

Research Article

Assessment of nutritional status among school children of Karimnagar, Telangana, India

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ABSTRACT

Background: Children are the country's biggest human investment for development. Quality of life of school children, by all standards continues to be poor more so in rural areas and urban slums. Hence evaluation nutritional status of the children is imperative as it is an important index of the national investment in the development of its future manpower. Nutritional status during school age is a major determinant of nutritional and health status in adult life. Globally, including India, health hazards associated with under-nutrition and micronutrient deficiencies remain major public health problems. Therefore comprehensive health care of this section will fulfil the health need of these vulnerable populations.

Methods: A descriptive, cross-sectional study was conducted among children (Aged 6 to 11 years) from selected government primary schools (Urban and Rural) of Karimnagar city, Telangana, India during study period November 2011 to October 2012. The calculated sample size was 820. Children were interviewed during school and examined in classrooms with the assistance of teachers. The background information of respondents was collected by personal interview and supplemental information was gathered from the school registers and parents. Nutritional status of the children was assessed by anthropometry using standardized techniques.

Results: There were total 820 children out of which 410 were belonging to rural area and similar numbers of children were in urban area. Age range of the children was between 6 to 11 years. Age distributions in context to school area showed that maximum numbers of children were in age of 7 and 10 years (11.8 per cent each) in rural area and 6 and 9 years (8.7 per cent in and 10.2 per cent respectively) in urban area. Out of total children 401, (48.9 per cent) were boys and 419, (51.1 per cent) were girls. There was marginal difference observed between the proportion of boys and girls in urban and rural areas. In rural areas girls accounted for 27.1 per cent whereas in urban area boys accounted for 26 per cent of total sample. Mean caloric intake of children was deficient in relation to reference standards for all age groups and both sexes. Mean caloric intake among boys was better in early age (6 to 8 years) but in later ages their intake was less than girls as per reference. Among rural children 29.3 per cent were underweight as compared to 22.2 per cent urban children. Similarly 21.5 per cent children were stunted in rural and 16 per cent from urban areas.

Conclusions: Under nutrition were the key findings of the present study especially in rural areas. Hence emphasis on primordial and primary preventive measures like health education should be given for this section of students.

Keywords: Nutritional profile, School children, Stunting, Wasting

INTRODUCTION

Children are the country's biggest human investment for development. Quality of life of school children, by all standards continues to be poor more so in rural areas and

urban slums.¹ Hence evaluation of the nutritional status of the children is imperative as it is an important index of the national investment in the development of its future manpower.^{2,3} Nutritional status during school age is a major determinant of nutritional and health status in adult

life. Globally, including India, health hazards associated with under-nutrition and micronutrient deficiencies remain major public health problems.⁴ Therefore comprehensive health care of this section will fulfil the health need of these vulnerable populations.⁵

School age children have not received as much attention from health providers/planners as the under-fives. In an international workshop at Kentucky, USA in 1994, it was agreed that there was a dearth of information on the health status of school age children from developing countries particularly at the community level. Under five years old children are targeted for priority care under various maternal and child health programmes, but these age groups (5-15 years) remain neglected.⁶ School health services provide an ideal platform to detect the health problems early and treat them.

At least 170 million children are affected by stunting. This means that not only are they too short for their age – they're also likely to enroll in school later and to do less well academically. Stunted children are predicted to earn an average of 20 percent less when they become adults.⁷

In the poorest countries, the poorest children are two times more likely to be chronically malnourished than their richest counter-parts.⁸ Significant progress has already been made in saving children's lives. The number of children not making it to their fifth birthday has fallen from 12 million in 1990 to 7.6 million in 2011.

Children are the major sector of population suffering from nutrient deficiency. According to National Family Health Survey about 45.5 per cent of children are malnourished in India.⁹ After India become independent in 1947, several steps were taken for the improvement of the health situation and well-being of the children. But malnutrition continues to be a major problem in India and at present, 46 percent of India's children under the age of three are underweight. India has the highest percentages of undernourished children in the world.¹⁰

In India about 1.83 million children die annually before completing their fifth birthday – most of them due to preventable causes.¹¹ Forty eight percent of children in India are stunted.¹² Despite 50 per cent increase in gross domestic product since 1991 more than one third of world's malnourished children live in India. India, a lower middle-income country, has a shockingly high rate of 48 per cent of children who are stunted, though there is large variation between states. The prevalence of undernutrition in Chenchu population was comparable with other tribal and rural counterparts in Andhra Pradesh, however, the crude death rate was higher among the Chenchus as studied by Rao KM et al.^{10,13}

With this information in mind, assessment of the nutritional status of the children of government primary schools of Karimnagar was undertaken. The study was conducted in selected government primary schools. The

main objective of the study was to assess the nutritional status, through anthropometric indices, and to make early diagnosis of nutritional deficiency of government primary school children in some rural and urban areas of Karimnagar, Telangana, India.

METHODS

A descriptive, cross-sectional study was conducted to assess the nutritional status of children (Aged 6 to 11 years) from selected government primary schools (Urban and Rural) of Karimnagar city (Telangana) India during study period November 2011 to October 2012. Ethical consideration was met through institutional ethical committee. A list of government schools was obtained from the District Education Office of Karimnagar. There were 45 schools in the urban area and 81 schools in rural areas of Karimnagar. The total numbers of children enrolled in these schools were 6987, of which 3194 were boys and 3793 were girls.

The prevalence of malnutrition estimated in previous studies was around 50 percent.

The sample size was estimated using the formula

$$n = 4pq/d^2.$$

Where n is the sample size, p is the prevalence, q is (1-p) and d is precision.

The calculated sample size was 384. Five percent was added to this to account for non-response bringing the total to 404 which was rounded off to 410. The number was doubled to enable an urban rural comparison bringing the total sample size to 820. Eight schools in the urban area and eight schools in the rural areas were selected by simple random sampling.

The schools selected in the urban area were in the localities of Kattarampur, Ashoknagar, Autonagar, Gauthamnagar, Mukkarampura, Subhashnagar, Kaman road and Gurudwara. The schools selected in the rural area were in the villages of Arnakonda, Gumlapur, Rukmapur, Katnepally, Jublinagar, Chamanpally, Chakunta and Ragampeta. The total numbers of children enrolled in these schools were 1150 among which 528 were boys and 622 were girls.

All children in these schools were selected for the study and excluding the numbers for repeated absences, non-consent, incomplete responses, 820 children were included in the final analysis. Selected schools were approached after getting permission from District Education Officer of Karimnagar. Prior permission from each school principal was also obtained to get full cooperation of teachers for smooth conduction of study.

Before starting the collection of data the researcher and interpreters met with teachers and children at the school

and explained about purpose of study. Teachers were also asked to inform parents to be present on the day of examination to provide related family particulars and regarding dietary history of their child.

Inclusion criteria

- Children enrolled in registers of government primary schools in Karimnagar.
- Children studying in primary school from I to V standards.
- Children in the age group of 6 to 11 years.

Exclusion criteria

- Children who were unreachable in spite of two school visits.
- Children and parents who were unwilling to consent or co-operate with the study.

Children were interviewed during school and examined in classrooms with the assistance of teachers. For absentee students, two visits were made to locate them in the school. Predesigned pretested proforma was used for the study.

Questionnaires were completed, through an interview process by the researcher. Explanations were provided in the relevant languages to assist in obtaining accurate information. The nutritional status of school children

was assessed by anthropometric measurements i.e. height in centimeter (cm) and weight in kilograms (kg). The height and weight of children were compared to WHO growth standards. Nutritional status of the children was assessed by using standardized techniques. A brief health education session was given to the teachers and students after completion of the study. The parents and children were provided with health information and suggested to contact the nearest health institution if needed.

Statistical analysis

Data analysis was performed using Epi-info (version 7) software. Categorical variables were appropriately coded for data entry. Numerical data such as height, weight and age were entered as such. Statistical measures obtained were means, standard deviation, percentages, proportions and Z score.

RESULTS

There were total 820 children out of which 410 were belonging to rural area and similar numbers of children were in urban area. Age range of the children was between 6 to 11 years. Age distributions in context to school area showed that maximum numbers of children were in age of 7 and 10 years (11.8 per cent each) in rural area and 6 and 9 years (8.7 per cent in and 10.2 per cent respectively) in urban area. Frequency distribution of children across all ages showed marginal difference between two groups (Table 1).

Table 1: Age wise distribution of children.

Age in years	Rural		Urban		Total	
	Number	%	Number	%	Number	%
6	43	5.2	71	8.7	114	14.0
7	97	11.8	61	7.4	158	19.2
8	42	5.1	68	8.3	110	13.4
9	65	7.9	84	10.2	149	18.1
10	97	11.8	66	8.0	163	20.0
11	66	8.0	60	7.3	126	15.3
Total	410	50	410	50	820	100

Table 2: Gender wise distribution of children.

Gender	Rural		Urban		Total	
	Number	%	Number	%	Number	%
Boys	187	22.8	214	26.0	401	48.9
Girls	223	27.1	196	23.9	419	51.1
Total	410	50	410	50	820	100

Out of total children 401, (48.9 per cent) were boys and 419, (51.1 per cent) were girls. There was marginal difference observed between the proportion of boys and girls in urban and rural areas. In rural areas girls

accounted for 27.1 per cent whereas in urban area boys accounted for 26 per cent of total sample (Table 2). As per modified Kuppusswamy’s socioeconomic status scale, majority of children (63.9 per cent) were belonging to

upper lower class followed by 26.3 per cent belonging to lower middle class. Urban-rural comparison reveals that only 3.2 per cent of the children in rural area were belonging to upper middle class compared with 6.6 per

cent in urban area. Similarly only 10.1 per cent of children in urban area were belonging to lower middle class compared with 16.2 per cent of children in rural area (Table 3).

Table 3: Children according to socio economic status.

Socio economic status	Rural		Urban		Total	
	Number	%	Number	%	Number	%
Upper middle	26	3.2	54	6.6	80	9.8
Lower middle	133	16.2	83	10.1	216	26.3
Upper lower	251	30.6	273	33.3	524	63.9
Total	410	50	140	50	820	100

(As per modified Kuppuswamy's socioeconomic scale)

Table 4: Caloric intake among rural school children.

Age in years	Sex			
	Male		Female	
	Mean calorie intake (K. Cal)	SD	Mean calorie intake (K. Cal)	SD
6	1104	72	1065	49
7	1170	46	1123	66
8	1200	80	1138	121
9	1208	35	1234	45
10	1134	59	1329	161
11	1304	121	1367	207

Table 5: Calorie intake among urban children.

Age in years	Sex			
	Male		Female	
	Mean calorie intake (kcal)	SD	Mean calorie intake	SD
6	1334	201	1258	145
7	1287	115	1317	91
8	1368	121	1473	217
9	1664	185	1480	127
10	1671	148	1747	80
11	1550	183	1739	131

Table 6: Height and weight Z Scores of children.

Variables	Rural	Urban
Height (Stunting)	Mean Z score	0.8±1.19
	% below 2 SD	22.2%
	% below 3 SD	1.2%
Weight (Wasting)	Mean Z score	0.59±1.15
	% below 2 SD	16.2%
	% below 3 SD	2.3%

Mean caloric intake of boys was more than that of girls for all ages except 9 and 11 years. Mean caloric intake of children was deficient in relation to reference standards for all age groups and both sexes (Table 4). Mean caloric intake among children was not meeting the reference

standards across all ages. Mean caloric intake among boys was better in early age (6 to 8 years) but in later ages their intake was less than girls as per reference (Table 5).

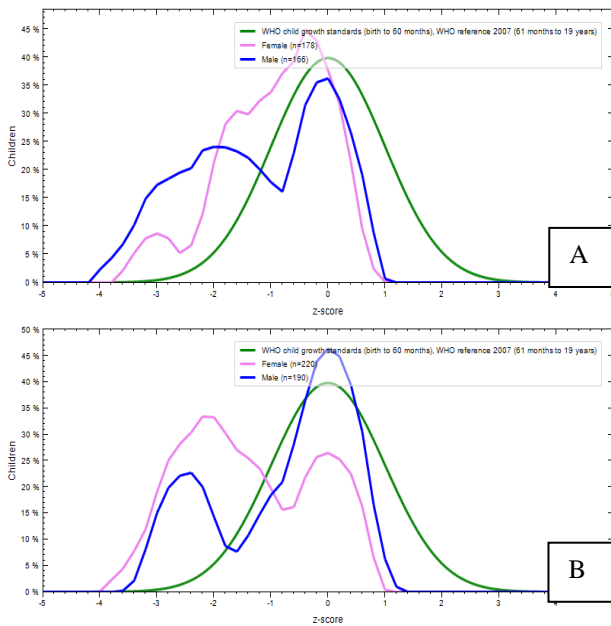


Figure 1: Weight for age curves for rural and urban children.

Rural children 29.3 per cent were underweight as compared to 22.2 per cent urban children.

Similarly 21.5 per cent children were stunted in rural and 16 per cent from urban areas (Table 6, Figure 1 and 2).

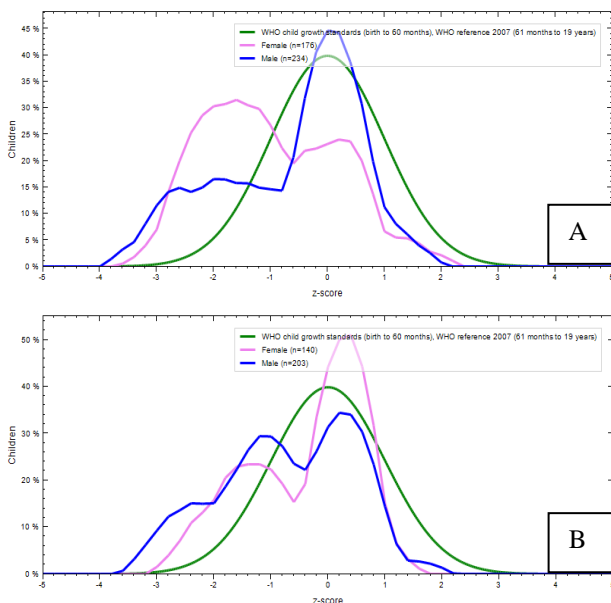


Figure 2: Height for age curves for urban and rural children.

DISCUSSION

Malnutrition and infections often coexist in underprivileged communities, the presence of one predisposing and aggravating the other. Hence the

relationship between the two is considered mutually causative or bi-directional.¹⁵⁻¹⁷ Malnutrition is an underlying cause of more than a third of children's deaths – 2.6 million every year, but it is not recorded on death certificate and as a result, it is not effectively addressed.^{18,19} One in four of the world's children are stunted.²⁰ In developing countries this figure is as high as one in three.¹⁸

Evaluation of the nutritional status of the school children is of immense importance as morbidity and malnutrition constitute heavy burden in this age group. Adequate nutrition is important among children because it affects the achievement of growth and development. Furthermore, a child's nutritional status can have an effect on their response to illness.

Nutritional status of school children can be quickly assessed by anthropometric measurements. Therefore, a nutritional assessment should be conducted on children so that their nutrition status, in turn, their health status can be identified. School children between the ages of 6 – 11 years were sampled as the nutritional and growth requirements in this age group is proportionally higher than adults and is an age at which occurrences of malnutrition are common.

There was an equal distribution of boys and girls among the sample in a ratio of 1:1. This is in concordance with the sex ratio in Karimnagar district at 1009:1000.²¹

There was marginal difference observed between the proportion of boys and girls in urban and rural areas with slight preponderance of girls in the rural area compared to the urban area.

A majority of the respondents were classed into the lower middle and upper lower classes. These findings are consistent with the findings of study done Bele S et al reported 61.3 per cent of the children belonged to lower socioeconomic status in an urban slum of Karimnagar.²²

Mean caloric intake of children was deficient in relation to reference standards for all age groups and both sexes. Mean caloric intake of boys was more than that of girls at all ages except 9 and 11 years. A study conducted by Mehrotra et al among primary school children in Bareilly district showed that energy deficiency was exhibited by respondents in both urban as well as rural area.²³ Among nutritional status more than half (51.5 per cent) children were stunted as their height for age was lower than reference norms and 37 per cent of children were under weight as their weight was below WHO standard for weight for age.

On comparison urban children were taller and heavier than their counter parts in rural the area. In a study done by Goon D et al, they found that 55.8 per cent were having low height for their age and 45.4 per cent recorded low weight for their age.²⁴

CONCLUSION

The current study was conducted among school children to obtain a comparison between urban and rural school children and to evaluate their nutritional status. Mean caloric intake of boys was more than that of girls at all ages except 9 and 11 years.

Mean caloric intake of children was deficient in relation to reference standards for all age groups and both sexes. Mean calorie intake among children was not meeting the reference standard across all ages.

More than half children (51.5%) were stunted as they were suffering from chronic malnutrition. This needs to be tackled through adequate nutrition and health education. Nearly 40 percent of the children were underweight; an acute condition if not corrected at earlier stage may progress to severe form of malnutrition. Children of urban schools were taller and heavier than rural counterparts.

Under nutrition were the key findings of the present study. Hence emphasis on primordial and primary preventive measures like health education should be given for this section of students. In this respect not only parents but school teachers should be trained adequately.

Nutrition education may be made as a part of school curriculum apart from regular education activities. Regular health and nutritional assessment of the primary school children for early detection and treatment is to be stressed more and current school health services programmes should be further strengthened.

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REFERENCES

1. Saluja N, Garg S, Chopra H. Prevalence of Morbidity and Morbidity Pattern in School Children (5 – 11 years) in Urban area of Meerut. Int. J Epidemiology. 2011;2(2).
2. Goyal RC, Chavan UA. Health status of school children in Ahmednagar city. Ind J Maternal and Child Health. 1993;4(3):81-3.
3. Bahal R, Bhandari N, Vij A, Bhan M K. Vitamin A, immunity and infection between malnutrition and diarrhea in rural Bangladesh, Int J Epidemiology. 1995;16:477-81.
4. Nutrition Foundation of India, New Delhi, July 2009, Nutrition and physical performance in school children. Website: <http://www.nutritionfoundationofindia.res.in>.
5. Dambhare DG, Barambe MS, Mehendale AM, Garg BS, Nutritional Status and Morbidity among School going Adolescents in Wardha, a Peri-Urban area. Online Journal Health Allied Sciences. 2010;9(2).
6. Bundy DAP, Guyatt HL. The health of school age children: Report of a workshop Parasitology. Today. 1005;11:166-7,
7. Horton S. 'Opportunities for investments in low income Asia', Asian Development Review, World Bank (2010), Scaling up Nutrition: What will it cost? 1999;17:246-73.
8. National Demographic and Health Surveys.
9. Nair KRG. Malnourishment among children in India: A regional analysis. Economic and Political Weekly. 2007;47(2):3797- 803.
10. India 2005–06. National Family Health Survey -3.
11. State of the World's Children. Repor. UNICEF. 2010.
12. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Development potential in the first 5 years for children in developing countries. Lancet. 2007;369(9555):60-70.
13. Rao KM, Kumar RH, Krishna KS, Bhaskar V, Laxmaiah A. Diet & nutrition profile of Chenchu population - A vulnerable tribe in Telangana & Andhra Pradesh, India. Indian J Med Res. 2015;141:688-96
14. <http://formulas.tutorvista.com/math/statistics-formulas.html>
15. Reddy V. Interaction between nutrition and measles. Indian J Pediatr. 1987;54:53-7.
16. Srikanita SG, Prasad SJ, Bhaskaram P, Krishnamachari KAVR. Anaemia and immune response. Lancet. 1976;1:1307-8.
17. Underwood BA. Blinding Malnutrition: A preventable blight on the global society, In: Nutritional Blindness in Developing Countries, Inter-disciplinary Symposium, Basel, Switzerland 1996;14-30.
18. Black RE1, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child under-nutrition: global and regional exposures and health consequences. Lancet. 2008;371(9608):243-60.
19. UN Inter-agency Group for Child Mortality Estimation (2011) Levels & Trends in Child Mortality: Report 2011, New York: UNICEF.
20. Onis M, Blossne M, Borghi E. Prevalence of stunting among pre-school children 1990-2020, Growth Assessment and Surveillance Unit, Public Health Nutrition. 2011;14:1-7.
21. National Indian census. Available at <http://www.census2011.co.in/census/district/120-karimnagar.html>.

22. Bele SD, Bodhare TN, Valsangkar S, Saraf A. An epidemiological study of emotional and behavioral disorders among children in an urban slum. *Psychol Health Med.* 2013;18(2):223-32.
23. Mehrotra M, Arora S, Nagar V. Nutritional Health Status of Primary School Children. A study in Bareilly District. *Indian Educational Review.* 2011;48(1).
24. Goon D. *BMC Public Health.* 2011;11:769. <http://www.biomedcentral.com/1471-2458/11/769>.

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