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Association between socioeconomic factors and nutritional status of rural primary school children of Bankura district (West Bengal), India

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Abstract
The period of Primary school age, six to ten years, is marked by active growth and development. So this period is nutritionally very significant in life. Nutritional inadequacy at school age can cause growth retardation, poor mental and social development and serious health implications throughout their life. This community based, cross-sectional survey was carried out among eighty six rural school going children (five to ten years) from Bankura district, India. The socioeconomic status was assessed by modified Kuppuswami's socioeconomic scale. The anthropometric parameters such as weight, height, body mass index (BMI), mid-upper arm circumference (MUAC), head circumference (HC) and chest circumference (CC) were measured for each of the children. The nutritional status of the school children is assessed by determining the different indices of undernutrition such as underweight, stunting and wasting are determined by Z-score using the reference values of weight-for-age, height-for-age and weight-for-height of NCHS standards respectively. For measuring the overall prevalence of undernutrition, Composite Index of Anthropometric Failure (CIAF) is used. For statistical analysis student's t test, one-way ANOVA and Pearson's product moment of correlation were computed. The students were distributed in three categories according to their socioeconomic status viz. upper middle, lower middle and upper lower. The weight ($P<0.05$), BMI ($P<0.05$), MUAC ($P<0.001$), HC ($P<0.05$) and CC ($P<0.05$) reflect an upper tendency in the higher socioeconomic status but the height of the children did not show such differences. The prevalence of underweight, stunting and wasting was 29.06%, 22.09% and 13.95% respectively. The present study indicates a direct association between nutritional status with various socioeconomic factors.

Keywords: socioeconomic factor, nutritional status, rural school children, CIAF

Introduction
Children of the age group 5-14 years constitute over one-fifth of our population [1]. The period of Primary school age, six to ten years, is a transition phase between childhood and adolescence marked by active growth and development [2]. School age is nutritionally significant period in life because it is the time to store nutrients in the body for the preparation of rapid growth of adolescence [3].

Nutritional imbalance at school age can cause serious health implications throughout their life [4]. The incidence of childhood under nutrition is high around the world and it is alarming in the developing countries [5]. In developing countries, undernutrition is the major cause of ill-health and early death among children [6]. Out of 10 million child deaths each year, more than 60% death occurs from direct or indirect effect of malnutrition [7]. In India, 22% of the burden of malnutrition is among school going children [8]. About 40 % undernourished children in the world are living in developing countries like India and the main cause of it is inadequate diet in respect to their requirements [9]. High prevalence of malnutrition, especially under-nutrition, is found in developing countries despite of economic growth [10].

The problem of malnutrition has serious and long term consequences for the child and as a whole the development of a nation [11]. It causes physical and emotional suffering of children and it is a violation of a child's human rights [12]. Health problems as a result of nutritional inadequacy in primary school children are the most important determinant of poor school enrolment, unsatisfactory academic performance, high absenteeism and early dropout [13]. Moreover, undernourished children may suffer from functional impairment in adult life which leads to a reduction in productive life. Thus undernutrition affects the overall economic productivity of the society [14].

Malnutrition was caused by various intervening factors which results in formation of web of causation [15]. Different socioeconomic factors like poverty, parents' education, parents occupation, accessibility to health care services etc. are the important determinants of malnutrition in childhood [16]. Poverty, illiteracy, large family size, food insecurity, lack of proper education in women appears to be associated with poor health status of children from low socioeconomic class [17].

The information regarding the problem of undernutrition among rural children in different parts of India was reported in different studies. But there is no sufficient information about undernutrition among rural school children in Bankura District, West Bengal. With this background the present study was conducted with following objectives:

1. To assess the nutritional status of primary school children in rural area of Bankura district.
2. To find out the various socioeconomic factors associated with nutritional status of those children.

Methods

Study Location

The study is undertaken in the rural areas of Bankura district (West Bengal), India. This district is economically underdeveloped and lags far behind other districts in terms of the income index - one of the three human development indicators [18].The Ministry of Panchayati Raj, in 2006, declared Bankura as one of 250 most backward districts in India [19]. Most of the rural people of this district is small or marginal farmer and belongs to low socioeconomic class.

Participants

A total of 86 school going children aged 6-10 years were selected by systemic random sampling.

Study Design

The study is designed as a community based cross-sectional type. A semi-structured and pre-tested schedule was used to collect sociodemographic information and anthropometric data. The socioeconomic status of the children's family is assessed by modified Kuppuswami's socioeconomic scale [20]. Standard techniques [21] are used for measuring different anthropometric parameters such as weight, height, body mass index (BMI), mid-upper arm circumference (MUAC), head circumference (HC) and chest circumference (CC). The nutritional status of the school children is assessed by determining the different indices of undernutrition such as underweight, stunting and wasting are determined by Z-score using the reference values of weight-for-age, height-for-age and weight-for-height of NCHS standards respectively [22]. Overall prevalence of undernutrition is measured using Composite Index of Anthropometric Failure (CIAF) which is assessed by Svedberg's model [23] in six groups.

Statistical Analysis

The data is analyzed using MS-Excel. Means and standard deviations are computed to express data. Sex wise comparison was done using student's t test and socioeconomic group comparison was done using one way ANOVA. Pearson's Product moment correlation coefficient (r) between different socioeconomic factors and anthropometric parameters were determined. The p value of ≤ 0.05 was considered statistically significant.

Results

Total 86 children in the age group of 6-10 years were included in the present study, out of which 47 (54.65%) were boys and 39 (45.35%) were girls (Table 1). The mean and SD of the different anthropometric variables is shown in Table 1. The sex wise difference in the anthropometric parameters showed that HC of the boys were significantly higher than the girls (P<0.01) and in others parameters like weight, height, CC had higher level in the case of boys but no statistical significance was observed (P>0.05). Some other parameters like BMI and MUAC was higher among the girls. though statistically insignificant (P>0.05).

Table 1: Sex wise mean of anthropometric variables

Anthropometric Parameters	Boys	Girls
	Mean ± SD	Mean ± SD
Weight (kg)	19.83±3.44	19.50±4.82
Height (cm)	117.74±9.09	116.11±9.02
BMI (kg/m^2)	14.24±1.32	14.39±2.25
MUAC (cm)	15.67±1.59	16.18±2.24
Head circumference (cm)	49.46±1.52**	48.44±1.89
Chest circumference (cm)	55.89±3.73	55.61±5.46

Level of significance **P<0.01

Among the study group, 8 (9.30%) belonged to upper middle class, 21 (24.42%) were lower middle class and the rest 57 (66.28%) were upper lower class. The association between anthropometric variable and socioeconomic status was determined by ANOVA (Table 2). It was observed that, there is significant difference between anthropometric variables (except height) and socioeconomic status. The weight (P<0.05), BMI (P<0.05), MUAC (P<0.001), HC (P<0.05) and CC (P<0.05) shown an upper tendency in the higher socioeconomic status but the height of the children did not show such differences.

Table 2: Distribution of anthropometric variables according to different socioeconomic classes

Anthropometric parameters	Upper Middle N=8	Lower Middle N=21	Upper Lower N=57	ANOVA
Weight (kg)	23.25±7.29	19.53±3.97	19.24±3.36	3.580*
Height (cm)	120.99±11.75	116.06±9.84	116.79±8.36	0.903
BMI (kg/m^2)	15.85±4.08	14.40±1.65	14.06±1.21	3.718*
MUAC (cm)	17.80±3.54	16.44±1.83	15.44±1.41	7.298***
Head circumference (cm)	50.60±1.45	48.95±1.82	48.80±1.70	3.901*
Chest circumference (cm)	59.64±9.22	56.42±4.27	54.99±3.42	4.207*

Level of significance *P<0.05; ***P<0.001

The association between anthropometric variables and socioeconomic factors was represented in Table 3. It was observed that, there is a direct relationship between most of the anthropometric variables and different socioeconomic factors.

Table 3: Correlation between anthropometric variables and different socioeconomic factors

Anthropometric parameters	Age (years)	Father's Education	Father's Occupation	Family income (Rupees)	Socio-economic status
Weight (kg)	0.456***	0.235*	0.056	0.281**	0.215*
Height (cm)	0.710***	0.092	0.011	0.106	0.071
BMI (kg/m^2)	-0.111	0.253*	0.076	0.308**	0.251*
MUAC (cm)	0.071	0.366***	0.192	0.356***	0.359**
Head circumference (cm)	0.138	0.280**	0.189	0.230*	0.280**
Chest circumference (cm)	0.361***	0.290**	0.130	0.355***	0.294**

Level of significance *P<0.05; **P<0.01; ***P<0.001

Prevalence of malnutrition in different socioeconomic classes is shown in Table 4. Prevalence of underweight, stunting and wasting is same (12.5%) in upper middle class. In lower middle class it was 23.80%, 19.04% and 9.52% respectively and in upper lower class it was 33.33%, 24.56% and 15.78%. Overall prevalence of underweight, stunting and wasting is 29.06%, 22.09% and 13.95% respectively.

Table 4: Prevalence of malnutrition in different socioeconomic classes

Nutritional status	Upper Middle N=8	Lower Middle N=21	Upper Lower N=57	Total N=86
Underweight	1 (12.5%)	5 (23.80%)	19 (33.33%)	25 (29.06%)
Stunting	1(12.5%)	4 (19.04%)	14 (24.56%)	19 (22.09%)
Wasting	1(12.5%)	2 (9.52%)	9 (15.78%)	12 (13.95%)

Table 5: Subgroups of anthropometric failure among the study population

Group		Upper Middle N=8	Lower Middle N=21	Upper Lower N=57	Total N=86
A	(No failure)	6 (75.00%)	14 (66.67%)	31 (54.39%)	51 (59.30%)
B	(Wasting only)	1 (12.50%)	0 (0.00%)	2 (3.51%)	3 (3.49%)
C	(Wasting and underweight)	0 (0.00%)	2 (9.52%)	4 (7.02%)	6 (6.98%)
D	(Wasting, stunting & underweight)	0 (0.00%)	0 (0.00%)	3 (5.26%)	3 (3.49%)
E	(Stunting & underweight)	1 (12.50%)	2 (9.52%)	6 (10.53%)	9 (10.47%)
F	(Stunting only)	0 (0.00%)	2 (9.52%)	5 (8.77%)	7 (8.14%)
Y	(Underweight only)	0 (0.00%)	1 (4.76%)	6 (10.53%)	7 (8.14%)
	CIAF (B-Y)	2 (25.00%)	7 (33.33%)	26 (45.61%)	35 (40.70%)

CIAF showed a higher prevalence of anthropometric failure with 40.70% of the studied children (Table 5). In upper middle socioeconomic class the prevalence of anthropometric failure was 25.00%; it was 33.33% and 45.61% in lower middle class and upper lower class respectively.

Discussion

Children are the future of a nation. Their nutritional needs are immense important for the wellbeing of society [24]. Children of the age group 5-12 years need more attention for the physical and mental development [25]. Childhood malnutrition is significantly associated with adverse health [26]. But the problem of undernutrition is prevalent among children in almost all the states of our country [27]. So, for better development of future generation an understanding of the nutritional status of primary school going children is very much important.

In the present study, prevalence of underweight, stunting and wasting is 29.06%, 22.09% and 13.95% respectively amongst children. From a previous study at Bankura district it is observed that the overall prevalence of underweight, stunting and thinness were 16.9%, 17.2% and 23.1%, respectively [28]. This difference in prevalence might be due to the higher proportion of individuals belonging to lower socio economic strata in the study.

The result of the study indicates that the nutritional status of children is determined by various interrelated factors. Undernutrition is associated with different socioeconomic factor such as education of father and monthly income of the family. Child health and nutritional status is greatly influenced by the education of the family. In most of family of the rural community, the main earner and decision maker is the father and for this reason the educational level of them plays a significant role in ensuring good nutritional status of their children [29].

Conclusion

The present study indicates high prevalence of underweight, stunting and wasting among primary school children in the area of study. So it can be concluded that the nutritional status of the primary school children is poor. This study also indicates that undernourishment was significantly associated with education of father and monthly income of the family. So it can be concluded that the nutritional status of the primary school children is directly associated various socioeconomic factors.

Nutritional status of the rural school children can be improved by improving socioeconomic condition of the rural people. Enhancement of nutritional awareness by nutrition education programme and improvement of economic condition of the rural people by effective economic, social and political measures are few interventions to bring about change in nutritional status of the school children.

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