## **Original Research Article**

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# Prevalence and risk factors of under nutrition among under three children in an urban community in Ludhiana city

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### **ABSTRACT**

**Background:** Under nutrition is important cause of childhood morbidity and mortality. In India burden of underweight children in under 5 years of age is still 35.7% (NFHS-4) and is 22% in Punjab which is still considered to be a major public health problem. Thus this study was planned to find prevalence and risk factors of under nutrition in under 3 children in urban Ludhiana.

**Methods:** It is community based cross-sectional study conducted in under 3 year children in field practice area of Urban Health Centre under Department of Community Medicine, Dayanand Medical College, Ludhiana. Minimum sample size of 368 was calculated. Data was collected from routine surveillance by ANMs in their visits to area. Under nutrition was taken as weight for age as per standard growth chart used in India (WHO based). Statistical analysis: Microsoft Excel, Chi square test, SPSS.

**Results:** Out of 387 children, 82 (21.2%) were underweight [17 (4.4%) severely and 65 (16.8%) moderately underweight]. Increasing age, partial immunization, low birth weight and high birth order were significantly associated, while gender, type of family, SES, mother's BMI & literacy and exclusive breast feeding were not significantly associated with prevalence of underweight.

**Conclusions:** Increasing age, partial immunization, low birth weight and high birth order were all significantly associated with underweight. Maternal and child health services need to be strengthened.

**Keywords:** Under nutrition, Underweight, Under 3 children, Urban, Risk factors

## **INTRODUCTION**

Under nutrition is identified as a major health and nutrition problem in India. It is not only an important cause of childhood morbidity and mortality, but leads also to permanent impairment of physical and possibly mental growth of those who survive. The prevalence of under-weight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa. Although the burden of underweight children under 5 years of age has decreased from 42.5%(NFHS-3) to

35.7% (NFHS-4), still it is a considerable number.<sup>3</sup> A study done among children aged between 3 months and 3 years of age conducted in 130 districts through Demographic and Health Surveys in 53 countries over a period from 1986 to 2006 found that- variance in mild under-weight has a larger and more robust correlation with child mortality than the variance in severe underweight. The prevalence of mild under-weight deserves greater attention as a useful signal of changing public health conditions among preschool children in developing countries.<sup>4</sup> Under nutrition makes the child susceptible to

infection and complements its effect in contributing to child mortality. This accounts for 22% of the burden of disease in India and adversely affects the economic growth of the country with an estimated adult productivity loss of 1.4% of gross domestic product (GDP).5

Therefore, it is important for the health system to detect malnutrition at an early stage for planning and implementing timely interventions at the community level. It is known that place of residence, household wealth, birth weight, age of child, awareness regarding diarrheal disease and acute respiratory tract infection control, maternal education, number of under 5 years children and source of drinking water were strong predictors of child nutritional status in developing countries.6

The nutritional status of under -5 children in Punjab has improved since NFHS-3 by some measures, but not by all measures. Stunting among children decreased from 37% to 26% in the 10 years between NFHS-3 and NFHS-4, and the percentage of children who are underweight decreased from 25.5% to 22%. However, in the same period, wasting among children increased from 9% to 16%. Despite the gains in stunting and underweight, child malnutrition is still a major problem in Punjab. Thus this study was planned as it attempts to find the prevalence of under nutrition in under 3 children and its risk factors in the urban area of Ludhiana which has the maximum number of slums in Puniab.

## **METHODS**

The present study is a community based cross-sectional study conducted in the under 3 year children in the field practice area of Urban Health Centre under the Department of Community Medicine, Dayanand Medical College and Hospital, Ludhiana from August 2016 to October 2016. The center caters to a population of 11257, most of it belonging to low socio economic class. There is no such facility nearby and DMC&H being charitable institution provides the primary health care services at a very low cost. The present study is a part of routine activities being carried out in the area. All the houses in this area are registered under the Urban Health Centre. The team consisting of ANM and community health worker and nursing students visit the area daily. The team is regularly supervised by the MOH of the Urban Health Centre. Family folders are being filled on regular basis in which there are separate cards for antenatal mothers, the under 5 children, eligible couple and individuals which have been used as a tool for this study. The folder has the relevant information like family composition, education, occupation, socio economic status, immunization status and anthropometric information regarding family members. Weight for age serves as a composite index of height for age and weight for height.8 The criteria to define malnutrition thus has been taken as weight for age as per the standard growth chart used in India based on

the standard WHO growth charts for under 3 children. All information has been entered into the folder and cards in the field.

## Sample size

The sample size was calculated using the formula,  $n=Z^2$  $(1-\alpha/2)$  pg/d2 (Where Z  $(1-\alpha/2)=1.96$  at 95% confidence; p=prevalence of underweight, q=1-p; d=absolute allowable error. For this study, the prevalence of underweight in the under five children was taken to be around 36% as per NFHS 4 at national level, hence p=0.36; q=0.64; d=5%. Minimum sample size thus yielded was of 368. Adding a 10% for nonresponse rate, the total number came out to be 404. Out of the total of 414 folders available, only the data of 387 was adequately available and therefore were taken for analysis. The information in the folders was entered in MS excel and was analyzed using SPSS version 20.

#### RESULTS

Maximum children 160 (41.3%) belonged to 1-2 years age group. The number of male children 219 (56.6%) was more than that of female children 168 (43.4%) (Table 1).

Table 1: Age and gender distribution of under 3 children.

Age of the	Females	Males	Total
child (year)	N (%)	N (%)	N (%)
0-1	54 (37)	92 (63)	146 (100)
1-2	74 (46.2)	86 (53.8)	160 (100)
2-3	40 (49.4)	41 (50.6)	81 (100)
Total	168 (43.4)	219 (56.6)	387 (100)

Chi square=4.154, p>0.05.

Table 2: Distribution of children according to their underweight status.

	Number	Percentage (%)
Normal weight	305	78.8
Moderately underweight	65	16.8
Severely underweight	17	4.4
Total	387	100

Out of 387 children, 82 (21.2%) were underweight. Further out of 82 underweight children, 17 (4.4%) were severely underweight while 65 (16.8%) were moderately underweight (Table 2). The number of children belonging to joint and nuclear families were almost similar. More than half of the children, 202 (52.2%) belonged to the Sikh religion. Maximum number of children 160 (42.3%) belonged to the lower middle class socio economic status followed by those belonging to upper lower and upper middle class (Table 3). Majority 304 (78.6%) of the children were born by institutional deliveries. Immunization status of 361 (93%) children was found to be complete and only 6.7% (26) were partially immunized. Only 58 (18.3%) of the children were born with low birth weight. About 1/5th of children had birth order of 3 or more (Table 4).

Table 3: Prevalence of Underweight among under 3 children in relation to socio-demographic factors.

Variables	Normal weight N (%)	Underweight N (%)	Total N (%)	Significance (Chi-square, p value)
Age (in years)				
0-1	130 (89)	16 (11.1)	146 (37.7)	_
1-2	125 (78.1)	35 (21.9)	160 (41.3)	23.350, p=0.000
2-3	50 (61.7)	31 (38.3)	81 (20.9)	23.330, p=0.000
Total	305 (78.8)	82 (21.2)	387 (100)	
Gender				
Female	127 (75.6)	41 (24.4)	168 (43.4)	
Male	178 (81.3)	41 (18.7)	219 (56.6)	1.839, p=0.175
Total	305 (78.8)	82 (21.2)	387 (100)	
Family type				
Nuclear family	158 (80.2)	39 (19.8)	197 (50.9)	
Joint family	147 (77.4)	43 (22.6)	190 (49.1)	0.465, p=0.495
Total	305 (78.8)	82 (21.2)	387 (100)	•
Religion				
Hindu	151 (86.8)	23 (13.2)	174 (45)	
Sikh	146 (72.3)	56 (27.7)	202 (52.2)	12.028, p=0.002
Others	8 (72.7)	3 (27.3)	11 (2.8)	
Total	305 (78.8)	82 (21.2)	387 (100)	
Socio economic status		•		
Upper middle	77 (86.5)	12 (13.5)	89 (23.5)	5.292, p=0.071
Lower middle	127 (79.4)	33 (20.6)	160 (42.3)	
Upper lower	95 (73.6)	34 (26.4)	129 (34.1)	
Total	299 (79.1)	79 (20.9)	378	
Mother's education				
Illiterate	11 (64.7)	6 (35.3)	17 (4.7.)	
Upto 5 <sup>th</sup>	82 (71.9)	32 (28.1)	114 (31.8)	
10 <sup>th</sup>	90 (81.1)	21 (18.9)	111 (31)	8.633, p=0.071
12 <sup>th</sup>	68 (86.1)	11 (139)	79 (22.1)	
Graduation and above	31 (83.8)	6 (16.2)	37 (10.3)	
Total	282 (78.8)	76 (21.2)	358 (100)*	

<sup>\*</sup>the data of only 358 subjects was available for this variable.

The percentage of underweight in under 3 children was significantly higher in the age group of 2 to 3 years (38.3%) as compared to 0-1 year (11.1%) and 1-2 year age group (21.9%). No significant difference was seen in the percentage of underweight children with respect to their gender and the type of family they belonged to. The percentage of underweight children was found to be more in children belonging to Sikh 56 (27.7%) and other religions 3 (27.3%) as compared to those belonging to Hindu religion 23 (13.2%) and this difference was found to be statistically significant. Although the number of underweight children increased with the decrease in the socioeconomic status, the difference was not found to be statistically significant (Table 3).

Partially immunized children were having a greater prevalence of underweight in children 38.5% (10) as compared to those completely immunized 19.9% (72); the difference being statistically significant. The prevalence of underweight in children was found to be higher in the children born with low birth weight 31% (18) as compared to those born with normal weight 15.4% (40) and the difference was found to be statistically significant.

Mothers who were themselves underweight (BMI <18.5) had more number of underweight children 27 (26%) as compared to those with normal and overweight or obese, but the difference was not found to be statistically significant. Only 17 (4.7%) of the mothers were illiterate and maximum percentage of underweight children 35.3% (6) were found in this category; however the difference was not found to be statistically significant. On comparing the children who were exclusively breast fed and those not exclusively breast fed, no significant difference was found in the prevalence of underweight children. However it increased with increase in birth order, highest being in children having the birth order 4 or more (37.5%) as compared to those having the birth order 1 (13.9%). This difference was found to be statistically significant (Table 4).

Table 4: Prevalence of underweight among under 3 children in relation to other relevant risk factors.

Variables	Normal weight N (%)	Underweight N (%)	Total N (%)	Significance (Chi-square, p value)
Place of delivery				
Hospital	246 (80.9)	58 (19.1)	304 (78.6)	3.778, p=0.052
Home	59 (71.1)	24 (28.9)	83 (21.4)	
Total	305 (78.8)	82 (21.2)	387 (100)	
Immunisation status				
Complete	289 (80.1)	72 (19.9)	361 (93.3)	
Incomplete	16 (61.5)	10 (38.5)	26 (6.7)	4.98, p=0.026
Total	305 (78.8)	82 (21.2)	387 (100)	
Birth weight				
<2.5 kgs	40 (69)	18 (31)	58 (18.3)	
≥2.5 kgs	219 (84.6)	40 (15.4)	259 (81.7)	7.705, p=0.006
Total	259 (81.7)	58 (18.3)	317 (100)*	
Mother's BMI				
<18.5 (underweight)	77 (74)	27 (26)	104 (27.7)	2.178, p=0.337
18.5-22.9 (normal)	130 (79.3)	34 (20.7)	164 (43.7)	
>23 (overweight and obese)	88 (82.2)	19 (17.8)	107 (28.5)	
Total	295 (78.7)	80 (21.3)	375 (100)	
Breast feed				
Not Exclusively Breast fed	29 (85.3)	5 (14.7)	34 (8.8)	0.938, p=0.333
Exclusively Breast fed	276 (78.2)	77 (21.8)	353 (91.2)	
Total	305 (78.8)	82 (21.2)	387 (100)	
Birth order				
1 <sup>st</sup>	136 (86.1)	22 (13.9)	158 (40.8)	10.098, p=0.018
2 <sup>nd</sup>	118 (75.6)	38 (24.4)	156 (40.3)	
3 <sup>rd</sup>	41 (71.9)	16 (28.1)	57 (14.7)	
4 <sup>th</sup> or more	10 (62.5)	6 (37.5)	16 (4.1)	
Total	305 (78.8)	82 (21.2)	387 (100)	

<sup>\*</sup>Birth weight record was only available for 317 subjects.

## **DISCUSSION**

The overall prevalence of underweight in under 3 children was found out to be 21.2% which is higher than that reported by Chakravarthy in a similar cross sectional study done on under 3 children in South India, which reported the prevalence to be 14.8% and is almost similar to the under 5 underweight prevalence of 22.4% as reported for urban Punjab by NFHS 4. However it is lesser than the prevalence of underweight (30.62%) reported for urban Ludhiana in the district wise report of NFHS 4.<sup>9,7</sup>

Majority 304 (78.6%) of the children were born by institutional deliveries which is similar to the urban Ludhiana urban data under NFHS4 which is 78.46% and is lesser than the urban Punjab and national urban figure of around 89% according to NFHS 4. Immunization status of 361 (93%) children was found to be complete and only 6.7% (26) were partially immunized which is

higher than the Ludhiana district (72.32%) and Punjab state (89.1%) reports.<sup>7</sup>

The prevalence of underweight in children significantly increased with the age which is similar to the trend seen in a study done in Jhansi which found an increase in under nutrition from 52.3% (0-1 years) to 80.9% among 1-3 years children. 10 The prevalence of underweight rapidly increased from 11.9% (<6 months) to 37.5% (6-11 months) to 58.5% among 12-23 months old children. 11 These variations are not just due to increasing age, but also because of the dietary changes and weaning practices which have a significant role in affecting nutritional status.

The prevalence of underweight in children was found to be significantly more in children belonging to Sikh 56 (27.7%) and other religions 3 (27.3%), while no significant difference was seen in the prevalence of underweight children with respect to their gender and the type of family they belonged to. However according to the Punjab state report of NFHS-4 there are only small differences in the level of under nutrition by urban-rural residence or by the sex of the child or by religion.<sup>7</sup>

Immunization is an essential intervention to prevent childhood infections and consequent under-nutrition. Partially immunized children were having a greater percentage of underweight children 38.5% (10) as compared to those completely immunized 19.9% (72); the difference being statistically significant. Similarly the prevalence of underweight children was significantly higher in incompletely immunized children in a study done by Sengupta in urban slums of Ludhiana. In a case control study done by Basit et al in under 5 children in Karnataka the unimmunized children belonged to the case group and this factor was found to have a significant association with under-nutrition in the univariate analysis. In a case

The percentage of underweight children was found to be higher in the children born with low birth weight 31% (18) as compared to those born with normal weight 15.4% (40) and the difference was found to be statistically significant. The prevalence of under nutrition was higher among the children born with low birth weight with 18 (75%) being undernourished among the low birth weight compared to 66 (60.6%) of 109 normal birth weight children in a study done by Sathyanath in a study done on under 5 in rural area of Mangalore. Similarly significant association was found between low birth weight and malnutrition in a study done by Avachat in rural field practice area of Loni. 14

Only 17 (4.7%) of the mothers were illiterate and maximum percentage of underweight children 35.3% (6) were found in this category; however the difference was not found to be statistically significant. However significant association has been reported between mother's illiteracy and higher prevalence of underweight children in a similar studies done by Sengupta in urban slums of Ludhiana, by Khanna et al in rural communities of Punjab and Vyas et al in a rural area of Uttrakhand. <sup>12,15,16</sup>

No significant difference was found in the prevalence of underweight children who were exclusively breastfed as compared to those who were not. Similar results were observed by Sathyanath in a study done on under 5 in rural area of Mangalore.<sup>8</sup>

In the present study the prevalence of under nutrition increased with the birth order and the difference was found to be statistically significant. Similar trends were seen in the studies done by Khanna et al in rural communities of Punjab and by Sengupta in urban slums of Ludhiana. <sup>15,12</sup>

### Limitations

Other anthropometric indices could not be studied which would have presented a more clear picture of the nutritional status and factors like mothers occupation and factors related to the weaning practices could also have been studied in detail.

### **CONCLUSION**

The prevalence of underweight is similar to the state prevalence and is lower than the national prevalence. The prevalence of low birth weight and immunization status was almost similar to the state figures. Increasing age, partial immunization, low birth weight and high birth order were all significantly associated with under nutrition (underweight) in under 3 children. A multipronged approach for strengthening the maternal and child health and nutritional services in the community with the coordinated efforts of ANM, ASHA, Anganwadi worker and the local self-help groups is being recommended along with the health education to the parents with respect to the nutritional requirements of the under 3 children.

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