growth monitoring tools for this age group were introduced only in 2007 by WHO. In India, as in many low- and middle-income countries, nutrition programs continue to focus mainly on under-fives and late adolescents, with a gap in care for middle childhood.[10]

While children under five benefit from maternal and child health programs like ICDS and RCH, the 5–16 years age group remains largely neglected. As school-age children transition into adulthood, targeted and coordinated health services are urgently needed.[11]

Consequently, there is a critical need to generate data focusing on malnutrition and its determinants among children aged 5–9 years, particularly in underserved populations like urban slums.

Therefore, this study was undertaken with the objectives to

1. Estimate the prevalence of malnutrition among 5–9 years age children, and
2. Assess the association of socio-demographic variables with malnutrition among them.

MATERIALS AND METHODS

This was an observational, cross-sectional analytical study conducted in an urban slum area under the Urban Health Training Centre (UHTC) of the Department of Community Medicine, affiliated with a tertiary care medical college in Mumbai. The study population consisted of 283 children aged 5–9 years, selected using systematic random sampling from the identified households. The study was carried out over a period of 18 months, including 3 months for protocol preparation and ethics approval, 12 months for data collection, and 3 months for data analysis and report writing. A pre-tested semi-structured questionnaire was used to collect socio-demographic information through face-to-face interviews with the primary caregiver. Anthropometric measurements, including height and weight, were recorded following WHO procedures, and clinical assessments were conducted to identify probable nutritional deficiencies based on the Rashtriya Bal Swasthya Karyakram (RBSK) screening criteria. The anthropometric data were analyzed using WHO growth reference standards for children aged 5–19 years. The statistical analysis was performed using SPSS version 21.0. Chi-square or Fisher's exact test was used to assess associations between categorical variables, and logistic regression was applied to identify independent predictors of malnutrition. A p-value of <0.05 was considered statistically significant. The study was approved by the Institutional Ethics Committee, and informed consent was obtained from the parents or caregivers of the participants.

RESULTS

Table 1: Socio-demographic Profile of Study Participants (n=283)

Variable	Frequency (n)	Percentage (%)
Age Group		
5–6 years	66	23.3
6–7 years	47	16.6

7–8 years	54	19.1
8–9 years	116	41.0
Sex		
Male	100	35.3
Female	183	64.7
Religion		
Hindu	95	33.6
Muslim	172	60.8
Buddhist	16	5.7
Type of Family		
Nuclear	227	80.2
Joint	56	19.8
Mother's Education		
Illiterate	53	18.7
Primary school certificate	75	26.5
Middle school certificate	85	30.0
High school certificate	57	20.1
Intermediate/Diploma	7	2.5
Graduate and above	6	2.1
Father's Education		
Illiterate	24	8.7
Primary school certificate	37	13.5
Middle school certificate	48	17.5
High school certificate	145	52.7
Intermediate/Diploma	20	7.3
Graduate and above	1	0.4
Socioeconomic Status (Modified Kuppuswamy)		
Lower Middle Class (III)	80	28.3
Upper Lower Class (IV)	203	71.7

The socio-demographic profile of the study participants (n=283) reveals the following characteristics: the majority of participants were aged 8–9 years (41.0%), with 23.3% aged 5–6 years, 16.6% aged 6–7 years, and 19.1% aged 7–8 years. The sample comprised more females (64.7%) than males (35.3%). Most participants were Muslim (60.8%), followed by Hindu (33.6%) and Buddhist (5.7%). A significant majority (80.2%) lived in nuclear families, while 19.8% belonged to joint families. Regarding parental education, 52.7% of fathers had completed high school, while 30.0% of mothers had a middle school certificate. In terms of socioeconomic status, 71.7% of participants belonged to the upper-lower class (IV), and 28.3% were classified as lower-middle class (III) according to the Modified Kuppuswamy scale.

Figure 1 depicts the nutritional status of the study participants (n=283) based on anthropometric measurements. The figure categorizes the children into various nutritional groups, such as underweight, stunted, and wasted, according to their weight-for-age, height-for-age, and weight-for-height indices. These indices were compared against the WHO growth reference standards for children aged 5–19 years. The results highlight the prevalence of malnutrition, including moderate underweight (30.0%), stunting (15.9%), and wasting (21.9%) among the study population. Further analysis could explore the breakdown of these categories to understand the specific nutritional deficits among the children more clearly. [Figure 1]

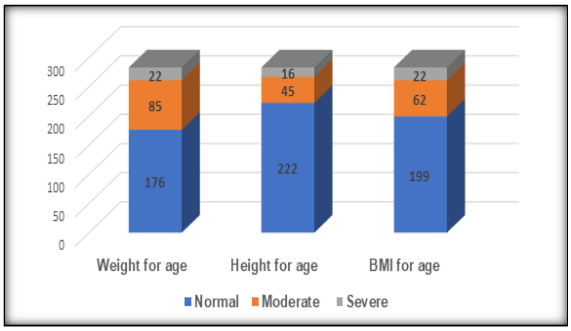

Figure 1: Nutrition status of study participants based on anthropometry (n = 283)

Table 2: Distribution of study participants based on Nutritional deficiency (as per RBSK)

Micronutrient Deficiencies	Frequency (n)	Percentage (%)
Signs of Iron deficiency anaemia	42	14.8
Signs of Vitamin D deficiency	36	12.7
Signs of Iron & Vitamin D deficiency	32	11.3

Table 2 shows the distribution of study participants (n=283) based on micronutrient deficiencies, as identified through the Rashtriya Bal Swasthya Karyakram (RBSK) screening criteria. The table indicates that 14.8% of children exhibited signs of iron deficiency anemia (n=42), 12.7% showed signs of vitamin D deficiency (n=36), and 11.3% had signs of both iron and vitamin D deficiencies (n=32). These deficiencies are common in this population, highlighting the need for targeted interventions to address these nutritional gaps.

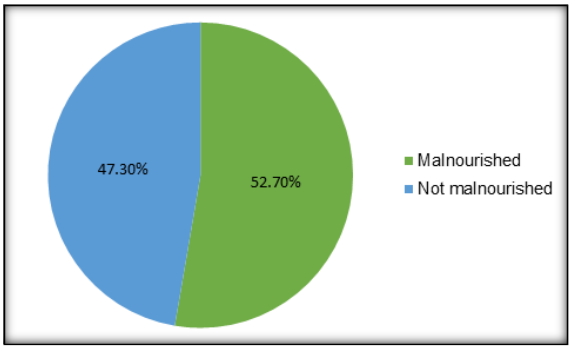

Figure 2: Distribution of study subjects according to their malnourished status (n=283)

Figure 2 illustrates the distribution of study subjects (n=283) according to their malnutrition status, based on anthropometric measurements. The figure categorizes the participants into different malnutrition groups, such as underweight, stunted, and wasted. These categories are determined using the WHO growth reference standards for children aged 5–19 years. The data reveal the prevalence of various forms of malnutrition in the study population, including the proportion of children who are underweight, stunted, or wasted, providing insight into the nutritional challenges faced by the urban slum children in this study.

Table 3: Association of Socio-demographic Variables with Malnutrition (n=283)

Variable	Malnourished (%)	Normal (%)	p-value
Sex			0.005
Male	64.0	36.0	
Female	46.4	53.6	
Father's Occupation			
Plant & machine operators Skilled workers and shop & market sales workers	*43.5*	56.5	0.002
Craft & related trade workers	*48.8*	*51.2*	
Elementary occupation	*69.2*	*30.8*	
Number of children (<12 years)			
<=2(1-2 children)	63.8	36.2	0.002
>2(3-6 children)	*44.9*	*55.1*	
School going			
Yes	47.9	52.1	0.003
No	*68.8*	31.2	
Type of school			
Government	55.3	44.7	0.001
Private	31.9	68.1	
Age of mother			
20-25	88.2	11.8	<0.005
25-30	48.3	51.7	
30-35	41.6	58.4	
35-41	65.2	34.8	
Colour of ration card			
White & Orange	43.3	56.7	<0.005
Yellow	87.9	12.1	
Availing services of Midday meal			
Yes	55.3	44.7	0.001
No	31.9	68.1	
Availing services of RCH			
Yes	39.6	17.2	<0.005
No	60.4	82.8	
Financial problems faced			
Yes	78.8	21.2	<0.005
No	46.8	53.2	
Borrowed money			
Yes	80.0	20.0	0.001
No	48.8	51.2	
Income affected due to COVID 19 pandemic measures			
Yes	62.6	37.4	0.002
No	44.1	55.9	

No statistically significant association was found between malnutrition and other socio – demographic variables such as age group, religion, mother's education, father's education, mother's occupation, family size, birth order, type of family, socioeconomic status, availing services of the Public Distribution System (PDS), or availing services of the Integrated Child Development Services (ICDS), as per Chi-square test results.

Logistic regression analysis identified the following as significant independent predictors of malnutrition: Having a greater number of children under 12 years in the family, male sex, non-enrollment in school, not availing Reproductive and Child Health (RCH) services, financial difficulties in purchasing food.

DISCUSSION

The present study assessed the nutritional status, dietary diversity, and associated factors among 283 children aged 5–9 years residing in an urban slum. A

higher proportion of participants were female (64.7%), with the majority belonging to the Muslim religion (60.8%) and living in nuclear families (80.2%). Similar demographic trends were reported by Joshi HS et al,[14] Dey AK et al,[9] and Ray A et al.[15] Regarding parental characteristics, 30.0% of .mothers had completed middle school and 52.7% of fathers had completed high school. Most participants belonged to the upper lower socioeconomic class (Class IV), comparable to findings by Murugkar DA et al,[16] Panigrahi A et al,[17] and Amruth M et al.[18]

The overall prevalence of malnutrition was 52.7%, with moderate underweight (30.0%), stunting (15.9%), and wasting (21.9%) being predominant. Probable nutritional deficiencies like iron deficiency anemia (14.8%) and vitamin D deficiency (12.7%) were also common. Srivastava A et al,[6] and Fazili A et al,[19] similarly reported a high burden of malnutrition among school-age children, with Fazili et al,[19] observing a greater impact on males, consistent with the present study.Although malnutrition was more frequent among children aged 8–9 years, no significant association with age was found, aligning with Murugkar DA et al.[16] However, malnutrition was significantly higher among males ($p=0.005$), as also observed by Amruth M et al.[18] and Kamath R et al.[20]

Religion did not show a significant association with malnutrition in this study, despite higher prevalence among Muslims, aligning partially with findings by Pal D et al.[21] Malnutrition was more common among children of illiterate parents and working mothers, but only father's occupation showed a statistically significant association ($p=0.002$), consistent with findings by Mukherjee R et al,[22] and Pal D et al.[21] Children with ≤2 siblings under 12 years had significantly higher malnutrition ($p<0.005$), though no association was found with birth order or family type, contrasting slightly with Srivastava A et al,[6] who found higher malnutrition risk in joint families and higher birth orders.

School enrollment was significantly associated with nutritional status, with non-school-going children showing higher malnutrition ($p=0.003$), similar to observations by Yeasmin S et al.[23] Additionally, children attending government schools had higher malnutrition (55.3%, $p=0.001$), consistent with findings by Amruth M et al.[18]

Children of younger mothers (20–25 years) were more malnourished ($p<0.005$). Although no association was found between socioeconomic status and malnutrition in this study, Ray A et al,[15] reported significant associations between lower SES and undernutrition. Malnutrition was also higher among yellow ration card holders ($p<0.005$), though availing PDS or ICDS services did not show a significant effect, contrasting with Mandal S et al.[24] Malnutrition was significantly higher among children availing Midday Meal services (55.3%, $p=0.001$) and among those not receiving iron-folic acid supplementation under the RCH program ($p<0.005$). Financial hardship emerged as a strong predictor; 78.8% of children from families facing financial problems, 80.0% from families borrowing money for food, and 62.6% from families whose income was impacted by COVID-19 were malnourished ($p<0.005$).

Logistic regression analysis identified poor dietary diversity, male gender, non-school enrollment, financial hardship, low food group consumption, and non-availing RCH services as significant predictors of malnutrition. Males had a 4.54 times higher risk, and non-school-going children had an 8.19 times higher risk. Financial problems increased the risk 16.12 times, and consuming ≤4 food groups raised the risk 8.84 times. These findings are in agreement with studies by Srivastava A et al,[6] and Mandal S et al,[24] which also highlighted socio-demographic and service-related factors as key determinants of malnutrition.

Limitations

Although direct method such as anthropometry were utilized to assess nutritional status, biochemical and laboratory evaluations were not included due to feasibility constraints. Future research incorporating these methods is recommended to provide a more comprehensive assessment.

CONCLUSION

This study highlights a high prevalence of malnutrition (52.7%) among 5–9-year-old children in an urban slum, with males more affected than females. Significant factors associated with malnutrition included male sex, father's elementary occupation, non-school enrollment, younger maternal age and financial hardships. Logistic regression identified non-school enrolment, male gender, financial problems, larger number of children, and non-availing RCH services as independent predictors. These findings underscore the need for targeted nutrition interventions, school-based programs, and strengthened public health services to address malnutrition in vulnerable mid-childhood populations.

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