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Profile of Nutritional Status of the School Aged Children Residing in Urban Slums of Agra City: A Community based Cross Sectional Study

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Abstract: ***Background: Their growth pattern is different from that of under-five children, besides today they are at risk of developing malnutrition owing to their differing lifestyle, compared to the previous generations. Evaluating the nutritional profile and growth monitoring of these children, particularly promotes continuity of care. Objectives: To find out the nutritional status profile of school aged (5 – 10 years) children by measuring their anthropometric parameters and to correlate the anthropometric parameters with WHO (2007) Child Growth Standards. To find out associated bio-social factors associated with their nutritional status. Methods and Material: A cross-sectional study was conducted including a total of 350 children aged 5 – 10 years through a door-to-door survey in the selected slum areas. Data was collected on the demographic profile and biosocial factors. The anthropometric parameters recorded (height, weight and BMI) was imported to WHO Anthro Plus software and statistical analysis was done by calculating Z score. Results: Prevalence of overall malnutrition was found to be 41.14%. Prevalence of stunting, wasting and underweight was 21.71%, 12.86% and 20.57% respectively. Among these 0.57% of the children suffered from all the three types of malnutrition. Conclusions: As per anthropometric calculations the burden of malnutrition among 5 to 10 years of children residing in the slums of Agra city is high. Various factors like, low socio-economic status, caste, large family size, high birth order and drinking water and sanitation facilities were found to be significantly associated with malnourishment.***

Keywords: school-aged children; urban slums; concurrent underweight; concurrent wasting

1. Introduction

The nutritional status of an individual is a result of many interrelated factors. It is influenced by the adequacy of food intake both in terms of quantity and quality and also by the physical health of the individual.[1] Better nutrition is related to improved health, stronger immune systems, lower risks of non-communicable diseases and longevity. Insufficiency of nutrients in children can interfere with their normal growth and development. Research suggests that early growth patterns might have long-term effects on risk of developing chronic diseases in adulthood.[2] It is seen that people who remain in the setting in which they developed childhood malnutrition tend to remain malnourished as adults also.

Anthropometry remains the conventional benchmark for evaluating the nutritional profile of children, particularly for epidemiological purposes. Growth monitoring promotes continuity of care. Insights into the nutrient status of individuals and populations and understanding of the impact of optimizing nutrient status during a lifespan in different life conditions is unsatisfactory. Malnutrition especially among young children is viewed in the modern age as one of the principle public health problems throughout the world, primarily for it affects large segment of world's population.

Attention to child nutrition plays an important role in the well-being of the society. Healthy children learn better, and these children grow up into healthy adults. People with adequate nutrition are more productive and can create opportunities to gradually break the cycles of poverty and hunger.While ample data is available on nutritional status of under-five children, including nationally representative demographic and health surveys (DHS) data, very little research is available on school aged children. School-aged children (5 years to 14 years of age[3]) are in active growing phase. This age group is a dynamic period of physical growth and mental development. The environment plays a major role in shaping the habits and perceptions of children in this age group. Easy access to unhealthy food and decreasing physical activities, makes them more prone to become malnourished.

Urban slum dwellers are exposed to poor environmental conditions (overcrowding, poor quality drinking water and sanitation, no removal of waste). Ignorance and difficult conditions of life in the slums are likely to result in improper food habits, low health care use and hygiene awareness and lack of knowledge of the origin of sickness and proper measures of cure. The situation is further worsened due to lack of necessary health centres, medicines and health care personnel. Children living under such conditions are especially at high risk of nutritional problems, this was the idea behind choosing the study population for our study.

2. Methodology

A community based cross-sectional study was conducted among 350 school aged children (aged 5 – 10 years) in randomly selected slum areas of Agra city. A door-to-door survey was conducted in the selected slum area to identify families with children befitting our inclusion criteria. Before the start of the interview, the participants were explained the procedure and purpose of the study. An easily understandable, written informed consent was taken from the parents/guardians in Hindi and English. Parent/Guardian who had consented for the study were interviewed and the semi-structured/pre-designed questionnaire was filled.

Children were examined after verbal assent. Only one (randomly selected) child from a single household was included in the study in case more than one child of the inclusion criteria age range were present in the family. Weight and height of the participating children was measured using standardised weighing scale and stadiometer. Children were barefoot and wearing lightest of the clothing when measuring their weight. The weight of all children was measured by an electronic scale (maximum range of 180 kg and accuracy of 100 g). which was recorded till two decimal points. The height of children was measured using Stadiometer (maximum range of 200 cm, and accurate to 0.1 cm. BMI was calculated as weight in kg/height in m^2, by entering the height, weight and age of the child in WHO AnthroPlus software v 1.0.4. The corresponding scores, i.e., weight-for-age Z-score (WAZ), weight- for-height Z-score (WHZ), and height-for-age Z-score (HAZ) and BMI for age Z-score (BAZ) is calculated using anthropometric calculator of WHO AnthroPlus software v 1.0.4.

For the purpose of the present investigation, underweight status, wasting, stunting, overweight and obesity is defined by WAZ, HAZ, BAZ scores that were more than +/-2Standard Deviation (+/-2SD) away from the WHO standard reference for the children population, respectively.

***Operational Definitions*:**

School aged children: Children aged 5 years to 14 years of age. 6

The development that takes place in adolescence (11 years to 19 years) is generally uneven in that, most children in this age group experience growth spurts. Therefore, the problems faced by this age group is quite different from the ones faced by younger school aged children (5 to 10 years).

For this reason, we have ignored this subset of the school aged children in our study and we have included only school aged children aged 5 years to 10 years.

Malnutrition: Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is 'undernutrition'—which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight and obesity.[2]

Stunted: Children are defined as stunted if their height-for-age is less than two standard deviations of the WHO Child Growth Standards median.[2]

Underweight: Moderate and severe - below minus two standard deviations from median weight for age of reference population; severe - below minus three standard deviations from median weight for age of reference population4, here WHO Child Growth Standards median.

Wasting: Moderate and severe - below minus two standard deviations from median weight for height of reference population.4

Overweight: Overweight is defined as a BMI at or above the 85th percentile and below the 95th percentile for children and teens of the same age and sex.[4]

Obesity: is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex.[4]

Body Mass Index: BMI is calculated by dividing a person's weight in kilograms by the square of height in meters. For children and teens, BMI is age- and sex-specific and is often referred to as BMI-for-age[4]

Low-birth-weight:[6] Birth weight below 2500 grams.

Normal-birth-weight:[6] Birth weight between 2500 grams and 4000 grams.

Socio-economic Scale used: Modified Kuppuswamy scale[5]

3. Results and Discussion

Nutritional status plays an important role and determines the further growth and quality of life of a child. There is a growing concern over health of the children all over the world with rapid economic growth and social changes. Major determinant of health status in an adult is their nutritional status in childhood. Malnutrition causes children to be more susceptible to infections and vice versa. Those frequent infections negatively affect their physical and cognitive abilities locking them into a vicious cycle. About half the population in Agra city lives in the slums or similar settlements. Therefore, the present study, a community based descriptive cross-sectional study, was carried out in the slum areas of Agra city.

Socio-demographic factors: [Table 1]The maximum number of participants belonged to the age group of 5-6 years (32.00%) and least number in the age group 9-10 years. There were almost twice as many boys (228, 65.14%) as girls (122, 34.86%). Almost two-third of the children belonged to Hindu (60.29%) religion and OBC (62.57%) caste. More than half (51.41%) of the study participants lived in a nuclear family. Half (50.28%) of the families had 6-9 to members in their household. While almost two-third (64.00%) families had a family size greater than two. Majority (80.86%) of the families belonged to upper lower socio-economic scale (Modified Kuppuswamy Scale).

Table 1: Sociodemographic profile of the study participants

Variables	Participants N = 350	(Percentage)
Age (in months)		
60-71	112	32
72-83	90	25.71
84-95	51	14.57
96-107	71	20.28
108-120	26	7.42
Sex		
Male	228	65.14
Female	122	34.86
Religion		
Hindu	211	60.29
Muslim	139	39.71
Caste		
General	54	15.43

OBC	219	62.57
SC	45	12.86
Type of Family		
Nuclear	180	51.41
Joint	129	36.89
Three Generation	41	11.7
No. of Family Members		
≤5	97	27.71
06-Sep	176	50.28
≥10	77	22
Family Size		
≤2	126	36
>2	224	64
Socioeconomic Status		
Upper middle	9	2.57
Lower middle	37	10.57
Upper lower	283	80.86
Lower	21	6

Table 2 shows the frequency distribution of study participants according to their nutritional status. Only 2 (0.57 %) of the kids were found to be over nourished while 144 (41.14%) of the children were undernourished. Stunting (i.e., Z score below 2 SD) was seen in 76 (21.71%) of the children out of which 37(10.57%) of them were stunted only, while 24 (6.86%) and 13 (3.71%) were concurrently stunted and underweight and stunted and wasted. Underweight and wasting was seen in 72 (20.57%) and 45 (12.86%) of the children respectively. Out of these 8 were concurrently underweight and wasted, while 38 (10.86%) and 22 (6.29%) were underweight only and wasted only respectively, 2 (0.57%) children had concurrent wasting, underweight and stunting. Micronutrient deficiency) was seen in 107(30.57%) children. Out of these 84 (24.00%) children were malnourished while 23 (6.57%) had normal height and weight. [Fig: Venn Diagram]

Table 2: Frequency distribution of participants according to nutritional status

Nutritional Status	Number	Percentage
Overweight only	2	0.57
Normal (between +2SD to -2SD)	204	58.29
Underweight only	38	10.86
Underweight & stunted	24	6.86
Stunted only	37	10.57
Stunted & wasted	13	3.71
Wasted Only	22	6.29
Wasted & underweight	8	2.29
Wasted, underweight & stunted	2	0.57
Micronutrient Deficiency with undernutrition	84	24.00
Micronutrient Deficiency in children with normal anthropometric parameters	23	6.57

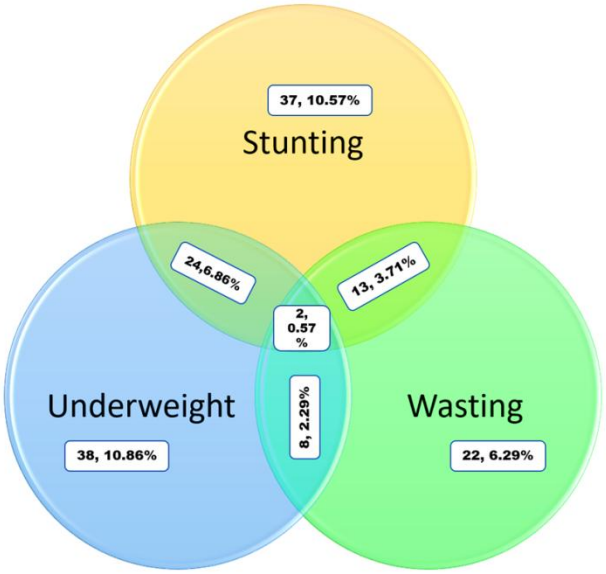

Figure: Venn Diagram

We found that the overall prevalence of malnutrition is 41.57%. Maximum percentage (47.06%) of malnourished (according to any one or more anthropometric criteria) children are present in the age group 7-<8 years, and least percentage (37.78%) in the age group of 6-<7 years. However, since the p value is > 0.05, this difference is not statistically significant.

More percentage of girls (44.26%) were observed to be malnourished than boys (40.35%). Since the p value is >0.05, this difference is not statistically significant. No significant difference is seen in prevalence of malnutrition among the age groups.

Table 3 depicts the association of under nutrition of any kind (wasting, underweight, stunting or a combination of any of these) with various bio-social factors. Two-third (63.16%) of the children born with low birth weight were found have undernourishment (of any type) while less it was seen in less than 40 per cent of the children born with normal birth weight. This difference was found to be statistically significant.

More than half (57.14%) of the children with a birth order of three or higher were found to have at least some kind of under nutrition. While only one-fifth (21.24%) of the first borns were undernourished. Proportion of under nutrition was seen in an increasing trend with birth order. This variation was found to be statistically significant.

Around 70 per cent of the children who consumed water directly from the source suffered from under nutrition. While undernourished children were seen in a comparatively lesser proportion (38.89%) among the ones who consumed filtered water. This difference was also found to be statically significant.

Less than 40 percent (38.14%) of the kids who used private toilet facility suffered from undernutrition. While a large percentage (69.23%) of children defecating in the open were found to be suffering from malnutrition. This difference was also found to be statistically significant.

Less than one-third (29.79%) of the children who did not give any history of sickness spells in the last one year suffered from under nutrition. While a higher percentage of children who gave history of sick spells once, 2-3 times or more than 3 times (42.80%, 39.02% and 50.00% respectively) were observed to be suffering from any one kind of malnutrition. However, this variation was not statistically significant.

Under nutrition was observed in a higher proportion among children who had suffered from some infectious disease in the past one month (46.30%) compared to the ones who did not (40.20%). This difference was also not found to be statistically significant.

More than half (51.52%) of the children who were not fully immunized were suffering from undernutrition, on the other hand 40.06% of the children who were fully immunized were found to be undernourished. However, this difference was also not found to be statically significant.

Table 3: Association of undernutrition with various bio-social factors

Variable		Undernourished		Normal		χ^2 (P Value)
		n	%	n	%	
Birth weight	LBW (38)	24	63.16	14	36.84	8.53 (<0.01)
	NBW (312)	120	38.46	192	61.54	
Birth Order	First (113)	24	21.24	89	78.76%	14.56 (<0.01)
	Second (146)	68	46.58	78	53.42%	
	3+ (91)	52	57.14	39	42.86%	
Source of drinking water	Direct (26)	18	69.23	8	30.77%	9.1 (<0.01)
	Filtered (324)	126	38.89	198	61.11%	
Type of sanitation	Private (312)	119	38.14	193	61.86%	10.79 (<0.01)
	Public (25)	16	64.00	9	36.00%	
	Open (13)	9	69.23	4	30.77%	
No. sickness spells in last 1 year	None (47)	14	29.79	33	70.21%	3.69 (0.30)
	Once (236)	101	42.80	135	57.20%	
	2-3 times (41)	16	39.02	25	60.98%	
	>3 times (26)	13	50.00	13	50.00%	
H/o any infectious diseases in last 1 month (like diarrhoea, ARI)	Yes (54)	25	46.30	29	53.70%	0.70 (0.40)
	No (296)	119	40.20	177	59.80%	
Immunization status	Fully immunized (317)	127	40.06	190	59.94%	1.62 (0.20)
	Not (33)	17	51.52	16	48.48%	

4. Summary and Conclusions

The state of health is determined by an assessment of nutritional status. Nutritional status is influenced by the adequacy of food intake both in terms of quantity and quality and also by the physical health (growth and development) of the individual. But at the same time nutritional status also largely depends upon a set of complex and interrelated factors. The nutrition related problems are so rampant in our country that today it is no longer considered the outcome of absolute deficiency, but viewed as a multidimensional problem inter facing many developmental imperatives which needs to be explored in totality. Based on the findings of our study we have made the following conclusions.

The prevalence of malnutrition was found to be 41.71% and that of micronutrient deficiency 30.57% in our study population. Besides the prevalence a number of associated risk factors were also identified from the noted observations.

Lower caste, larger household size, larger family size and a lower income (or overall socio-economic status) appeared to be a risk factor for malnourishment among children. Another risk factor identified was working mothers, though this should not be made into a final conclusion because all the mothers who worked outside the house in our sample also belonged to a lower socio-economic class. Still a plausible explanation for this finding could be because these mothers owing to their lower educational level might be less knowledgeable about good nutrition and also, they could not monitor their children's nutrition as closely was mothers who stay at home.

Apart from these a few bio-social risk factors were also identified, like higher birth order, source of drinking water and sanitation facility. Higher birth order again points towards larger family size and hence a lesser affordability of nutritious food by the family. Also, the mother of the child herself might be malnourished and becomes weaker by each successive pregnancy. A malnourished mother most likely gives birth to a low-birth-weight babies who in turn will be more for malnourishment.

Drinking unfiltered water and unhygienic toilet facilities makes the child more prone to infections which will ultimately affect the nutritional status of the child, and pushes the child into the vicious cycle of infection-malnutrition-infection.

Early identification and prevention of malnutrition and other micronutrient deficiencies among these actively growing school-aged children is of paramount importance. Till preventive programs are properly designed and implemented, creating awareness through community visits and other health promotional activities about avoidable risk factors for malnourishment should remain as a mainstay for prevention of malnutrition. Based on the findings of this study following recommendations were made.

References

[1] Sandeep Sachdeva, Ali Amir, Seema Alam*, Zulfia Khan, M. Athar Ansari, Najam Khalique Nutritional status of infants and toddlers in rural and urban areas of Aligarh. Curr Pediatr Res 2010; 14 (2): 95-101
[2] Victora, C., Adair, L., Fall, C., Hallal, P., Martorell, R., Richter, L. and Sachdev, H., 2008. Maternal and child undernutrition: consequences for adult health and human capital. The Lancet, 371(9609), pp.340-357.
[3] Park K. Preventive medicine in obstetrics, pediatrics and geriatrics. In: Park K, editor. Textbook of Preventive and Social Medicine. 25th ed. Jabalpur: Banarsidas Bhanot; 2019. p. 641.
[4] Gigante DP, Nazmi A, Lima RdC, Barros FC, Victora CG. Epidemiology of early and late growth in height, leg and trunk length: findings from a birth cohort of Brazilian males. Eur J Clin Nutr (in press).
[5] Diet and Health. 1st ed. Washington DC: NATIONAL ACADEMY PRESS; 2022. p 46.
[6] Sachdev HS, Fall CH, Osmond C. Anthropometric indicators of body composition in young adults: relation to size at birth and serial measurements of body mass index in childhood in the New Delhi birth cohort. Am J Clin Nutr. 2005;82:456–466.
[7] Initiatives Development. 2018 Global Nutrition Report: Shining a light to spur action on nutrition. Bristol, UK: Development Initiatives; 2018. https://www.unscn.org/uploads/web/news/2018-Global-Nutrition- Report.pdf.
[8] National Institutes of Health (US); Biological Sciences Curriculum Study. NIH Curriculum Supplement Series [Internet]. Bethesda (MD): National Institutes of Health (US); 2007. Understanding Human Genetic Variation. Available from: https://www.ncbi.nlm.nih.gov/books/NBK20363/
[9] Wijnhoven TMA, de Onis M, Onyango AW, Wang T, Bjoerneboe GEA, Bhandari N, Lartey A, Al Rashidi B, for the WHO Multicentre Growth Reference Study Group. Assessment of gross motor development in the WHO Multicentre Growth Reference Study. Food Nutr Bull 2004;25(1)(suppl 1):S37–45.
[10] Levels and trends in child malnutrition: UNICEF/WHO/The World Bank Group joint child malnutrition estimates: key findings of the 2021 edition [Internet]. Who.int. Available from: https://www.who.int/publications-detail-redirect/9789240025257.