



## A Study on Health Status of Urban School Children (7-18 Years): A School Based Cross Sectional Study

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## ABSTRACT

**Background:** School age is considered as a dynamic period of growth and development because children undergo physical, mental, emotional and social changes. The health and nutritional status of school children is an index of national investment in the development of its future manpower.

**Objective:** The objective of the present study was to assess the health status of school children in Urban Health Training Centre (UHTC) area of Bareilly, India.

**Methods:** A total of 417 children from various schools aged between 7 to 18 years residing in UHTC area were surveyed in a School Health Program. Height and weight was measured following standard procedures. General nutritional status was assessed clinically. SPSS Version 16 was used to analyze the data.

**Results:** 417 students were examined. The overall prevalence of underweight was 72.7%. 50% study subjects were educated up to Junior High School and Primary School among the boys & girls category respectively. Generally boys were taller & heavier than girls. The prevalence of Underweight, Clinical anemia & Dental carries was higher in Girls, while Worm infestation & URTI was higher in Boys.

**Conclusion:** Most of the school children in our study had a poor nutritional status. Interventions such as skills-based nutrition education, fortification of food items, effective infection control, and delivery of integrated programs are recommended.

**Keywords:** Urban School Children; Underweight, Nutrition, UHTC

## INTRODUCTION

India is home to 472 million children under the age of 0-18 years, comprising 39% of the country's total population. Out of the 128.5 million children residing in urban areas, close to 7.8 million children under the age of 0-6 years still live in abject poverty and poor conditions in informal settlements, making it imperative that we plan and build sustainable and inclusive cities from their perspective.

The health and growth of adolescents has attracted global attention in the last two decades<sup>1</sup>. This pe-

riod is known to be a second chance for growth for those children who have experienced a nutritional deficit in their early life<sup>2,3</sup>. During this period 35% of adult weight and 11-18% of adult height are acquired.<sup>4</sup> Short stature in adolescence resulting from chronic under nutrition is associated with reduced lean body mass and deficiency in muscular strength and work capacity<sup>4</sup>.

Anthropometric assessment is a simple tool to study the nutritional status of the community at large. It serves as the most useful screening test es-

pecially in developing countries of the world, where malnutrition is widely prevalent and the resources are limited<sup>5</sup>. In India alone there are approximately 60 million children who are underweight<sup>6</sup> and the prevalence is higher in rural areas compared to urban areas<sup>7</sup>.

The condition of being underweight may have resulted from a) low dietary in-take b) excessive work out c) chronic infections<sup>8</sup>. Thus this study was done in the urban area of Bareilly district, to know the current health status of school children.

## MATERIAL AND METHODS

A cross sectional study to assess the health status was conducted on 417 school children (311 boys and 106 girls), aged 7-18 years studying in class I-X in three Government and Private high schools of adopted areas of Urban Health Training Centre, Rampur Garden, Bareilly (U.P.), attached to the Department of Community Medicine, SRMS IMS, Bareilly.

The nutritional and morbidity survey was conducted by a health team comprising of Health workers (MSWs), Interns, Pediatrician, Ophthalmologist Dermatologist, Lady Medical Officer (LMO) and Medical Officer, under supervision of an experienced faculty from Department of Community Medicine, SRMS IMS, Bareilly, Uttar Pradesh. Health survey was conducted in the respective schools during the school hours after taking the prior permission of the principal of the schools.

School children present on the date of examination and attending the health survey were included while children not willing to participate in the study survey and severely ill were excluded from the study.

Preliminary information of the students like their name, age, sex, date of birth was obtained and recorded on the survey register. A detailed clinical examination was done with special attention on those systems which were affected most commonly. Height and weight were measured using standard protocol.

Weight was measured using a floor type weighing scale with due respect to the standardization of the equipment and procedure. The measurements were taken to the nearest 1 Kg.

Height was taken using a measuring tape applied to the wall. The measurements were taken with children barefoot with their back of heels, buttocks and head touching the wall. Readings were taken to the nearest 0.5 cm.

The children were asked for any disease symptoms and clinical examination of all the systems was

made and diagnosis of nutritional deficiency if any was made based on the findings.

Anemia was diagnosed by clinical signs such as pallor of the conjunctiva/tongue.

Worm infestation was diagnosed on the basis of history and asking questions. Otoloscope was used to diagnose ear problems. Hearing was assessed by Rinne's test using Tuning Fork. Snellen's chart was used to assess the visual acuity.

Oral cavity was examined for any abnormal pigmentation of teeth, caries, cavities, glossitis and ulcers of mouth or tongue.

Data thus collected and recorded on the survey register and it was analyzed with percentage, mean and standard deviation, by using SPSS 16 software

## RESULTS

A total of 417 school children in the age 7- 18 years, belonging to 3 schools were included in the study. 311 (74.6%) of them were boys and 106 (25.4%) of them were girls. Half of the boys were educated up to junior high school & half of the girls were educated up to primary in his/her group. Nearly equal proportions of study subjects were educated up to primary & high school level.

Table 2 shows that on an average the boys were found to be taller than girls at all ages except at age 7, 10 and 12 years. The mean height of the children increases with all ages except at age 10 years for boys and at 7 & 15 years for girls. The height of the study subjects were exceeds the reference value of NCHS at the age from 7 to 9 years but after that it becomes lesser.

Mean weight of boys increased with age from seven to sixteen years but also a decrease in weight of boys was noted between sixteen to eighteen years, while the weight of the girls increased with age uniformly. Boys in all age groups were heavier than girls except at the age of 7 and 13 years, where girls were heavier than boys.

Around 72.7% of the students were underweight, with BM<18.5. Girls (79.2%) were more underweight as compared to Boys (70.4).

**Table 1: Distribution of study subjects according to education**

Education	Boys (n=311)	Girls (n=106)	Total (n=417)
Primary School	60(19.3)	53(50.0)	113(27.1)
Junior High School	157(50.5)	31(29.2)	188(45.1)
High School	94(30.2)	22(20.8)	116(27.8)

Figure in parenthesis indicate percentage.

**Table 2: Distribution according to height of children (Mean  $\pm$  SD)**

Age (year)	Boys (n=311)				Girls (n=106)			
	Number	Mean $\pm$ SD	Reference value*	Percentage#	Number	Mean $\pm$ SD	Reference value*	Percentage#
7	5	128.8 $\pm$ 6.68	121.7	105.8	2	134.5 $\pm$ 0.70	120.8	11.3
8	9	133.67 $\pm$ 4.87	127.3	105.0	16	128.68 $\pm$ 4.71	126.6	101.64
9	13	135.23 $\pm$ 7.58	132.6	101.9	8	134.37 $\pm$ 7.78	132.5	101.41
10	31	133.90 $\pm$ 7.86	137.8	97.16	19	136.15 $\pm$ 7.79	138.6	98.23
11	34	140.08 $\pm$ 9.83	143.1	99.27	12	139.91 $\pm$ 7.82	145.0	96.48
12	43	143.48 $\pm$ 13.24	149.1	96.23	15	145.53 $\pm$ 7.63	151.2	96.25
13	58	151.46 $\pm$ 10.94	156.0	97.08	14	150.71 $\pm$ 6.94	156.4	96.36
14	62	152.41 $\pm$ 13.18	163.2	93.38	18	150.83 $\pm$ 5.36	159.8	94.38
15	34	156.20 $\pm$ 8.01	169.0	92.42	2	148 $\pm$ 7.07	161.7	91.52
16	6	160 $\pm$ 6.13	172.9	92.53	0	0	162.5	0
17	5	163.8 $\pm$ 4.76	175.2	93.49	0	0	162.9	0
18	11	162.90 $\pm$ 7.35	176.1	92.50	0	0	163.1	0

\*50<sup>th</sup> percentile of WHO; #Percentage of reference value**Table 3: Distribution according to weight of children (Mean  $\pm$  SD)**

Age	Boys (n=311)				Girls (n=106)			
	Number	Mean $\pm$ SD	Reference value*	Percentage#	Number	Mean $\pm$ SD	Reference value*	Percentage#
7	5	22.6 $\pm$ 3.28	23.54	96.00	2	23.5 $\pm$ 7.1	22.49	104.49
8	9	28.11 $\pm$ 7.88	26.30	106.88	16	24.25 $\pm$ 4.29	25.16	96.38
9	13	28.92 $\pm$ 6.73	29.31	98.66	8	25.25 $\pm$ 3.57	27.95	90.33
10	31	28.87 $\pm$ 6.28	32.96	87.59	19	27.79 $\pm$ 7.39	31.42	88.44
11	34	32.58 $\pm$ 6.33	36.90	88.29	12	31.25 $\pm$ 6.63	35.71	87.51
12	43	34.97 $\pm$ 7.22	40.37	86.62	15	34.53 $\pm$ 5.05	41.91	82.39
13	58	37.75 $\pm$ 7.28	46.74	80.76	14	39.21 $\pm$ 9.69	46.45	84.41
14	62	41.45 $\pm$ 8.89	52.93	78.31	18	40.67 $\pm$ 6.65	50.74	80.15
15	34	44.61 $\pm$ 8.67	59.87	74.51	2	42.0 $\pm$ 12.73	52.85	79.47
16	6	52.67 $\pm$ 8.50	64.93	81.11	0	0	53.85	0
17	5	50.8 $\pm$ 4.87	68.30	74.37	0	0	55.05	0
18	11	50.63 $\pm$ 6.41	69.85	72.09	0	0	55.64	0

\*50<sup>th</sup> percentile of WHO; #Percentage of reference value**Table 4: Morbidity pattern of study subject**

Sickness	Boys n=311(%)	Girls n=106(%)	Total n=417(%)	P value
Underweight	219(70.4%)	84(79.2%)	303(72.7%)	0.078
Worm infestation	116(37.3%)	38(35.8%)	154(36.9%)	0.071
Upper Respiratory Tract Infections	112(36.0%)	37(34.9%)	149(35.7%)	0.83
Anemia	72(23.2%)	40(37.7%)	112(26.8%)	0.003
Dental carries	75(24.1%)	28(26.4%)	103(24.7%)	0.63
Refractive errors	39(12.5%)	10(9.4%)	49(11.7%)	0.39
Skin infections	16(5.1%)	3(2.8%)	19(4.5%)	0.32
Ear Discharge	8(2.6%)	10(9.4%)	18(4.3%)	0.002
Hypertension	5(1.6%)	4(3.8%)	9(2.2%)	0.18

Among morbidity pattern, under nutrition was the commonest morbidity 303(72.7%) followed by worm infestation 154(36.9%), upper respiratory tract infection 149(35.7%), anemia 112(26.8%) and dental carries 103 (24.7%) found in most children. Under nutrition 84(79.2%), anemia 40(37.7%), dental carries 28(26.4%), ear discharge 10(9.4%) and hypertension 4(3.8%) were more common in girls while worm infestations 116(37.3%), upper respiratory tract infection 112(36.0%), refractive errors 39(12.5%) & skin infection 16 (5.1%) were more observed in boys. Here association of anemia and ear

discharge with gender was found highly statistically significant.

All the children with abnormal results were further investigated at the UHTC, Bareilly. The children with infective etiology were treated by the pediatrician and refractive errors correction by glasses by ophthalmologist at the time of visit. Nutritional counseling was provided by MSWs to the school children with malnutrition, anemia and dental hygiene. Other diseases needing investigation and treatment by subject experts were referred to the concern higher center for the further treatment.

## DISCUSSION

The mean height of both boys and girls was found to be increasing with age as depicted by table 2, except at age 10 year for boys and 7 & 15 year for girls. The mean height of both boys and girls in the 10-18 years age groups were lower as compared to the WHO standards. H. Mullick<sup>9</sup>, S.Khalil & Z. Khan<sup>10</sup> and Semwalet al<sup>11</sup> in their study also reported findings similar to this present study. The total increase in height during the period of 7-18 years was 34.1 cm in case of boys and 23.15 cm in case of girls. The maximum gain in height was seen in 12-13 years age group in case of boys and 11-12 years in case of girls.

Mean weight of all the children were lower in comparison to WHO standards, except at 8 years for boys and 7 years for girls. Similar findings were also reported by others authors in the country<sup>9-10</sup>. Average weight at 7 years for boys was 22.6 kg and it increased to 50.63 kg at the age of 18 years thus accounting for an increase of 28.03 kg from 7-18 years of age. The girls showed an increase from 23.5 kg at 7 years of age to 42.0 kg at 18 years, thus gaining a total weight of 18.5 kg during the period of 7-18 years.

School children going through puberty will have many changes in their developing bodies as growth surges and muscles change shape. Most girls start their sexual development between the ages of 8 and 13 (the average age is 12), and have a growth spurt between the ages of 10 and 14, while most boys start developing sexually between the ages of 10 and 13, and continue to grow until they're around 16. Puberty is a time of dramatic change for both boys and girls. Hormone-driven changes are accompanied by growth spurts that transform kids into physically mature teens as their bodies develop. So that this height and weight gain during adolescent stage is spurt growth was may be due to physical and physiological growth of the body.

Prevalence of underweight among children was found 72.7% in the present study, which is more similar to Maheshwaran R<sup>12</sup> et al study, but it was lower than the study done in rural Tamilnadu 80%<sup>13</sup>. Higher underweight prevalence in the present study was may be due to low socio economic status.

Author observed clinical anemia in the 26.8% school children, which is similar to the finding of Panda et al (26%) study based at Ludhiana City<sup>14</sup> and contrast to the study done by Fernando et al<sup>15</sup> reporting higher incidence of anemia among rural children. Clinical anemia was higher in Girls as compared to Boys which is similar reported by Kakkar R et al<sup>16</sup> in their study based at Dehradun.

Worm infestation was higher in boys (37.3%) as compared to Girls (35.8%) in present study, which is similar to Kakkar R et al<sup>16</sup> study, but its prevalence was higher among both sexes in comparison to present study. The prevalence of dental caries 24.7% was reported in the present study. Other studies have reported dental caries was present in the range of 23.1% to 27.9%<sup>14,17,18</sup>.

Hookworm and Plasmodium species may contribute to anemia in addition to dietary deficiencies. Our finding of diseases among school children are consistent with the previous study<sup>19</sup> reporting incidence of Upper respiratory tract infection, worm infestation and dental caries as the most commonly prevailing diseases. Refractive errors, skin infections, ear discharges and hypertension form the next more common diseases in these children. These health problems make learning difficult and may seriously hamper the education and child's intellectual growth. Moreover, this can also lead to high absenteeism and poor classroom performance.

## CONCLUSION

There is a huge shortfall in growth and development of school children which will adversely affect the nutritional status of future generations. The poor nutritional status of adolescents, especially girls, has important implications in terms of physical work capacity and adverse reproductive outcomes. School based mid-day meal programme and iron supplementation should receive on priority basis.

## LIMITATIONS

The instruments used for this study are those generally used for measuring weight and height in the community. Standard procedures were followed in using those instruments for measurements. Inter observer variation in measurement of height and weight could be a possibility. Apart from nutritional status there could be many other factors affecting academic performance. Factors like social environment, study environment, learning ability, hereditary factors, gender etc. are also found to influence academic performance.

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