

Morbidity profile of under-5 slum dwellers of Amritsar city: A descriptive cross-sectional study

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ABSTRACT

Context: Children living in slums are deprived from basic necessities. Unhygienic environment and deficient nutrition hinder their growth and make them more prone to infectious diseases. **Aims:** To study morbidity profile of under-5 children and determine social epidemiological factors associated with it. **Settings and Design:** A descriptive cross-sectional study in urban slums of district Amritsar. **Methods and Material:** In total, 400 households each from four slums (1600 in total) were randomly selected. One to one interview with mother of each under 5 was conducted and information was recorded on pretested performa. Height and weight with haemoglobin estimation was done for each child. **Statistical Analysis Used:** Descriptive statistics (frequencies and proportions) and univariate logistic regression was applied to determine factors associated with under nutrition. **Results:** Out of 1136 under-5, 50, 45 and 8% were stunted, underweight and wasted. Severe malnutrition was seen among 23%. In total, 79% had anaemia. About 69% suffered from one or more infectious disease in last 3 months. Anaemia, birth order >2, lower socio-economic status and suffering from any infectious disease in last 3 months were associated with malnutrition. **Conclusions:** Severe malnutrition and anaemia was high among under-5 of urban slums and 69% suffered from infectious disease in last 3 months emphasizing on addressal of health needs of under-5 residing in urban slums.

Keywords: Anaemia, malnutrition, morbidity, under-5 children, urban slums

Introduction

Slum is a compact area of at least 300 populations or about 60–70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and poor sanitary and drinking water facilities^[1] and slums contribute significantly to the urban population of the country.

Though the level of urbanization has increased marginally, i.e., from 27.81% in 2001 to 31.16% in 2011, but urban slums have grown

at a larger pace. At state level, they contribute to 17.36%, whereas at state level, slum contributes 14.06% (1.4 million) of total urban population.^[2] Even though Punjab being a farming-dominated area, urban population is on a rise, where 37.49% of population resides in urban areas, which is above the national figure that is 31.16%. Amritsar accommodates about 40% of population in urban slums, which is second in rank after Ludhiana.^[3]

This large proportion of population living in slums is exposed to poor living conditions, which has a direct impact on public health. High levels of morbidity and mortality are also related to poor living conditions and deficient nutrition; under-5 children being most at risk as they are in a growing phase and have an immature immune system.

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India ranked 102 out of 119 countries on Global Hunger Index as reported by International Food Policy and Research Institute.^[4] Further not much difference (improvement) in prevalence of undernutrition has been observed in National Family health Survey 4 (NFHS 4) and NFHS1.^[5] As per the Comprehensive National Nutrition Survey report (2016–2018), 17% of children aged 0–4 years were reported to be wasted and 33% were underweight.^[6] United Nations Children’s Fund has declared undernutrition (underweight, stunting and wasting) a “silent emergency”.^[7-9]

The most affected being those residing in urban slums, where 27% of infants born in slums have low birth weight.^[10] Half of the children in slum areas are underweight and 19% are severely underweight. Four out of every 10 children are found to be stunted, which is higher than that in nonslum areas.^[11] Among under-5 children residing in urban slums, nearly 60% reportedly suffered from at least one episode of Acute Respiratory Infections (ARI) and 24.8% had at least one episode of diarrhoea in last 3 months.^[12]

The most conspicuous and highest degrees of incidence could be noticed for some special diseases: the incidence of tuberculosis is 10 times higher in the slums than in the city as a whole, viral infections were 2.5 times higher, skin diseases 2 times, respiratory diseases 1.4 times, heart and circulatory system about 10 times and allergic diseases 1.9 times higher. Diseases of digestive system (26.1%) followed by the respiratory system (11.4%) are most common causes of mortality in slum population.^[13]

Anaemia among children is more widespread in slum areas than in nonslum areas.^[5] Immunization coverage is also reported to be significantly lower as compared to those residing in nonslum areas. Therefore, it makes under-5 residing in urban slums more vulnerable to various diseases and undernutrition.^[14]

However, the data just pertaining to slums is still limited, which prevents provision of health care services towards this population. Therefore, this study was planned to assess the morbidity profile of children aged 0–5 years as well as to determine various social epidemiological factors associated with it, which would add to the knowledge of primary care physicians who are the main health care providers.

Subjects and Methods

Community based cross-sectional study was conducted over a period of 1 year in urban slums of district Amritsar (Punjab) after obtaining scientific and ethical approvals from the institutional committees. The sampling procedure adopted is shown in Figure 1. Ethical approval taken by institutional ethics committee as per letter no. BFUHS/2k12/ p-TH/ 2513 dated 8/3/2013.

Assuming the power of study to be 80%, the sample size for each selected slum was calculated by using the formula for single proportional, i.e.,

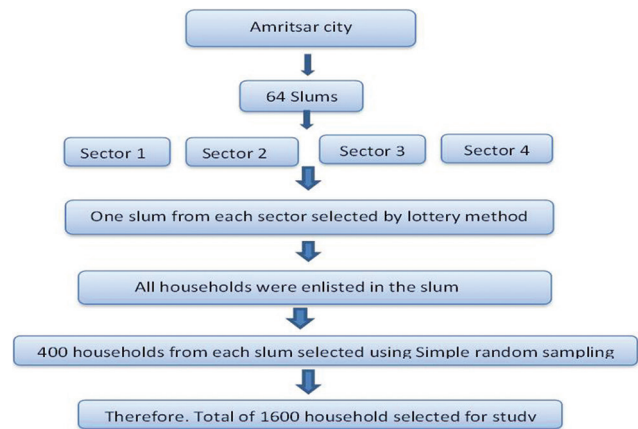


Figure 1: Sampling technique used in the study

$$N = \frac{Z_{\alpha/2}^2 \hat{p}(1-\hat{p})}{d^2}$$

where \hat{p} = expected prevalence/proportion of interest (taken to be 50% to get the maximum sample size),

d = precision assumed to be 5%,

$Z_{\alpha/2} = 1.96$ (for level of confidence of 95%).

Therefore, a total of 400 households were selected from each slum (total sample size = 1600).

A household survey was conducted among the selected households and all children aged 0–5 years were included in the study after taking written informed consent of mother/guardian. Any household without an under-5 child and who failed to give an informed consent were excluded from the study and immediately next household in the line list was included to complete the sample. Children with chronic disabilities/disorders and mental retardation were also excluded from the study.

During the visit, mother/guardian of the child was interviewed and information on sociodemographic profile of the family, disease status of under-5 in last 3 months, was recorded on semistructured and pretested performa along with this length/height in cm; weights in kg of under-5 children were measured recorded using standardized technique and recorded on the same performa. For children aged <24 months/those who were unable to stand, length was recorded by using an ISI marked infantometre. Weight was recorded by an ISI marked infant weighing scale calibrated up to 0.1 kg for the children aged between 0 and 12 months. Among children aged between 13 and 24 months, an adult weighting scale was used to record the weight of child calibrated up to 0.5 kg and it was calculated by weight of the (mother and child) – (weight of the mother alone). The same machine was used to record weight of child of age >24 months. For recording the height of children

aged >24 months, an ISI marked stadiometre was used with a calibration up to 0.1 cm.

These measurements were used to assess the nutritional status of the child, where weight for age, height for age and weight for height indices were calculated. WHO criteria based on standard deviation (SD) units was considered for undernourishment. Any of above indices more than 2 SD below the reference median line were labelled as underweight, stunted and wasted.

Haemoglobin estimation was done by Sahli's method. Children with Hb less than 11 g/dL were considered as anaemic. They were further graded into mild anaemia (10–11 g), moderate (7–9.9 g) and severe (<7 g).^[15]

The data was compiled and analysed using Epi Info 07 (CDC, USA). Proportions were calculated where relevant and Chi-square test was applied. Univariate logistic regression was applied to determine the factors associated with undernutrition.

Results

In the current study, 1600 households were surveyed having a total population of 7263 and an average family size of 4.5. Out of the total population, 1136 (15.6%) were from the age group of 0–5 years, which formulated our study population.

As far as sex distribution of the study population was concerned, males and females were almost in equal proportions, i.e., 50.4% (573) and 49.6% (563), respectively. Majority (85%) had migrated from other states and belonged to socioeconomic status of upper lower class (94.4%) according to Kuppuswamy scale. In total, 89.9% were Hindu by religion. Most of parents

of study participants were illiterate with 77.7% of mothers and 73.1% of fathers being illiterate.

Nutritional status of the study participants was also assessed. Weight for age, stunting, wasting and both stunting and wasting were taken into account across different age groups. It was observed that half of the children were stunted, whereas wasting was seen only in 8% of the children. Further wasting and stunting both were observed in 36% of children. Differences across age group for stunting, stunting and wasting and undernutrition were found to be statically significant [Table 1].

Overall prevalence of anaemia was 74%, whereas among children of age group of 6 months–1 year, it was 38% only. In contrast, 83% of children aged 3–4 years were anaemic and this difference was statically significant [Table 2]. Distribution of under-5 according to severity of anaemia is shown in Figure 2.

Further while accessing morbidity, it was observed that 780 (69%) of children suffered from any infectious disease in last 3 months [Table 3]. Variation across different age groups was found to be statically significant. Majority (66%) of children suffered from respiratory tract infection (both upper and lower) followed by diarrhoea, which was seen in 57% of the children [Figure 3].

Univariate analysis was done to determine the various factors associated with undernutrition among children [Table 4]. Children suffering from anaemia and any infectious disease in last 3 months had 4.9 times (95% CI = 3.4–6.9) and 2.5 times (95% CI = 1.9–3.2) higher odds of being undernourished. Birth order >2 and monthly income of <Rs 4500 were also associated with undernutrition.

Table 1: Age wise distribution of under-5 children according to their nutritional status

Indicator	Age distribution					Total (n=1136)	P
	<1 year (n=236)	1-2 y (n=252)	>2-3 y (n=245)	>3-4 y (n=211)	>4-5 y (n=192)		
Stunting (height for age)	107 (45%)	148 (59%)	122 (50%)	106 (50%)	89 (46%)	572 (50%)	0.03
Wasting (weight for height)	20 (8%)	26 (10%)	20 (8%)	17 (8%)	10 (5%)	93 (8%)	0.44
1) Stunting and wasting	81 (34%)	115 (45%)	92 (37%)	82 (38%)	50 (26%)	420 (36%)	0.001
2) Underweight (weight for age)	103 (43%)	139 (55%)	112 (45%)	99 (46%)	60 (31%)	513 (45%)	0.001

Table 2: Age wise distribution of Anaemia among under-5 children of urban slums

Anaemia	Age distribution					Total (n=1035)
	6 m-1 year (n=135)	>1-2 year (n=252)	>2-3 year (n=245)	>3-4 year (n=211)	>4-5 year (n=192)	
Present	52 (38%)	205 (81%)	187 (76%)	175 (83%)	150 (78%)	769 (74%)
Absent	83 (62%)	47 (19%)	58 (24%)	36 (17%)	42 (22%)	266 (36%)

Chi sq: 107.3; df=4; P=0.000

Table 3: Age wise distribution of under-5 children according to presence of infectious disease in last 3 months

Infectious disease (in last 3 months)	Age distribution					Total (n=1136)
	0-1 year (n=236)	>1-2 year (n=252)	>2-3 year (n=245)	>3-4 year (n=211)	>4-5 year (n=192)	
Present	149 (63%)	193 (77%)	173 (71%)	142 (67%)	123 (64%)	780 (69%)
Absent	87 (37%)	59 (24%)	72 (29%)	69 (33%)	69 (36%)	356 (31%)

Chi sq: 13.2; df=4; P=0.01

Table 4: Univariate analysis of various epidemiological factors with malnutrition

Variable	Nutritional Status of children		cOR	95% CI	P
	Undernutrition	Normal			
1) Mother's Education					
a) Illiterate	409 (46%)	474 (54%)	1.2	0.9-1.6	0.16
b) Literate	102 (41%)	145 (59%)			
2) Father literate					
a) Illiterate	401 (48%)	430 (52%)	1.2	0.9-1.5	0.14
b) Illiterate	127 (43%)	166 (57%)			
3) Socio-economic status					
a) <Rs 4500	230 (49%)	236 (51%)	1.3	1.05-1.69	0.017
b) >Rs 4500	283 (42%)	387 (58%)			
4) Sex of child					
a) Male	255 (45%)	318 (55%)	0.9	0.8-1.2	0.65
b) Female	258 (46%)	305 (54%)			
5) Immunization status					
a) Complete	243 (48%)	267 (52%)	1.2	0.9-1.5	0.131
b) Partial/incomplete	268 (43%)	353 (57%)			
6) Disease in last 3 months					
a) Present	405 (52%)	375 (48%)	2.5	1.9-3.2	<0.0001
b) Absent	108 (30%)	248 (70%)			
7) Anaemia					
a) Present	416 (53%)	372 (47%)	4.9	3.4-6.9	<0.0001
b) Absent	47 (19%)	207 (81%)			
8) AWC registration					
a) Present	149 (45%)	180 (55%)	1	0.7-1.3	0.9
b) Absent	364 (45%)	443 (55%)			
9) Birth order					
a) >2	135 (55%)	112 (45%)	1.6	1.2-2.1	0.0007
b) Up to 2	378 (43%)	511 (58%)			

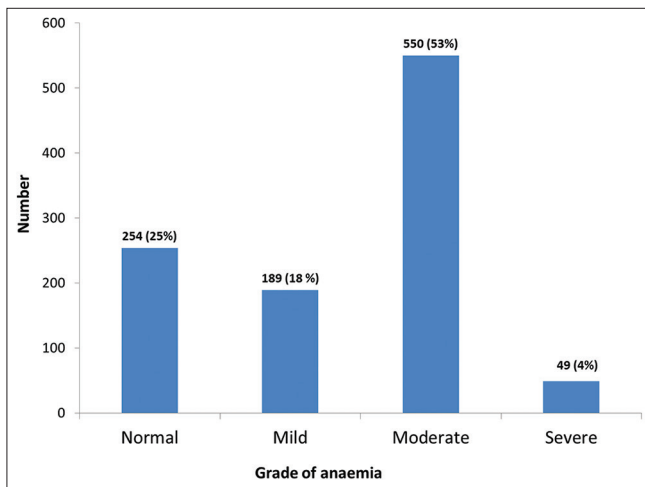


Figure 2: Distribution of under-5 according to grade of anaemia

Discussion

Out of 1136 study participants, 50% were stunted, 45% were underweight, 8% wasted and 36% were found to be suffering from wasting and stunting both. Severe malnutrition was seen among 23% of children. The prevalence of anaemia was found to very high, i.e., 74%. About 69% of them suffered from one or more infectious disease in last 3 months.

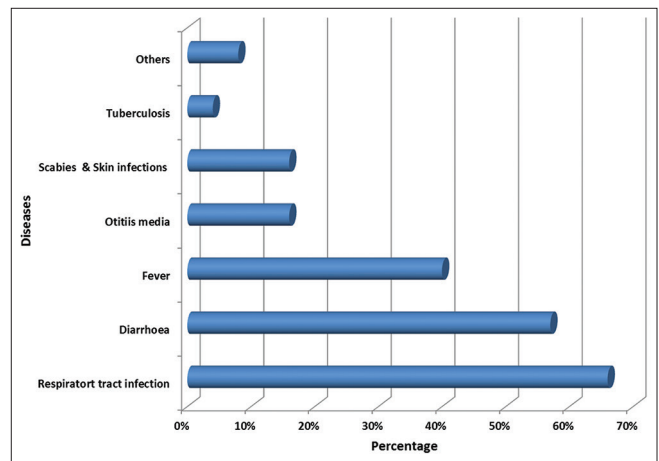


Figure 3: Distribution according to the type of infectious diseases under-5 children suffered from last 3 months

Factors like anaemia, birth order >2, lower socioeconomic status and suffering from any infectious disease in last 3 months were found to be associated with malnutrition among study population. This prevalence is much higher in comparison to NFHS-4 Punjab data, where only 22% children were underweight, 6% wasted, 26% stunted and 57% were anaemic.^[6] This could be attributed to study population difference as only slum/marginalized population was included in our study who

live in poor environmental conditions and are more prone to suffer from various diseases, which in turn affect their overall health status.

As per age wise distribution of both acute and chronic malnutrition were concerned, maximum was observed among children aged 1–2 year, which has been supported by various studies conducted in different parts of country.^[11,17-19] This could also be attributed to delay in weaning and faulty complimentary feeding practices. It could also be due to poor socioeconomic status, which in turn inhibits the inhabitants to buy necessary livelihood things/food/food insecurity, etc.

Similarly, maximum children aged 1–2 years suffered from an infectious disease in last 3 months and anaemic. At this age, nutritional needs of child increase and only mother milk is not sufficient to provide required calories necessary at this age. Further at this age, child starts to walk which in turn lead to increase outdoor activity; hence, exposure to poor environmental conditions also making him/her more prone to infections, which lead to malnutrition and anaemia.

Overall, about three-fourth of children (74%) were found to be anaemic. This was about 18% higher than that reported by NFHS-4. Prevalence of anaemia was least in the early stage of life (6 months–1 year), i.e., 38%, and it increased with the increase in age, as demand for iron increases with the age but intake remains the same, making child iron deficient. This fact was also reported in various studies.^[20,21]

About two-third (66%) of children suffer from one or more infectious disease in last 3 months, where respiratory tract infection (66%) and diarrhoea (57%) were most common. This high prevalence may be due to unhygienic environmental conditions like lack of sanitation, inadequate water supply, overcrowding, under nutrition, etc., prevailing in our study. Similar findings were seen in various studies conducted in various parts of country.^[12,22,23]

Anaemia and suffering from infectious disease in last 3 months were found to be strongly associated with undernutrition, whereas low socioeconomic status along with birth order >2 were also found to be associated with it. Similar findings have been reported by various studies highlighting that acute episodes of diseases result in sudden weight loss leading to undernutrition.^[24-28] The birth order of more than 2 has also been a predictor of undernutrition as seen in our study, which is well supported by a study conducted in Maharashtra.^[9,28-31] In our study, socioeconomic status was found to be inversely proportional to undernutrition, which was also seen in other studies conducted in Maharashtra and urban slums of Delhi.^[32]

The literacy status of both parents did not have significant role in undernutrition as majority of literate parents (22.3% of mother and 26.9% of father) were educated up to primary (13% of mother and 18% of father). The low level of mother's education

affects the nutrition of the child as she is the primary caregiver. More the educational status of the mother, more she is aware of available health services and utilizes the same to greater extent. These findings are supported by various other studies too.^[7,33,34]

Therefore, this study clearly highlights that under-5 children residing in urban slums are malnourished (underweight, wasted and stunted), anaemic and experience repeated episodes of communicable diseases like diarrhoea and respiratory tract infections. This further stresses on the need of primary care physicians to be appointed in these disease breeding areas to provide health care services.

Conclusions and Recommendations

The present study shows high prevalence of undernutrition, wasting and stunting as well as anaemia among under-5 residing in urban slums. Anaemia, birth order >2, lower socioeconomic status and suffering from any infectious disease in last 3 months were found to be associated with undernutrition. Therefore, from the current study, it can be concluded that poor environmental conditions when coupled with inadequate facilities like food, shelter, sanitation and health care make lives of those residing in urban slums even worse. Children are more vulnerable due to the immature immune system and increasing requirements of the body. Insufficiency leads to malnutrition, infections, anaemia, and this vicious cycle continues. It is high time that primary care physicians pay attention towards improvement in health care services; incomes of poor, proper health services and quality environment are important for upliftment of health status of population residing there. Finally, political will, i.e., working toward more equitable socioeconomic system is the only practical solution of problem.

Key Messages

There is an urgent need of inclusion of vulnerable slum population into the mainstream so that disparity between income, health services and quality environment are removed.

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Conflicts of interest

There are no conflicts of interest.

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