

A Study to Assess the Nutritional Status of the Government and Private School Children of South 24 Parganas, West Bengal, India

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Abstract

The present study is an attempt to understand the nutritional status of children of a Government and a private school of South 24 Parganas, West Bengal. A total of 240 participants (60 boys and 60 girls) aged 6-10 years were selected from each school. The study reflected that 84.16% of Government school and 10.83% of private school children were underweight and the boys were more underweight than the girls of Government school. A significant difference ($p < 0.001$) was found between the nutritional status of the children of the Government school and the private school. The morbidity status shows that the Government school children suffer from more diseases. This confirms the poor nutritional status of the Government school children. Therefore various nutritional intervention programs can be formulated to improve the nutritional status of the children.

Keywords: Nutritional Status; School; Anthropometry; Overweight; Underweight; Morbidity

Abbreviations: WHO: World Health Organization; BMI: Body Mass Index.

Introduction

Child under-nutrition is the major public health issue in many developing countries such as India. It also continues to be one of the principal causes of ill-health and premature mortality and morbidity among children of these countries [1-3]. Among the low and middle income countries, which accounts for considerable proportion of undernourished children in the world, the condition is found to be more worsened in case of Asian countries [4]. It is well documented that about 46% of

children under five years in South Asia is moderately or severely underweight. Half of the world's malnourished children are to be found in only three countries; India, Bangladesh and Pakistan [5]. It has been estimated by World Health Organization (WHO) that 60.0% of 10.9 million deaths that occur annually among children of less than five years of age in the developing nations are associated with under nutrition [6,3]. It has been found that developing nations accounts for 98% of the world's undernourished people and two third of the developing countries' unprivileged people lives in Bangladesh, China, Democratic Republic of Congo, Ethiopia, India, Indonesia, Pakistan and China where India and china alone accounts for 40% [7].

Children are the future of our nation and therefore their health and nutritional condition is of utmost importance. India accounts for about 40% of undernourished children in the world which contribute to high morbidity and mortality in the country [8]. Inadequate diets and infections are associated with poor nutrition [9]. In India, children living in urban slums, those belonging to the socially backward group like schedule caste and tribal communities are highly susceptible to under-nutrition. The malnourished or under-nourished status of children is worst among the Scheduled tribe communities [10]. In India, one-half of the children under five years of age, are moderately to severely malnourished. 30% of new born are significantly underweight and 60% of women are anemic [11,12]. 20% of children under five years of age suffer from wasting due to acute under nutrition, more than one third of the world's children who are wasted live in India. 43% of Indian children under five years are underweight and 48% are stunted due to chronic under nutrition [8]. India accounts for more than three out of every 10 stunted children in the world [13]. In India, the 40% of population comprises of children below the age group of 15 years of which a substantial proportion is constituted by school going children [14]. In West Bengal half of the children suffer from different types of under-nutrition [15]. A recent analysis by the maternal and child undernutrition study group estimated that stunting, severe wasting and intrauterine growth restrictions together were responsible for 2.2 million deaths annually and most of these mortalities were found in under-privileged communities [16]. Malnutrition makes the children susceptible to infections and delays recovery, thus increasing mortality and morbidity [17,12]. In the context of Indian scenario, considerable malnutrition has been found among the school going children. Several studies have accounted the variable rates of under nutrition for the school going students, showing such proportion to be higher among the children of government school [18]. Several initiatives have been taken by the government to curb the problem of under nutrition in school going children, but the increased morbidity among such children is still a matter of great concern [19].

The prevalence of malnutrition in children attending government school are high and overweight and obese children are probably found in private schools [18]. Globally, malnutrition among school age children is becoming a major public health concern. Despite the economic growth observed in developing countries, malnutrition and particularly under nutrition is still prevalent. The present study is an endeavor to assess and

compare the nutritional status and morbidity status of the school going children (government and private) of South 24 Parganas district of West Bengal.

Materials and Methods

To understand the prevalence of under nutrition among the school children, two schools have been selected. One of the schools is a private English medium school while other is a government Bengali medium school and both these schools administratively belong to Behala, South 24 Parganas district of West Bengal, India. These two schools have been purposefully selected owing to the fact that there are certain differences between the backgrounds of children attending the schools. Despite of being located proximal to each other, it has been seen that, there lies a subtle difference between the socio-economic backgrounds of the children attending the school. The parents of the private school have to pay high monthly fees unlike in case of government school, where no such fees has to be paid by the students. Also, there is provision of mid-meal programme in the government school. Information about the fees structure of respective school has been taken from the teachers of the concerned school.

The present study, has selected children from age group 6-10 years from both the schools. Altogether, 240 study participants were selected out of which 120 (60 boys and 60 girls) belongs to each school and 12 boys and 12 girls in each age category.

In the present context, data were collected chiefly through anthropometric methods. Here two measurements, height and weight have been taken following a standard procedure [20]. Height has been measured with the help of Martin's Anthropometer nearest to 0.1 cm. For this, the subject is made to stand erect on the floor asking them to take the shoes off and arms suspended on either side of the trunk. Keeping the head oriented in eye-ear plane, a moveable rod is kept at the back of the subject such that the cross bar touches tenderly the highest point of the head. The values are then noted down. The weights of the children are measured using portable weighing scale nearest to 0.5 kg. The subject is made of stand erect with bare feet on the weighing machine and the pointer is adjusted to zero mark by using the knob fitted on the instrument.

The nutritional status was assessed from Body Mass Index (BMI). The standard formula for computation of BMI is weight (in kg)/height (in m²) [21].

Percentile Range	Weight status category
Less than 5 th percentile	Underweight
5 th percentile to less than 85 th percentile	Healthy Weight
85 th percentile to less than 95 th percentile	Overweight
Equal to or greater than 95 th percentile	Obese

Table 1: Cut off used for BMI classification*.

*https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.htm [22].

Result

Table 2 shows the socio-demographic characteristics among the students of private fee-paying school and government non-fee-paying school. The education status of mother and father is better in case of private schools children than that of the government schools children. The occupation of father and mother of the private school children is mostly service and that of the Government school children is business and wage labor. Therefore, the monthly family income of the private school children is higher (Rs.20,000/-) than the Government school children.

Sl. No	Socio-Demographic Characteristics	Private School Children No. (%)	Government School Children No. (%)
1	Education of mother:		
	Non-literate	-	55(45.83)
	Primary education	-	39(32.5)
	Secondary education	62(51.66)	26(21.66)
2	Graduate and Above	58(48.33)	-
	Education of father:		
	Non-literate	-	54(45.0)
	Primary education	-	37(30.83)
3	Secondary education	67(55.83)	29(24.16)
	iv. Graduate and Above	53(51.66)	-
	Occupation of mother:		
	Government service	45(40.0)	-
	Private service	40(33.33)	-
4	Business	19(15.83)	23(19.16)
	Home maker	12(10.0)	82(68.33)
	v. Others	4(3.33)	15(12.5)
	Occupation of father:		
	Government service	67(55.83)	-
5	Private service	45(40.0)	11(9.16)
	Business	8(6.66)	34(28.33)
	Wage Labor	-	35(29.16)
	Driver Others	-	40(33.33)
	Family income:		
< 5000/-	-	56(46.66)	
5000-10000/-	3(2.5)	34(28.33)	
10000-20000/-	43(35.83)	15(12.5)	
> 20000/-	74(61.66)	5(4.16)	

Table 2: Socio-demographic characteristics of the private and government school children.

Table 3 presents the distribution of boys and girls according to their age and sex of the private and government school. Total 60 boys and 60 girls were selected from each school where there are 12 boys and 12

girls taken from each age group having in total 24 students accounting for (20.00%) out of total sample size of 120 for each school.

Private School			
Age in years	Boys (%)	Girls (%)	Total (%)
6	12(10.00)	12(10.00)	24(20.00)
7	12(10.00)	12(10.00)	24(20.00)
8	12(10.00)	12(10.00)	24(20.00)
9	12(10.00)	12(10.00)	24(20.00)
10	12(10.00)	12(10.00)	24(20.00)
Total	60(50.00)	60(50.00)	120(100.00)
Government School			
Age in years	Boys (%)	Girls (%)	Total (%)
6	12(10.00)	12(10.00)	24(20.00)
7	12(10.00)	12(10.00)	24(20.00)
8	12(10.00)	12(10.00)	24(20.00)
9	12(10.00)	12(10.00)	24(20.00)
10	12(10.00)	12(10.00)	24(20.00)
Total	60(50.00)	60(50.00)	120(100.00)

Table 3: Distribution of boys and girls according to their age and sex of the private and government school.

In table 4, the mean of the heights increases slightly over age, thereby suggesting the growth over the years. Likewise the mean weight increases also slightly over the years also suggesting the growth over the years. But a slight variation is observed in mean height and weights

among the different ages of boys and girls. The mean height and mean weight of the private school children (both boys and girls) were slightly more than the government school children for all ages.

Private School				
Age	Sex	No.	Height	Weight
			Mean (cm)±SD	Mean (kg)±SD
6	Boys	12	118.83±4.21	24.83±4.80
	Girls	12	118.35±4.36	23.91±4.75
7	Boys	12	123.13±6.45	27.25±4.49
	Girls	12	125.51±5.35	27.25±5.62
8	Boys	12	128.31±6.93	29.58±7.39
	Girls	12	127.15±2.73	30.33±7.99
9	Boys	12	134.29±5.64	36.33±7.83
	Girls	12	139.34±4.69	36.91±13.09
10	Boys	12	124.52±8.06	24.5±5.12
	Girls	12	131.09±4.95	30.75±6.32
Government School				
Age	Sex	No.	Height	Weight
			Mean (cm)±SD	Mean (kg)±SD
6	Boys	12	114.86±3.69	17.66±1.92
	Girls	12	113.61±4.83	18.25±2.00
7	Boys	12	121.20±6.34	19.16±2.88
	Girls	12	121.58±4.88	23.66±5.83
8	Boys	12	124.82±6.10	22.33±3.79
	Girls	12	125.15±5.52	23.58±6.68
9	Boys	12	132.43±6.40	26.66±7.01
	Girls	12	128.39±8.35	23.16±4.60
10	Boys	12	130.75±5.74	24.83±4.93
	Girls	12	135.48±7.00	4.93±29.91

Table 4: The mean and SD of height and weight of private school & government school children.

Table 5 shows that the boys are more underweight than the girls among the Government school children while it is not so among the private school children. No

significant difference ($p>0.05$) was observed between both the sexes of the Government and Private school.

Age in years	Underweight		Healthy		Overweight		Obese	
	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)
Private School								
6	2 (16.6)	2 (16.6)	10 (83.3)	10 (83.3)	-	-	-	-
7	-	1 (8.3)	12 (100.0)	11 (91.6)	-	-	-	-
8	1 (8.3)	1 (8.3)	11 (91.6)	11 (91.6)	-	-	-	-
9	1 (8.3)	2 (16.6)	11 (91.6)	10 (83.3)	-	-	-	-
10	2 (16.6)	1 (8.3)	10 (83.3)	11 (91.6)	-	-	-	-
Total	6 (5.00)	7 (5.83)	54 (45.00)	53 (44.16)				
Government school								
6	12 (100.0)	12 (100.0)	-	-	-	-	-	-
7	11 (91.6)	9 (75.0)	1 (8.3)	3 (25.0)	-	-	-	-
8	10 (83.3)	9 (75.0)	2 (16.6)	3 (25.0)	-	-	-	-
9	9 (75.0)	10 (83.3)	3 (25.0)	2 (16.6)	-	-	-	-
10	10 (83.3)	9 (75.0)	2 (16.6)	3 (25.0)	-	-	-	-
Total	52 (43.33)	49 (40.83)	8 (6.66)	11 (9.16)				

Table 5: Nutritional status (based on BMI) of the private and government school children according to their age and sex. *No significant difference was observed between the boys and girls.

Table 6 compares the nutritional status of the children of two schools (private and Government) from the prevalence of underweight, healthy, overweight and obese children based on BMI classification. Majority of the private school children are healthy weight (89.16%)

while majority of the Government school children are underweight (84.16%). A significant difference ($p<0.001$) was found between the nutritional status of the children of the Government school and the private school. There is no prevalence in overweight and obese children.

Age in years	Private school				Government school			
	UW	Healthy	OW	Obese	UW	Healthy	OW	Obese
6	4(3.33)	20(16.66)	-	-	24(20.00)	-	-	-
7	1(0.83)	23(19.16)	-	-	20(16.66)	4(3.33)	-	-
8	2(1.66)	22(18.33)	-	-	19(15.83)	5(4.16)	-	-
9	3(2.5)	21(17.5)	-	-	19(15.83)	5(4.16)	-	-
10	3(2.5)	21(17.5)	-	-	19(15.83)	5(4.16)	-	-
Total	13† (10.83)	107† -89.16	-	-	101† (84.16)	19† (15.83)	-	-

Table 6: Nutritional status (based on BMI) of the private and Government school children (sex combined).

*Figs in parentheses are percentages.

† $p<0.001$.

Table 7 represent the morbidity status among the students of private fee-paying school and government non fee-paying school. Majority of the government school children are suffering from diseases like Fever, Diarrhea,

Vomiting, Malaria and majority of the private school children are suffering from only fever. The most common occurrence disease is fever in both the private and government school children.

Sl. No	Morbidity Status	Private School No. (%)	Government School No. (%)
	Fever	16(13.33)	23(19.16)
	Diarrhea	8(6.66)	13(10.83)
	Digestive disorder	6(5.0)	10(8.33)
	Vomiting	9(7.5)	16(13.33)
	Upper respiratory infection	6(5.0)	9(7.5)
	Skin infection	7(5.83)	7(5.83)
	Mouth ulcer	-	-
	Malaria	2(1.6))	17(14.16)
	Measles	-	9(7.5)
	Jaundice	5(4.16)	9(7.5)

Table 7: Morbidity status among the private and Government school children.

Table 8 shows the occurrence of diseases among the private and government school children. Frequent occurrence of fever (13.33%) and digestive disorder (6.66%) is observed among the private school children.

Among the government school children frequent occurrence of fever (11.66%), digestive disorder (6.66%), and malaria (6.66%) is observed.

Sl. No	Disease	Frequent occurrence		Rare occurrence		No occurrence	
		No	%	No	%	No	%
	Private School						
	Fever	16	13.33	7	5.83	6	5
	Diarrhea	2	1.66	6	5	2	1.66
	Digestive disorder	8	6.66	6	5	1	0.83
	Vomiting	4	3.33	9	7.5	5	4.16
	Upper respiratory infection	4	3.33	6	5	9	7.5
	Skin infection	2	1.66	5	4.16	7	5.83
	Mouth ulcer	-	-	-	-	-	-
	Malaria	1	0.83	2	1.66	4	4.16
	Measles	-	-	-	-	-	-
	Jaundice	1	0.83	5	4.16	2	1.66
	Government School						
	Fever	14	11.66	2	1.66	1	0.83
	Diarrhea	3	2.5	8	6.66	6	5
	Digestive disorder	8	6.66	6	5	3	2.5
	Vomiting	7	5.83	3	2.5	5	4.16
	Upper respiratory infection	4	3.33	3	2.5	3	2.5
	Skin infection	1	0.83	4	3.33	1	0.83
	Mouth ulcer	-	-	-	-	-	-
	Malaria	8	6.66	6	5	3	2.5
	Measles	4	3.33	2	1.66	5	4.16
	Jaundice	1	0.83	2	1.66	2	1.66

Table 8: Prevalence of morbidity among the private and Government school children.

*Figures in parentheses are percentages.

Discussion

Under nutrition is acknowledged to play a major role in premature deaths of millions of children aged below

five years in developing countries [2]. Malnutrition makes a child susceptible to infections and delays recovery, thus increasing mortality and morbidity [23]. Malnutrition in children especially under five years of age remains one of

the most serious health problems in developing countries [24,12]. It has been reported that India has the highest incidence of childhood malnutrition in the world and reports from World Bank of year 2005 has indicated that 47% of children below the age of five years were malnourished [25,12]. Presently, several researches are being conducted among the children especially for the children under five years pertaining to their assessment of nutritional status and it has been reported from the studies that though the time trend of under nourished children in India is showing a decline pattern, but the pace of reduction is not matching the criterion set by United Nations Development Project (UNDP) under millennium development goals for India [26,27]. All these, therefore, warrants the increasing need to address the issue of under-nutrition in children in upcoming researches. The present study devotes attention on school going children of a private and a government school of South 24 Parganas where nutritional status has been evaluated.

A cross sectional study conducted among 1566 children aged 6 to 12 years from a government and private school in Mysore, Karnataka, reflected significantly higher rates of underweight for the government school than the private school children which is in concordance with the present study [28]. A considerably higher rates underweight has further been mentioned in studies from Hisar district of Haryana among rural school going children aged seven to nine years [29]; study from Vellore city conducted among children aged between seven to 11 years [30]; study among 935 school children from Gulbarga district of Karnataka [31]. These are in accordance with the present study which shows that the proportion of under nutrition is comparatively higher among the children attending government school than the private school. Prevalence of underweight is found to be much in concordance to an earlier study done among children under five years of age from Rohtak district of Haryana [27]. Underweight, on the other hand, in case of Government school in present study is slightly higher than a study from rural Kashmir where children of age 05 to 14 years were selected and also higher than the study conducted in Navinagar Mumbai [32,33].

The present study shows the significant difference in nutritional status for the boys and girls in two school. At each group it is evident that the proportion of boys and girls underweight is more in case of government school while percentage of healthy children is relatively more in case of private school for both boys and girls. The

frequency of occurrence of underweight girls is more in case of private school and the overall percentage of underweight is more in boys in case of government school. On the other hand the boys of private school are more-healthy than girls and in opposite the healthy boys and girls were equal in number in case of government school.

A comparative study between the private and government school in Mysore, Karnataka demonstrate the occurrence of 32.5% of underweight students in government school while it is 18.2% in private school. The prevalence of underweight is more in the government school of Mysore [28]. This finding corroborates with the present findings. The prevalence of under-nutrition in Bangalore government school is 58.2% [14].

The overall prevalence of healthy children is significantly higher in case of private school accounting for 84.16% while the incidences of overall healthy student accounts for 15.83% in case of government school. In case of private school more boys is healthy i.e. 49.8% but the percentage is 66.5% in case of government school. In case of private school more girls is healthy i.e. 41.4% but the percentage is 66.5% in case of government school.

Thus the overall prevalence of healthy children is more in case of private school perhaps reflecting the affluence condition and owing to higher socio-economic background, the children might have access to food stuffs high in calorie. Healthy is found to be slightly higher in boys than in girls in both school. The difference could be attributable to nutritional intake and changes in lifestyle pattern as well [28]. In the present study is also found to be underweight prevalence 10.83% in private school and 84.16% in government school. The overall healthy prevalence 89.16% in private school and 15.83% in government school. There is no prevalence in overweight and obese children. The prevalence of underweight is more in government school and the prevalence of healthy children is more in private school. Chowdhury, et al. [34] from Puruliya of West Bengal reported underweight 33.7%, whereas Mitra, et al. [10] from Chhattisgarh reported prevalence of underweight 90%. Medhi GK, et al. [35] from the study among the workers of Assam shown the percentage of underweight is 42.3% while the percentage of underweight school children in a Urdu Government school is found to be 52.4% respectively [14].

The use of BMI is an effective tool for assessing nutritional status and for identifying the vulnerable

segments of a population, which later can be helpful for framing public health policies and for administering governmental programmes in this regard.

Conclusion

The given study is limited by its small sample size and has concentrated attention solely on evaluating the nutritional status through certain anthropometric measurements. Despite of these limitations, the study provides useful insights on assessing the nutritional status in the backdrop of urban setting of South 24 Parganas district of West Bengal. The present cross sectional which is based on comparative analysis of nutritional status of children aged between 06 years to 10 years in a government and a private school, has well explicated that the prevalence of under nutrition to be higher among the children of government school.

The nutritional status of the private school children is better than government school children. This may be due to better socio-economic status of the private school children. The nutritional assessment on the basis of Body Mass Index shows prevalence of healthy children is more in private school i.e. 89.16% and less in government school i.e. 15.83%. The prevalence of under-nutrition is more in government school than that of private school. The percentages of underweight in government school are 84.16% and in private school is 10.83%. The private school children are affluent enough to take high quality food stuffs, they take high calorie and lifestyle variability owing to change the dietary habits as well as other activities which are responsible for increased healthy weight among them. The government school children suffers from more disease because of their low nutritional intake and their lifestyle variability, also their lower socio-demographic status is a result of this condition. Thus the present study highlights that poor nutritional status affects the morbidity status of the children and opens a podium for further research.

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