

Original Research Article

Malnutrition prevailing trend study among under five children of urban slum area of Gwalior city Madhya Pradesh

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Received: 18 September 2020

Revised: 05 November 2020

Accepted: 04 January 2021

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ABSTRACT

Background: Under five children constitute the most vulnerable segment and their nutritional status and mortality rate is a sensitive indicator of the community's health and nutrition. Health indices of slum children are worst among all urban groups and are even poorer than rural average.

Methods: A community based cross-sectional study was conducted from October 2019 to January 2020 in urban slum area of Gwalior city. Data were collected from 550 mothers of children aged 6-60 months using pre-tested semi structured questionnaires and measuring weight, height and mid upper arm circumference of the children.

Results: 68.36% of 550 children were having under nutrition in the form of underweight (53.09%), wasting (22.18%) and stunting (59.45%). Maximum number of underweight children belongs to age group 24-60 months (64.54%) followed by <24 months age groups. Stepwise regression showed that the risk of underweight and stunting was significantly ($p < 0.001$) higher among children of illiterate mothers and children from lowest and middle households wealth index.

Conclusions: Malnutrition is widely prevalent among study population more than the state and national prevalence. With increasing age cumulative increase in prevalence of malnutrition is seen perhaps due to persistence and addition of causative factors. Maternal education and faulty feeding practice are contributory factor of this high prevalence of disease.

Keywords: Malnutrition, Stunting, Wasting, Under five children

INTRODUCTION

Children under five years constitute the foremost vulnerable segment of a nation and their nutritional status and rate define as a sensitive indicator of community health and nutrition. Globally more than the half of the under five children deaths is due to under nutrition.¹ NFHS4 survey revealed the higher percentage of under nutrition 42.8%, wasting (low weight for height) 25.8% and stunting 42% In Madhya Pradesh underweight and these was remarkable over than the national

parameters where prevalence of under nutrition among under five, underweight is 35.7%, wasting is 21% and stunting 38.4% in India. Nutritional status plays an important role decide the health status in children. Nutritional deficiencies make to varied morbidities, which successively, may cause increased mortality. Malnutrition as well as impairing growth and development of the children increase their susceptibility to infections like diarrhea and pneumonia and produce more burden to cause high mortality and morbidities in under five children. Health indices of slum children are

worst affected among all urban groups and are even poorer than rural average, as not only deprived of the basic services but also not recognised as an vital segment. It's evident that the prevalence of under nutrition in urban slums is way beyond than national average for any areas.³ Inappropriate feeding practices like early initiation of complementary feeds, late weaning and inadequate amount of complementary feeds are the leading causes of PEM (protein energy malnutrition).⁴ Severe PEM, often related to infection, which successively increases their proneness to infections which further decreases their already poor nutritional status and leading to a vicious cycle of malnutrition and infection and provide contributes to high child mortality in underprivileged communities of slum dwellers. Under this background this study aimed to assess the prevalence of under nutrition & the factors and practices likely to influence it within the urban slum areas children. Objectives of present study were to seek out prevalence of under nutrition and its severity among the study population and to spot socio-demographic factors related malnutrition.

METHODS

A community based cross sectional study was conducted in the urban slum area of Gwalior city, Madhya Pradesh after getting clearance from institutional ethics committee. The study was conducted from October 2019 to January 2020.

According to NFHS-4 Madhya Pradesh, the prevalence of malnutrition among children under five years of age in rural area of Madhya Pradesh is 42%, taking it as prevalence, with the relative error (d) as 10% of prevalence (P) and Z as 1.96, the sample size for rural area was calculated as 530 and finally for round sum we taken total 550 children in study.² Multi stage random sampling was used.

Inclusion criteria

All children present at the time of household visit and not seriously ill were included in the study.

Exclusion criteria

Exclusion criteria for current study were; children <6 months and >5 years of age, children having any other chronic morbidity and suffering from serious illness and children from families not willing to participate in the study.

Ten urban slums were randomly selected first, and then in each slum area 50-60 households were randomly selected for study purpose. Mother or other care taker of under five children present at the time of household visit was interviewed for data collection. If any household has 2 under 5 children then the youngest is selected to be the study subject. If there were no under 5 children in a house, then the adjacent house with under 5 children was

included in the study. In this manner total 550 children were included in the study for round sum. Data was collected using a scientifically designed pretested semi structured questionnaires on socioeconomic status of the family, mother's education, birth history, feeding history and hygienic practice etc. The age, date of birth, was recorded by asking mother and confirmed by the records (MCP cards/ immunization cards).

The new WHO child growth standards for children under 5 years (2006) were used as reference for median.⁵ Nutritional status of children were assessed according to weight for age, height for age, weight for height and BMI for age and sex by standard deviation classification recommended by WHO.⁵ Children below -2SD of the reference median on any of these indices were considered as undernourished and termed as underweight, stunted and wasted respectively. Children below -3SD were considered to be severely undernourished.⁵

For determining the association of malnutrition Chi-square test, odds ratio was applied for each of the factor. The statistical significance was evaluated at 5% level of significance. $p < 0.05$ was considered as statistically significant. Microsoft office word 2007 and microsoft office excel 2007 were used to generate tables.

Operational definitions

Adequate feeding: frequency for 6-12 months, 2-3 meals per day with >8 times breast feeding, for 13-60 months 3 major meals with 2 nutritious feed irrespective of frequency of breastfeeding. Anthropometric measurements were carried out like, weight taken in a standardized scale in kilogram with minimum clothing and length measured by infant meter in supine position for children below 2 years and height of the child was measured for those who can stand. Mid upper arm circumference (MUAC) was measured with MUAC tape in a standardized way and head circumference and chest circumference was measured with a non-stretchable measuring tape. Nutritional status was assessed using weight for age (underweight), height for age (stunting), weight for height (wasting) and MUAC according to WHO criteria (SD classification). Maternal education: It is defined as the highest level of schooling attended, but not necessary completed. This variable has three categories: no education, primary or secondary education.

RESULTS

Total number of children studied between October 2019 to January 2020 were 550 of age group (6 months to 5 years) residing in 10 urban slums in Gwalior city. Majority of them were female (53.27%) predominantly belonging to age group of 2-5 years (63.29%) followed by 36.70% from 6 months to 2 years which may be due to declining birth rate.

Out of total 550 children, 376 (68.36%) children were under nutrition in the form of underweight (53.09%), wasting (22.18%) and stunting (59.45%). Undernourished children had more than one type of malnutrition

overlapping. Out of total 376 under nourished children, 53.27% were female and 46.27% were male, although the difference was not statistically significant (Table 1).

Table 1: Distribution of study population according to nutritional status (n=550).

Nutritional status	Sex				Total		P value	
	Female (N=293)		Male (N=257)		Frequency	%		
	Frequency	%	Frequency	%				
Malnutrition (N=376)	Weight for age (Underweight	164	55.97	128	49.80	292	53.09	0.002
	Wasting (Weight for height)	63	21.50	59	22.96	122	22.18	0.68
	Stunting (Height for age)	175	59.72	152	59.14	318	59.45	0.89
Normal nutrition (N=174)		93	53.44	81	46.55	174	31.6	0.362

Maximum number of children who were underweight belonged to age group 24-60 months (63.29%) followed by less than 24 months (36.7%) (Table 2). In the current study 80.40% children were having MUAC more than 12.5 cm, 19.60% children were having MUAC less than 12.5 cm and were suffering from severe acute

malnutrition (SAM) according to MUAC measurement. There was more percentage of less than 12.5 cm MUAC in malnourished children, 74% in stunting, 66% in underweight and 52.7% in wasting respectively and this difference of MUAC less than 12.5 cm and more than 12.5 cm was seen remarkable and statistically significant (p=0.003) (Table 3).

Table 2: Distribution of malnutrition type according to age (n=376).

Age (months)	Under weight (N=292)		Stunting (N=318)		Wasting (N=122)		Total		P value
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
<24 (N=195)	79	27.05	101	31.76	45	36.88	138	36.70	0.002 Significant
24 to 60 (N=355)	213	82.95	217	68.24	77	63.12	238	63.29	

Table 3: Distribution of children according to mid upper arm circumference (MUAC).

MUAC (cm)	Children N (%)	Underweight (N=292)		Stunting (N=318)		Wasting (N=122)		P value
		Frequency	%	Frequency	%	Frequency	%	
<12.5	108 (19.6)	93	66.04	79	74.07	51	52.77	0.003
>12.5	442 (80.4)	197	42.3	239	54.29	71	16.29	Significant

The association between different social factor and malnourished children was revealed in (Table 4). Most mothers of malnourished children had no education or little education. Mother of 24 malnourished children had college or professional education. This shows malnutrition is widely prevalent among mothers of nil or less educational groups. Majority of mothers of malnourished children, 318 (57.81%) belonged to lower middle and lower class, while there was much less prevalence of malnourished children in upper middle and middle class, and this difference was found significant statistically (p<0.005). Birth order of the child also had an impact and determined their nutritional status as per current study findings which revealed that child who has second or more birth order was suffering from malnutrition more in comparison to first birth order (OR=2.22, p=0.001). Relationship of malnutrition with

dietary practices of mother revealed that, significantly less number of children were suffering from malnutrition (47.79%) who received energy dense food. Similarly, children who received complementary feeding on time were significantly less undernourished than those who had delay in receiving the same (49.69%). However, frequency of feeding and food supplementation has no significant relation with under nutrition in this study. Malnourished classification of children according to SD classification using WHO child growth standard is depicted in (Table 5). Out of total underweight children 164 (55.97%) were female and 128 (49.80%) were male. Majority (49.3%) of children belonged to mild category underweight, followed by severe (38.1%) and moderate (30.11%) categories. There was no significant difference among both sexes in underweight category of under nutrition. Out of the total 550 children, 22.18% of

children were wasted (Table 5). Among all wasted children 27.86% were severe, 38.52% moderate and 33.60% were of mild grade of wasting. Among all wasted children 59 (48.36%) were males and 63 (51.63%) were females and there was no significant difference. The magnitude of stunting (chronic malnutrition) was observed in 57.81%, among which 37.73% were of

moderate condition, 9.24% were severe condition and 33.01% were in mild condition but the difference was not observed to be statistically significant. Out of the total 550, 52.20% of stunted children were females and 47.79% were males and moderate stunting was observed to be the most prevalent form of stunting.

Table 4: Distribution of malnourished children and associated factors.

Associated factors		Malnourishment (n=376)		Normal children (n=174)		Odds ratio	P value
		N	%	N	%		
Education	Illiterate	80	73.39	29	26.61	1	
	Up to middle	184	71.8	72	28.2	0.92	0.865
	Higher secondary	88	68.75	40	31.25	0.79	0.521
	Graduate & higher	24	42.10	33	57.90	0.26	0.001*
Socio Economic status	Upper middle	17	4.52	28	16.09	1	
	Middle	41	10.94	22	12.64	3.03	0.009*
	Lower middle	116	30.85	47	27.01	4.03	0.007*
	Lower	202	53.72	77	44.25	4.29	0.009*
Birth order	First	72	55.38	58	44.61	1	
	Second	193	71.74	76	28.26	2.04	0.001*
	>2	111	73.50	40	26.50	2.22	0.002*
Dietary practice	Adequate	152	47.79	166	52.21	1	
	Non adequate	224	96.55	08	3.44	30.4	0.000*
Complimentary/ supplementary feeding	Regular	162	49.69	164	50.31	1	
	Not regular	212	94.64	12	5.36	17.79	0.000*

*Significantly statistically

Table 5: Nutritional status of children under 5 year according to SD classification using WHO child growth standards.

Characteristics (anthropometry)	Z score and measure of under nutrition according to sex												P value
	<-3 SD (severe underweight)				-3 to <-2 SD (moderate underweight)				<-2 SD (mild underweight)				
	Female		Male		Female		Male		Female		Male		
	N	%	N	%	N	%	N	%	N	%	N	%	
Weight for age (under nutrition) (n=292)	38	14.0	45	15.4	30	10.2	35	11.9	68	23.38	76	26.02	0.97
Height for age (stunting) (n=318)	51	16.0	42	13.0	62	19.5	58	18.2	53	16.7	52	16.3	0.15
Weight for height (wasting) (n=122)	18	28.6	16	27.1	24	38.1	23	38.9	21	33.3	20	33.9	0.46

DISCUSSION

Current study presents the prevailing trend of malnourishment and risk factors associated with child malnutrition in terms of stunting, underweight and wasting among under-five children of urban slum area. Current study results show that education and socio

economic status of parents, birth order of children, dietary practice and complimentary feeding/supplementary feeding, are significant independent association with child nutritional status. The magnitude of malnutrition observed in this study reinforced the need to take actions to improve the nutritional status of children in deprived areas of urban. Present study shows the prevalence of malnutrition was 68.36% in different forms which was

about to same (69%) of one urban slum study carried by Sethy et al in Berhampur city but much more than the study of Raman et al where it was 54% among children aged between 1 and 5 years.^{6,7} In present study, besides 32% of normal children all were suffering from different types of malnutrition like underweight (53.09%), wasting (22.18%) and stunting (59.45%) which overlapped. This is much more compared to National prevalence of underweight 35.7%, wasting 21% and stunting 38.4% among under five and with another study by Bharati et al revealed among infants 27.8% were underweight, 22.5% stunted and 26.7% were wasted.⁸ In urban slum area, the prevalence of stunting in children <5 years is very high (59%) as compared to other neighbouring regional countries like Bangladesh (36%) and Nepal (35.8%).^{9,10} Wasting and underweight was found to be higher than a study by Kumar D where it was 10.6%, 36.4% and stunting is little less than 51.6%.¹¹ Kulwa et al found that among children of less than 24 months age, 27.05% were underweight and 36.88% were wasted.¹² Also Mesharam et al found in their study the prevalence of wasting as 20%.¹³ However, prevalence of stunting in Kulwa study was more than current study (36.70%).¹³ But it is much less than the study of Bhupeswari et al where moderate to severe stunting and wasting are 68% and 66.8% respectively.¹⁴ In the present study, underweight was most prevalent (82.95%) among children aged 24-60 months. The difference may be due to more number of older age group included in present study and prevalence of malnutrition being more in under-five. In study of Tara et al infants (0-1 year) had better nutritional status than the toddlers (1-3 years) similar to present study.¹⁵ Proportions of underweight (82.95%) and stunting (68.24%) were found maximum among children aged 24-60 months.¹⁵ Current study also depicted that odds of stunting significantly increased with child's age. Children within the age group of 24-59 months were more likely to be stunted compared to younger children (less than 24 months). Similar findings were also reported by other studies conducted in different parts of the world.^{16,17} Genderbased study revealed that, 55.97% girls while 49.80% boys were found underweight, 59.14% boys and 59.72% girls are stunted while 22.96% boys and 21.50% girls are wasted. There was no statistically significant gender difference in prevalence of under nutrition. Analysing the wasting pattern of undernourished children in present study, total 50% children had different grade of wasting, among all wasted children 38.52% were moderately wasted which is similar to Sethy in Berhampur.⁶ The higher prevalence of moderate wasting may be due to different epidemiological factor prevalent in the study area. However, this is a matter of concern and need further detail exploration. Analysing the prevalence of malnutrition in different age group by MUAC measurement 19.6% children are in less than 12.5 cm and 80.40% are in more than 12.5 cm. Such a large portion of children being SAM is much higher than the study by Dairo MD et al where the prevalence is 5.6%.¹⁸

Natarajan, et al in their study observed that as the educational status of the mother improved there was a decrease in the percentage of children with severe grade of protein energy malnutrition.¹⁹ Gupta et al told maternal literacy was identified as the most significant determinant of child's nutritional status.²⁰ Similar findings were also found in study conducted by Appoh et al on relationship between maternal education and child nutritional status (weight for age).²¹ The world health organization reported that inappropriate feeding in children is responsible for one-third of the cases of malnutrition.²² Feeding practices play a pivotal role in determining the nutritional status, morbidity and survival of children. The timing and type of complementary foods introduced in an infant's diet also have significant effects on the child's nutritional status.²² The increase in child stunting with age, stresses the need of proper and timely initiation of supplementary feeding to meet the growing nutritional requirements of the children. Additionally, the risk of wasting was significantly lower in children >23 months as compared to children <12 months. This data is consistent with previous findings that showed a decrease in wasting with child's age and thus, may be associated with the inclusion of other food items along with breast milk in children's diet after 6 months of age.^{23,24}

Assessing dietary intake and growth pattern of 455 children (9-36) months of age in an urban slum in Delhi by Kapur et al showed that the intake of different component of food was grossly inadequate. Nutrient intake for energy was 56% of the current RDA, 75% children were underweight, and 19% children were excessively thin/wasted.²⁵ Similarly a study in West Bengal showed positive association between the intake of complementary food and the nutritional status which documented the frequency, amount, energy-density, and diversity of food remained important issues in complementary feeding.²⁶

A study conducted in Vietnam shows that the main contributing factors for under-five stunting were found age of introduction of complementary feeding and method of feeding in addition to other factor.²⁷ In present study birth order of the child more than one is significantly associated with malnutrition which is similar to study of Meshram et al.²⁷ The strengths of current study includes the use of measurement MUAC as well as SD classification using WHO child growth standards for assessing malnourishment in under five children. Furthermore, the survey had a large sample size and high response rate (93%). The study also had certain limitations including the study design small sample size and many known contributory variable has been excluded due to time and resource constraint which suggest further explorative study in future. Moreover, micronutrient consumption and other dietary factors directly related to the nutritional status of children were not available.

CONCLUSION

Malnutrition of all form and grade is widely prevalent among study population of this slum area even more than the national prevalence irrespective of sex of the children. So, it seems gender related bias in causation of malnutrition is not observed. However, with increasing age cumulative increase in prevalence of malnutrition is seen perhaps due to persistence of causative factors. Our study found that both social and nutritional related factors are associated with malnutrition in deprived areas of urban society like slum areas children and most of them are preventable. In order to reduce the burden of early malnutrition in the country, strategies which are focused on poverty eradication, improvement of both parent mother's educational and socio economic level and accessibility to basic health and nutritional care facilities are needed. Furthermore, interventions that can address these factors are required such as community based education and targeted nutritional interventions.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Agarwal AK, Sarswat S, Mahore R, Saraswat S, Kuity P, Tripathi A. Malnutrition prevailing trend study among under five children of urban slum area of Gwalior city Madhya Pradesh. *Int J Community Med Public Health* 2021;8:623-9.