The Nutritional Status of School-Age Children by Age and Gender in Urban Slums of Haryana

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INTRODUCTION

Regarding nutritional status, prevalence of stunting (long duration malnutrition) and underweight was found to be the highest in age group 5-6 yrs and 11-12 yrs respectively whereas maximum prevalence of wasting (short duration malnutrition) was found in age group 7-8 yrs. In all age groups most of malnourished children belonged to the underweight category. Among boys, 30.7% and 18.1% belonged to wasted and stunted nutritional status. 16.1% of girls belonged to stunted nutritional status indicating higher prevalence of long duration malnutrition among girls.

METHODS

This study, in which we explored nutritional status in school-age slum children 5 to 15 years old, took place between December 2010 and April 2011 in urban slums of Haryana, India. The sample size of 384 was calculated assuming the prevalence of malnutrition was 50%, with relative precision of 10% at 95% confidence. For this study, 3 slums (Faltuganj, Kurramgotia and Kalibadi) were randomly selected from the urban area of the Bareilly district. All children aged 5-15 years from each of these slums were examined. A total of 512 children (297 boys and 215 girls) were interviewed and examined. A pre-designed and pre-tested questionnaire was used to interview the study participants to elicit information on family characteristics like residence, religion, type of family, education and occupation of parents; and information on individual characteristics like age, sex and eating habits. Anthropometric measurements were taken and noted by trained field workers. The questionnaire was pre-tested on 5 children from each slums. Necessary modifications were made in the questionnaire before the start of the study. Ethical approval was obtained from Institute of Medical Sciences, Haryana. For participation of the study subjects parents/guardians/caregivers were informed about the study objectives and gave informed written consent prior to inclusion into the study. Each child's height and weight were measured in the metric system, using standardized technique recommended by Jelliffe [6]. A stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subject was made to stand without footwear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top of the head making firm contact with the horizontal head piece. A portable balance with an accuracy of 100 g was used to record the weight of the subjects. Children were instructed to stand on the balance with light clothing and without footwear and with feet apart and looking straight. Weight was recorded to the nearest value. Height for age (stunted), weight for height (wasted), and weight for age (under weight) for each child were calculated [3] and compared with the CDC 2000 [4]. Cut-off point values between ± 2 SD were considered normal [5]. After collection, all data were compiled and analyzed and appropriate statistical tests were applied. $P < 0.05$ was considered as statistically significant. Multivariate analysis was carried out, using the odds ratio (OR) to test for associations between various socio-economic indicators and nutritional status.

Results

Overall 33.3% of children were wasted whereas 18.5% were stunted and 46.8% were in normal nutritional status. The nutritional status was positively correlated to age indicating poor nutritional status of younger children. No significant association was found between gender and nutritional status of children. The results highlighted the higher prevalence of malnutrition among younger children; therefore, younger age groups should be the main target for nutritional surveillance and interventions (Table 1).

Table 1

The nutritional status of school-age children by age and gender in urban slums of Haryana, India 2010-2011

Age (in years)	Nutritional Status (%)				Total
	Normal	Underweight (low weight for age)	Wasted(SDM) (low weight for height)	Stunted(LDM) (low height for age)	
5-6	50 (45.9)	39 (35.8)	34 (31.2)	25 (22.9)	109
7-8	64 (46.7)	55 (40.1)	49 (35.8)	24 (17.5)	137
9-10	48 (48.5)	35 (35.4)	31 (31.3)	20 (20.2)	99
11-12	30 (44.1)	28 (41.2)	23 (33.8)	15 (22.1)	68
13-15	53 (48.2)	44 (40.0)	37 (33.6)	20 (18.2)	110
Gender					
Boys	157 (51.6)	102 (33.6)	92 (30.7)	55 (18.1)	304
Girls	88 (40.2)	99 (45.2)	82 (37.4)	49 (22.4)	219
Overall	245 (46.8)	201 (38.4)	174 (33.3)	104 (19.9)	523

Table 1. The nutritional status of school-age children by age and gender in urban slums of Haryana, India 2010-2011

Except refractive errors, all other illnesses are more common among girls than boys, but this gender difference is statistically significant only for anemia. The most common illness found was anemia with prevalence of 37.5% followed by dental carries (18.5%) and throat infection (14.9%) (Table 2).

Table 2

The prevalence of nutritional disorders among school-age children by gender in urban slums of Haryana, India 2010-2011 (Multiple Responses)

Nutritional disorders	Boys (n = 304)		Girls (n = 219)		Total (%)
	No.	%	No.	%	
Anemia	102	33.7	94	42.8	196 (37.5)
	$X^2 = 4.76$, p = 0.0290				
Vit A deficiency disorders	7	2.3	11	5.0	18 (3.4)
	$X^2 = 2.83$, p = 0.0923				
Refractive errors	27	8.9	14	6.3	41 (7.8)
	$X^2 = 1.09$, p = 0.2962				
Rickets	0	0.0	4	1.8	4 (0.8)
	$X^2 = 3.45$, p = 0.06333				
Dental caries	52	17.2	45	20.4	97 (18.5)
	$X^2 = 0.99$, p = 0.3176				
CSOM	2	0.7	2	0.9	4 (0.8)
	$X^2 = 0.03$, p = 0.8580				
Throat infections	42	13.7	36	16.2	78 (14.9)
	$X^2 = 0.69$, p = 0.4062				
Skin diseases	8	2.7	7	3.1	15 (2.9)
	$X^2 = 0.14$, p = 0.7024				

Table 2. The prevalence of nutritional disorders among school-age children by gender in urban slums of Haryana, India 2010-2011 (Multiple Responses)

Univariate analysis showed a significantly higher risk of malnutrition among female children, children living in joint families, children with birth order > 2, children who were never breastfed, children whose father and/or mother had a low educational attainment (< 6th standard), children whose mother had a service/business. This implies the importance of the family characteristics in the causation or predisposition of an individual to malnutrition (Table 3).

Table 3

Univariate association of socio-economic factors with the malnutrition status of school-age children in urban slums of Haryana, India, 2010-2011

Variable	*Total*	*Malnourished*	*OR(95% CI)*
Sex of child			
Male	304	147	1
Female	219	131	*1.59(1.12-2.26)*
Type of family			
Nuclear	143	39	*1*
Joint	380	239	4.52(2.96-6.90)
Birth order			
≤2	198	69	1
> 2	325	209	3.37(2.33-4.88)
Ever breastfed			
Yes	407	200	1
No	116	78	2.12(1.38-3.28)
Mother's education			
> 6th standard	324	125	1
≤ 6th standard	199	152	5.15(3.46-7.65)
Father's education			
> 6th standard	412	207	1
≤ 6th standard	111	71	1.76(1.14-2.71)
Mother's occupation			
Nonworking	278	94	1
Working	245	184	6.10(4.16-8.97)
Father's occupation			
Service/business	338	153	1
Laborers	185	125	2.52(1.73-3.67)

Table 3. Univariate association of socio-economic factors with the malnutrition status of school-age children in urban slums of Haryana, India, 2010-2011

Step-down multiple logistic regression using backward LR method was applied to determine the significant correlates of malnutrition in the study population. The final model showed that joint family, birth order > 2, mother's education

≤ 6th standard and mother's occupation were significantly associated with malnutrition among the study population (Table 4).

Table 4

Multivariate association of socio-economic factors with the malnutrition status of school-age children in urban slums of Haryana, India, 2010-2011

Variable	Odds ratio	95% CI
Joint family	4.03	2.41-6.18
> 2 birth order	3.09	2.16-4.19
Mother's education ≤ 6th standard	3.81	2.37-5.96
Mother working	4.47	3.04-6.98

Table 4. Multivariate association of socio-economic factors with the malnutrition status of school-age children in urban slums of Haryana, India, 2010-2011

DISCUSSION

Children in the age group of 5-14 years are often considered as school-age. Since 1972, the United Nations Educational Scientific and Cultural Organization (UNESCO) considers 6-11 years as primary school age and 12-17 years as secondary school age for statistical purposes. In it is recorded that in India one fifth of the population consists of children between 5 and 14 years, which includes the primary and secondary school age. School age is considered as a dynamic period of growth and development because children undergo physical, mental, emotional and social changes. In other words the foundations of good health and sound mind are laid during the school age period. Hence the present study was formulated with the objective, to assess and find the major socio-economic correlates of nutritional status in school-age children.

The present study showed a growth lag in the basic parameters of height and weight as compared to the reference standards laid down by CDC 2000. Our findings are similar to that reported by other workers from India [7,8]. Best C. et al. also reported that underweight and thinness were most prominent in populations from South-East Asia and Africa, whereas in Latin America, the prevalence of underweight or thinness was generally below 10% [9].

Throughout the developing world, children fail to grow in length and weight in a remarkably similar age-specific pattern, despite vast differences in the prevalence of low weight (wt)/age and height (ht)/age between the regions [2]. We analyzed the prevalence of stunting, wasting and underweight as markers of undernutrition and our findings were similar as in South Africa, where stunting and underweight remain a public health problem in children, with a prevalence of 20% stunting and almost 10% underweight [10]. The anthropometric results of a study in Qwa Qwa also indicated that 2.8% of the total group of respondents was severely stunted, and that 11.3% were stunted [11].

Thus the differences in the degree of growth failure in weight and height have implications for assessing the true prevalence of chronic malnutrition. This is also important for monitoring trends or evaluating the effects of interventions [12]. There is a need to shift the focus from wt/age to ht/age and wt/ht for assessing malnutrition and identifying populations that could benefit from interventions.

The school children in the present study were found to be better nourished than the rural Punjab school children as reported in another recent study [13], where the prevalence of malnutrition was 87.4%. However, the standards of nutrition among children in the present study were lower than those found in children in Delhi by Dhingra et al. [14] and in urban school-age children in Tirupati as reported by Indirabai et al. [15]. Goyal et al. [16] found malnutrition among Ahmednagar school children to be 20% only, with 6.8% having severe malnutrition, which is much lower than rural school children of Punjab (37.6%) [13] and amongst school children of Madras, as found by Sunderam et al. (32.6%) [17]. These disparities in findings of different studies may be due to differences in study settings. The rate of undernutrition of the present study is quite similar to the findings of Medhi et al. [18] who recorded a prevalence rate of undernutrition of 53.9% among school-age children in Assam-India.

The evidence suggests that boys are more likely to be stunted and underweight than girls, and in some countries, more likely to be wasted than girls [19,20], but in the

present study, undernutrition was significantly more prevalent in girls than boys. A number of studies in Africa suggest that rates of malnutrition among boys are consistently higher than among girls. Studies conducted in Ecuador [21] and in Tanzania [22] show that boys were more commonly affected than girls. One of the largest studies [20] of anthropometric status of rural school children in low income countries (Ghana, Tanzania, Indonesia, Vietnam and India) found the overall prevalence of stunting and underweight to be high in all five countries, ranging from 48 to 56% for stunting and from 34 to 62% for underweight. Boys in most countries tended to be more stunted than girls and in all countries, boys were more underweight than girls. These disparities in findings are due to differences in study frame, family setups, gender bias and parental preferences for male children in the Indian society.

Anemia was detected in 37.5% of children in the present study, which was more than in the children of rural school children in Punjab (22.5%) [13]. The prevalence of anemia in girls (42.8%) was significantly higher than in boys (33.7%). In our study diagnosis of anemia was exclusively based on clinical examination; no laboratory examination was done. Hence there is a possibility of underreporting of prevalence of anemia in this study population and this underreporting may be higher in boys. Prevalence of dental caries in the present study was higher than in rural Punjab school children (11.1%) [13], almost equal to the findings in Tirupati (20.9%) [15] and less than in Madras school children (38.6%) [17]. Gender differences observed in the prevalence of dental caries were statistically not significant.

Women's educational and social status, food availability, and access to safe water are well reported important underlying determinants that directly or indirectly cause malnutrition among children [23]. In our study mother's education was found to be a strong predictor of child nutritional status. Data analysis of National Family Health Survey (NFHS) 1 also showed that mother's education has a strong independent effect on a child's nutritional status even after controlling for the potentially confounding effects of other demographic and socioeconomic variables Earlier studies using household-level data have found mother's education to be positively associated with a number of measures of child health and nutritional status. Results pointing to the importance of socioeconomic status indicators such as mother's education to children's nutritional status are consistent with findings in Yip et al.

Further improvement in nutritional status with maternal education has been reported by other authors The pattern of declining incidence of stunting by mother's education in Cambodia is consistent with patterns observed in many other developing countries. The pattern for wasting concurs with arguments found in several other studies that wasting is influenced less by maternal characteristics than is stunting. One explanation is that mother's education has a limited effect on preventing illness such as diarrhea when there are widespread sources of infection.

Various studies have concluded that parental education, especially mothers' education, is a key element in improving children's nutritional status.

In the present study family type was significantly associated with all three indices of malnutrition. Similar results have been reported by Gopaldas et al. NFHS 1 survey also showed that children living in joint family setup were more likely to suffer chronic malnutrition than children from nuclear families. The results are different from a study by Singh on children of urban slums as in their study > 70% of the families were nuclear.

It was clearly shown that children who had never been breastfed were at much higher risk of poor nutritional status. Thus breastfeeding is positive health behavior in this population, and should be encouraged.

One of the strongest predictors of malnutrition in this analysis was mother's working status. Children of nonworking mothers have better nutritional status than children of working mothers, possibly due to more time for caring of children. Hence the busy time schedule of working mothers adversely affects the nutritional status of children. The NFHS II also observed a higher prevalence of these three indices of malnutrition in children of working mothers.

This study shows that maternal educational status, mother's working status and family type are important determinants of the nutritional status of the child. Efforts directed towards improvement of female literacy, women empowerment and restricting family size will have a positive impact on the nutritional status of school children.

CONCLUSIONS

It is clear that the problem of malnutrition in India is of alarming magnitude, but also of great intricacy. The prevalence of underweight is among the highest in the world, nearly double that in Sub-Saharan Africa, and the pace of improvement lags behind what might be expected given India's economic growth. A major part of this problem is contributed by slum population.

Tackling malnutrition in urban slums requires a holistic approach, especially when targeting populations of school-age children. For effective implementation of this approach in urban slums following interventions are recommended.

SKILLS-BASED NUTRITION EDUCATION FOR THE FAMILY

Nutrition education should address family as a whole and not just the women. Nutrition education should focus on communication for behavioral change. The nutrition-related activities need to be based on qualitative research that has identified cultural and institutional constraints to good nutrition, detrimental attitudes and practices toward food and eating behavior. With creative thinking, nutrition and health-related activities can be incorporated into group activities, but needs to be perceived to be relevant to their lifestyles rather than imposed.

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