High prevalence of stunting among Integrated Child Development Services (ICDS) Scheme Children aged 1-5 years of Chapra Block, Nadia District, West Bengal, India.

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Citation

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Abstract

The present study investigated age and sex variations in height and weight, and levels of stunting, among 673 (boys = 323; girls = 350) 1-5 years old rural children of Bengalee ethnicity at 30 Integrated Child Development Services (ICDS) Centers of Chapra Block, Nadia District, West Bengal, India. Height-for-age (HAZ) was used to evaluate stunting following the National Center for Health Statistics (NCHS) Guidelines. Results showed that boys were significantly heavier and taller than girls at ages 2-4 years. Significant age differences existed in mean height and weight in both sexes. Mean HAZ was less than those of NCHS for both sexes at all ages. The overall (age and sex combined) rate of stunting was 39.2 %. The prevalence of stunting was higher among boys (43.4 %) than girls (35.4). Based on World Health Organization classification of severity of malnutrition, the overall prevalence of stunting was very high (≥ 40 %) among boys and high (30-39 %) among girls. In conclusion, the nutritional status of the subjects is unsatisfactory indicating a major public health problem. There is scope for much improvement in the form of enhanced supplementary nutrition.

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INTRODUCTION

Anthropometric measurement is a practical and immediately applicable technique for assessing children's development patterns during the first five years of life. Assessing of growth patterns and also provides useful insights into the nutrition and health situation of entire population. Anthropometric indicators are less accurate than clinical and biochemical techniques when it comes to assessing individual nutritional status. In field situations where resources are severely limited, however, anthropometry can be used as an inexpensive, easy to perform and non-invasive [1] tool to identify individuals at risk of undernutrition, followed by a more elaborate investigation using other techniques. Similarly, growth monitoring permits the detection of individuals with faltering growth, who can then be appropriately referred to specialized care. Changes in trends over time with respect to the nutritional situation can be evaluated in countries where national food and nutrition surveillance systems have been developed, or where nationally representative cross-sectional surveys have been conducted some years apart using identical, or nearly identical, methodologies. During preschool age period, children have special nutritional needs because of their extensive growth and development [2] . The legacy of malnutrition, especially among preschool children is a major public health problem and a huge obstacle to overall national development [2] . Undernutrition among pre-school children is an important public health problem in rural India [3] including West Bengal [4] . However, there exists scanty information of the prevalence of undernutrition among preschool children in India [5] .

Three most commonly used internationally recommended indicators are child stunting (low height-for-age), underweight (low weight-for-age) and wasting (low weight-for-height) [67] . While stunting reflects a failure to reach linear growth potential due to sub optimal health and/or nutritional conditions, underweight reveals low body mass relative to chronological age, which is influenced by both, a child’s height and weight. Underweight thus cannot distinguish between a child that is small in weight relative to his/her height and a child that is low in height relative to his/her age, but who may be normal in weight-for-height On the other hand wasting is an indicator of acute

undernutrition, the result of more recent food deprivation or illness [6] .

The Integrated Child Development Services (ICDS) scheme of Government of India is the largest national programme for the promotion of mother and child health and their development in the world [8] . The beneficiaries include preschool children, pregnant and lactating mothers, and other women in the age group 15 to 44 years [8] . The package of services provided by the ICDS scheme includes supplementary nutrition, immunization, health check-up, referral services, nutrition and health education, and pre-school education [8] . The scheme services are rendered essentially through the "Anganwadi" worker at a village center called "Anganwadi". There is therefore an urgent need to evaluate the nutritional status of children at ICDS centers to determine whether they have low rates of stunting, underweight and wasting. Low rates of stunting, underweight and wasting would imply that the supplementary nutrition being administered to the children is effective in reducing the rates of undernutrition. However, very few investigations have investigated this in depth in the study area [459] .

In view of this, the present investigation was undertaken to determine age and sex variations in height and weight as well as to evaluate the levels of stunting, 1-5 year old ICDS children of Bengalee ethnicity from Chapra Block, Nadia District, West Bengal, India.

MATERIALS AND METHODS

LOCATION

This cross sectional study was undertaken at Chapra Block, Nadia District, West Bengal, India. The study area is situated at the India–Bangladesh international border, 140 km from Kolkata, the provincial capital of West Bengal. The area is remote and mostly inhabited by Bengalee Muslims. All preschool children (1–5 years old) living in Chapra Block are enrolled at these centres. The ICDS authorities are allocated Rs. 4/- (approximately 8 US cents) per head (child) per day by the Government of India to provide supplementary nutrition to the children. This financial assistance ensures that each child is given a porridge consisting of 50 gm of rice, 18 gm of lentils, one half of egg and small amounts of soybean and vegetables per day.

THE SUBJECTS

Thirty (30) anganwadi centres were randomly selected out of 335 centers of the Chapra Block, Nadia District. The response rate was approximately 55%. A total of 673 children (323 boys and 350) aged 1–5 years were measured, out of whom 16 individuals (6 boys and 9 girls) were excluded because of missing data. The final sample size was 673 (Table 1) children (323 boys and 350 girls). Formal ethical approval was obtained from Vidyasagar University and ICDS authorities prior to the commencement of the study.

Figure 1

Table 1. Distribution of study subject by age and sex

Age (year)	Boys	Girls	Total
1	72	74	146
2	74	68	142
3	84	94	178
4	72	77	149
5	21	37	58
Total	**323**	**350**	**673**

AGE ESTIMATION OF THE SUBJECTS

Ages of the children were ascertained from the Anganwadi registers and subsequently confirmed by parents of the children. For analysis age was grouped in to twelve months intervals.

ANTHROPOMETRIC DATA

Height and weight were taken by one researcher (SB) on each subject following the standard techniques [10] . Technical errors of measurements (TEM) were found to be within reference values [11] and these not incorporated in statistical analyses.

EVALUATION OF NUTRITIONAL STATUS

Three commonly used undernutrition indicators, i.e., stunting, underweight and wasting were used to evaluate the nutritional status of the subjects. The United States National Centre for Health Statistics (NCHS) [1213] age and sex specific – 2 z-scores were followed to define stunting, underweight and wasting. The following scheme was utilized:

Stunting : < - 2 HAZ (Z-score for height-for age)

Where HAZ, refer to height-for-age, and sex specific z scores, respectively, of NCHS (1977).

The WHO (1995) classification was followed for assessing severity of malnutrition by percentage prevalence ranges of this indicator among children. The classification is:

Figure 2

	Low (%)	Medium (%)	High (%)	Very High (%)
Stunting	< 20	20 – 29	30 – 39	≥ 40

STATISTICAL ANALYSES

The distributions of height and weight were not significantly skewed therefore not necessitating their normalization. Between sexes differences in means of height and weight were tested by student's t-test. ONEWAY (Scheffe's Procedure) analyses were undertaken to test for age differences in mean height and weight in each sex.

RESULTS

The means and standard deviations of height and weight by age and sex are presented in Table 2. Significant sex difference in mean weight was observed at ages 1-5 years. Significant sex differences also existed in mean height at ages 2 to 4 years. For both weight as well as height, there existed significant increasing age trends in both sexes.

Figure 4

Table 3. Mean HAZ score by age and sex

Age (year)	Weight (kg)		t	Height (cm)		t
	Boys	Girls		Boys	Girls	
1	8.78 (1.18)	8.64 (1.55)	0.62	76.31 (4.15)	75.59 (6.19)	0.82
2	10.68 (1.39)	10.18 (1.19)	2.30*	85.31 (4.18)	83.72 (4.09)	2.28*
3	12.41 (1.59)	11.53 (1.49)	3.81***	92.78 (5.26)	90.79 (7.72)	2.66**
4	13.96 (1.65)	12.88 (1.35)	4.39***	98.86 (4.40)	97.52 (3.60)	2.03*
5	14.01 (1.69)	13.93 (1.28)	0.20	101.20 (5.68)	102.19 (3.80)	-0.80
	F= 137.63* **	**F= 135.60*** **		**F= 316.93*** **	**F= 278.96*** **	

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

Table 3 presents the mean z-scores for height-for-age. Results revealed that the mean HAZ, was less than (negative value) those of NCHS for both sexes at all ages. These values ranged from

-1.39 (boys aged 2 years) to –2.32 (aged 5 years).

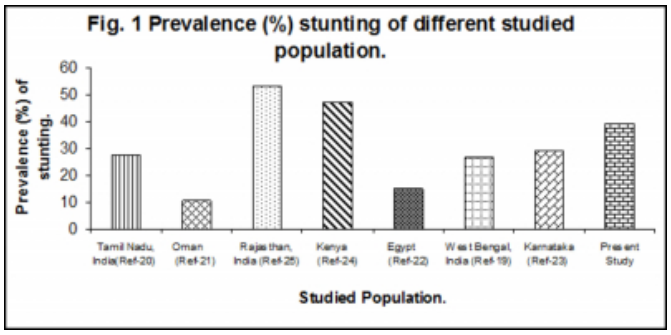
Figure 5

Table 4. Prevalence (%) of stunting by age and sex

Age	HAZ	
	Boys	Girls
1	-2.09 (1.12)	-1.57 (1.63)
2	-1.39 (1.19)	-1.49 (0.94)
3	-1.57 (1.27)	-1.69 (1.18)
4	-1.67 (0.87)	-1.71 (0.87)
5	-2.32 (1.20)	- 1.79 (0.77)
Total	**-1.71(1.16)**	**-1.64 (1.45)**

The frequency of stunting is presented in Table 4. The overall (age and sex combined) rates of stunting was 39.20 %. The rates of stunting was higher among boys (43.4%) compared with girls (35.4 %). Age specific prevalence rate of stunting was higher among 1 year children (52.05 %) compared with aged 2 years children (31.69 %). On the other hand, boys aged 5 years had higher prevalence rate of stunting (61.90 %) compared to girls (28.87 %) at 4 years age. Based on World Health Organization classification of severity of malnutrition, the overall prevalence of stunting was high (30 – 39 %)

Figure 6



DISCUSSION

Anthropometric indicators have been widely used in population-based studies to evaluate nutritional status particularly in the field of public health. Even they represent indirect measures of undernutrition that do not take into account nutrient intake or biochemical examination, their wide use is justified due to the ease of the method and its high sensitivity to nutritional alterations in a population [14]. Cohort studies, ideal for nutritional conditioning monitoring, suffer, in developing countries, from the logistic difficulties usually associated with population studies of large magnitude. In such cases, cross-sectional studies can provide relevant elements for understanding the connection between health status and physical conditions of life. These studies have the advantage of relatively low costs, and they can also provide fundamental information for the implementation of health surveillance systems and the definition of long-term health intervention strategies [15]. Undernutrition in childhood is one of the reasons behind the high child mortality rate in developing countries such as India. It is also highly detrimental for health in those children who survive to adulthood. The enhanced survival may be simply adding to the pool of under nourished children causing severe handicaps to future human resources. Most of the deaths (89%) associated with malnutrition occur in children who are only or moderately malnourished [16]. India has adopted a multi-dimensional strategy to combat these problems and to improve the nutritional status of the population [17].

The most commonly used indicators of undernutrition among children are stunting (low height for age), wasting (low weight for height) and underweight (low weight for age). Stunting is an indicator of chronic undernutrition, the result of prolonged food deprivation and/or disease or illness. This index is compared against an international reference population developed from anthropometric data collected in the United States by the NCHS [12,13]. Children whose measurements fall below –2 z-scores of the reference population median are considered undernourished, i.e. to have stunting. This index reflects distinct biological processes, and their use is necessary for determining appropriate interventions [6].

The results of the present study clearly showed that, based on WHO classification of severity of malnutrition, the overall prevalence of stunting was high (30 – 39). The rates of stunting were lower than that reported from India (48.0%) by UNICEF [18]. Results on stunting indicated that, among these children, there existed high level of chronic undernutrition due to prolonged food deprivation. The rate

of stunting was higher than those reported (26.60 %) in an earlier study [19] on ICDS children from West Bengal. Some other studies showed that prevalence of stunting lower than present study [20212223] on the other hand some studies showed higher prevalence [2425] than present study (Fig 1) .

{image:6}

Undernutrition is a function of both food deprivation and disease, which are in turn the consequences of poverty, anthropometric indices can serve only as proxies for evaluating the prevalence of undernutrition among children [26] . Efforts to reduce undernutrition, morbidity and mortality depend on reducing poverty and raising people's living standards by improving the quality of homes and by increasing access to clean drinking water and adequate sanitation. Such interventions have positive impacts on public health, and implementing these also goes some way towards fulfilling people's basic human rights [26] . However, in the context of the present study, it should be noted that ICDS offers only supplementary nutrition to young children and controlling of other related factors of undernutrition is not within its ambit.

From this study it is clear that the nutritional status of the subjects is not satisfactory and it seems that there is scope for much improvement in the form of enhanced supplementary nutrition than what is currently being offered by the ICDS scheme. This additional governmental funding is mandatory and requires political and administrative willingness to reduce the rates of stunting Unless and until such proactive measures are taken, it is unlikely, that in future, there would an appreciable decline in these rates. We also suggest that similar studies should be undertaken among children of other populations of not only West Bengal but also from other parts of India. Children of rural areas should be given priority.

The findings of this study have important implications for public health policy-makers, planners and organizations seeking to meet national and international developmental targets. Of paramount importance is to increase the amount of food supplementation given to these children.

In conclusion, our study provided evidence that these children were under acute and chronic nutritional stress in form of stunting indicating the requirement of immediate appropriate public health nutritional intervention programmes.

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References

1. Blössner M., de Onis M., & Uauy R (2006): "Estimating stunting from underweight survey data" In: Bose K. Culture, Ecology, Nutrition, Health and Disease. J Hum Ecol Special Issue Number 14. Chapter 20. Delhi: Kamla Raj Enterprise.
2. Bishnoi P., Sehgal K. & Kwatra A (2004): "Anthropometric measurements of preschool children as effected by socioeconomic factors". Asia Pacif J Clini Nutri 13 (Suppl.), S132.
3. Dolla C. K., Meshram P., Srivastava P., Karforma C., Das S., & Uike M (2005): "Nutritional status of Kodaku pre-school children in central India" J Hum Ecol; 17: 229-231.
4. Mustaphi P. & Dobe M (2005): "Positive deviance – the West Bengal experience". India J Public Health; 49: 207-213.
5. Bose K., Biswas S., Bisai S., Ganguli S., Khatun A., Mukhopadhyay A. & Bhadra M (2007): "Stunting, underweight and wasting among Integrated Child Development Services (ICDS) scheme children aged 3-5 years of Chapra, Nadia District, West Bengal, India". Matern Child Nutri ; 3: 216-221.
6. WHO. (1995): "Physical Status: the Use and Interpretation of Anthropometry". Technical Report Series no. 854. Geneva: World Health Organization.
7. Lee R.D. & Nieman D.C (2003): "Nutritional Assessment". New York: McGraw Hill.
8. Kapil U. & Pradhan R (1999): "Integrated Child Development Services scheme (ICDS) and its impact on nutritional status of children in India and recent initiatives". Indian J Public Health; 43: 21-25.
9. Bhasin S.K., Bhatia V., Kumar P. & Aggarwal O.P (2001): "Long-term nutritional effects of ICDS". Indian J Pediatri; 68: 211-216.
10. Lohman T. G., Roche A. F. & Martorell R (1988): "AnthropometricStandardization Reference Manual". Chicago: Human Kinetics Books.
11. Ulijaszek S.J. & Kerr D.A (1999): "Anthropometric measurement error and the assessment of nutritional status". Brit J Nutri; 82: 165-177.
12. Hamill P.V., Drizd T.A., Johnson C.L., Reed R.B., Roche A.F. & Moore W.M (1979): "Physical growth: National Center for Health Statistics Percentiles". Ame J Clin Nutri; 32:607-29.
13. WHO (1983): "Measuring Change in Nutritional Status". Geneva: World Health Organization
14. Post C. L. & Victoria C. G. (2001): "The low prevalence of weight-for-height deficits in Brazilian children is related to body proportions". J Nutri ; 131: 1133-1134.
15. Martorel R., Rivera J. & Kaplowitz H (1996): "Consequences of stunting in early childhood for adult body size in Guatemala". Ann Nest; 48: 85-92.
16. Pelletier DL (1994): "The relationship between child anthropometry and mortality in developing countries: implications for policy, programs and future research". J Nutr; 124: 2047-81 (S).

17. Government of India (2003): "Economic Survey (Annual Report 2002-03)". Government of India, New Delhi.
18. UNICEF. (2006) : "Report Progress for Children – A report card on nutrition".
19. Mandal G.C., Bose K., Bisai S. & Ganguli S (2008): "Undernutrition among Integrated Child Development Services (ICDS) Scheme Children aged 2-6 years of Arambag, Hooghly District, West Bengal, India: A serious public health problem". Italian J Public Health; Year 6: Vol-5, No-1, 28-33
20. Abel R., Sampathkumar V (1998) : "Tamil Nadu nutritional survey comparing children aged 0-3 years with the NCHS/CDC reference population" Indian J Pediatr; 5(4):565-72.
21. Alasfoor D., Elsayed MK., Al-Qasmi AM., Malankar P., Sheth M & Prakash N (2007) : "Protein-energy malnutrition among preschool children in Oman: results of a national survey". East Mediterr Health J ;13(5):1022-30.
22. el-Sayed N., Mohamed AG., Nofal L., Mahfouz A & Zeid HA (2001) : Malnutrition among pre-school children in Alexandria, Egypt. J Health Popul Nutr ;19(4):275-80
23. Joseph B, Rebello A, Kullu P& Raj VD (2002) : "Prevalence of malnutrition in rural Karnataka, South India: a comparison of anthropometric indicators". J Health Popul Nutr ; 20(3):239-44
24. Bloss E, Wainaina F & Bailey RC (2004) : "Prevalence and predictors of underweight, stunting, and wasting among children aged 5 and under in western Kenya". J Trop Pediatr ;50(5):260-70
25. Singh MB, Fotedar R, Lakshminarayana J & Anand PK (2006) : "Studies on the nutritional status of children aged 0-5 years in a drought-affected desert area of western Rajasthan, India". Public Health Nutr ;9(8):961-7.
26. Nandy S., Irving M., Gordon D., Subramanian S.V & Davey Smith G (2005) : "Poverty, child undernutrition and morbidity: new evidence from India". Bull World Health Organization; 83: 210-216.

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