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Assessment of dietary practices among school going children (7-12 years) of selected private and govt. schools

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Abstract
The objective of the study was to assess the nutritional status of 7-12 years school going children and to determine the nutrient intake of children in comparison with RDA. A total of 120 school going children were selected from one Govt. and two private schools of Bhubaneswar city, Odisha. Data on dietary intake was collected by using 24 hours recall method. Heights and weights were measured. From the study it was found that the prevalence of thinness was 58.33% in Govt. school children whereas 28.33% of private school children were overweight and 11.67% were obese. The school going children of Govt. school were found to be stunted 6.67%. Consumption of all the nutrients by Govt. school children was deficit from the Recommended Dietary Allowances (RDA) but in case of private school children, consumption of all the nutrients was excess from the Recommended Dietary Allowances except vitamin-A. The consumption of costly food items such as egg, fish, meat, milk and milk products, fruits and nuts were more by Govt. school children as compared to private school children. It is concluded that poor anthropometric indices, undernutrition in Govt. school children may be due to lower intake of food and nutrients than recommended. In general, negligible consumption of green leafy vegetables and minimal consumption of other vegetables and fruits due to which their diet deficient in vitamin-A were observed in the children of both schools.

Keywords: school going children, anthropometrics and nutrient intakes

Introduction
Children being the future wealth of the nation are considered as important segment of the population. Their survival, protection, and development are the prerequisite for the future development of the society. The school age is the active growing phase of childhood and dynamic period of growth when children undergo physical, mental, emotional and social changes. During this age, children establish habits of their choice in eating, selecting hobbies, sports and performing exercise that stick with them for their entire lives. The availability of quality food, affordability of family, choice of children etc. are the critical factors contributing undernourishment and malnutrition. The prevalence of malnutrition and obesity is significantly higher in India than many other developed and developing countries. Malnutrition is one of the principal public health problems affecting large sections of populations especially children in developing countries (Begum and Nessa, 2008) [1]. Healthy habits of children minimize the risks of many chronic diseases but, physically inactive children with poor eating habits are vulnerable to adverse health conditions during forthcoming adulthood. Good nutrition is an essential component of healthy life which determines health, physical and mental growth. But, diet is one of the prime determinants of health and nutritional status. Assessment of food quality and quantity through dietary surveys are therefore essential for school children
In order to educate the school children and their parents for changing food habits, it is the needed to collect information on nutritional habits involving source of foods (e.g., mid day meal in schools etc.), associated factors of food consumption and feeding style are the prerequisites (Patrick and Theresa, 2004). Therefore, the present study has been designed to generate the information on school going children of 7-12 years of age of Bhubaneswar city with respect to the aforesaid characters with the objectives to study:
*   The nutritional status of school going children by anthropometry
*   The nutrient intake of children in comparison with RDA

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Materials and Methods

The study was under taken in Bhubaneswar city. A total of 120 school going children (7-12 years) were selected randomly. Three schools were selected as the study areas namely Rajbhawan Project U.P school (Gopabandhu square), D.A.V Public school (unit-8) and Steward School (CRPF Square) in Bhubaneswar City.

Survey Schedule: A semi-structured questionnaire was used to elicit the desired information regarding socio-demographic variables of a child such as age, sex, religion, height, weight, date of birth, type of diet, frequency of consumption of food group etc.

Anthropometric Measurement: Nutritional status of all the selected children was assessed by measuring body heights (cm) and weights (kg).

Weight: A bath room scale weighing machine was used for taking weight measurement of girls and boys. Every time before taking measurement zero error was checked and data were recorded.

Height: The child was made to stand with feet flat together against the wall with legs straight, arms at sides, and shoulders at level and removes their footwear. Mark was made where the bottom of the head piece meets the wall. Then by using a measuring tape. Height was measured from the base on the floor to the wall to the nearest 0.1 centimetre.

Anthropometric assessment for Undernutrition

Anthropometric assessment was conducted to identify children with moderate to severe undernutrition. Two indices were taken as a measure of chronic undernutrition i.e. BMI-for –age (thinness) and height -for -age (stunted) with reference to WHO standards, 2007.

Diet survey: In recalling foods consumed by the child in the past 24-hours, asked to indicate the time and source of the food (whether purchased, home-made, or school-meal) for each eating event. Standardised cups were used to estimate quantities of foods consumed. From the raw ingredients amounts, the nutritive value of each food item was calculated by using the nutritive values given by C. Gopalan (1989) [5]. It was compared with Recommended Dietary Allowances (RDA) of nutrients for those of specific age groups. It was recorded in terms of cereals & millets, pulses and legumes, green leafy vegetables, roots and tubers, other vegetables, fruits, milk and milk products, egg, fish, meat, sugar and jaggery, nuts and oil seeds. Nutrient value of calorie, protein, CHO, fat, calcium, iron and vitamin-A were computed by using the nutritive value of Indian foods (C. Gopalan, 1989) [5]. The RDA value (2010) was also taken into consideration for comparing the values.

Results and Discussion

Data obtained was analyzed with respect to the objectives of the present study. A total of 120 children aged 7-12years were selected. Out of total children 50.0% were taken from Govt. school and 50.0% from private school.

Table 1: Socio-demographic profile of the school going children

N=120

Sl. No.	Variables	Categories	Govt. School (n=60)	Private School (n=60)
01	Age	7-9yr.	30 (50.0)	30 (50.0)
		10-11 yr.	30 (50.0)	30 (50.0)
02	Type of family	Nuclear	21 (35.0)	42 (70.0)
		Joint	39 (65.0)	18 (30.0)
03	Caste	General	7 (11.67)	53 (88.34)
		OBC	39 (65.0)	2 (3.33)
		SC	10 (16.67)	5 (8.33)
		ST	4 (6.66)	-
04	Socio-economic status	Upper	-	21 (35.0)
		Upper middle	2 (3.33)	39 (65.0)
		Lower middle	21 (35.0)	-
		Upper lower	37 (61.67)	-

Figures in the parenthesis indicate percent value

The socio-demographic profile of study children between age group of 7-12 years of age was presented in Table-1. The majority children (70.0%) from private school belonged to nuclear family whereas children (65.0%) from Govt. school were from joint family system. Out of total children from private school, majority were from general caste category (88.34%) followed by Sc (8.33%) and OBS (3.33%). In Govt. school majority children from OBC (65.0%) followed by SC (16.67%), general (11.67%) and ST category (6.66%). The all children of private school belonged to upper (35.0%) and upper middle class (65.0%) category, but in Govt. school children were from upper middle (3.33%), lower middle (35.0%) and upper lower (61.67%).

Anthropometric measurement of children

Table 2: Nutritional status according to BMI-for-age

N=120

Nutritional Status	WHO Indicator	Govt. School (n=60)	Private School (n=60)
Thinness	≤ -2S.D	35 (58.33)	-
Normal	≥ 1S.D to -2S.D	25 (41.67)	36 (60.0)
Overweight	≥ +1S.D	-	17 (28.33)
Obesity	≥ +2S.D	-	7 (11.67)

Figures in the parenthesis indicate percent value

The nutritional status of school children according to BMI-for-age was presented in Table-2. The school going children of Govt. school were found to be thinness and normal group i.e. 58.33% and 41.67% respectively. There were no children found in overweight and obesity group of Govt. school. But in private school 60.0 per cent children were in the normal group followed by overweight (28.33%) and obese (11.67%). Thinness was not found in children from private school. But study conducted in the Western Region of Nepal, among 786 students, 26% of the students were found to be undernourished (Joshi. *et al*., 2011) [8]. On the other hand, the private school children were estimated 19.9% for under-nourished, 10.2% for overweight and 5.7% for obese categories (Ganganahalli. *et al*., 2016) [3].

Table 3: Nutritional status according to height-for-age

N=120

Nutritional Status	WHO Indicator	Govt. School (n=60)	Private School (n=60)
Stunting	≤ -2S.D	4 (6.67)	-
Normal	≥ -2S.D	56 (93.33)	60 (100.0)

Figures in the parenthesis indicate percent value

The nutritional status of school children according to height-for-age was presented in Table-3. The school going children of Govt. school were found to be stunted and normal group i.e. 6.67% and 93.33% respectively. But in private school all children (100.0%) were in the normal group and stunting was not found in children from private school. Out of 253 children, 28.8% were in underweight, 19.4% stunting and 17.8% in wasting in Panchakula city, Haryana (Talwar. *et al*., 2015) [12]. Further a study was carried out amongst 558 school children aged 3-16 years in Ghaziabad city reported that 59(10.5%) were stunted (Gar*g. et al*., 2015) [4]. Since, because of low income, their children are compelled to avail low quality nutrition and remain in different categories of under nourishment. This is the reason of observing more malnutrition children in Govt. school. In contrast, the children of private school are from medium and high income family with different life style and food habits.

Table 4: Age wise anthropometric measurement of Govt. and private school children

N=120

Age group	Parameters	Govt. School (n=60)	Private School (n=60)	t-value
7-9 yrs.	Height (cm.)	121.53±6.68	125.5±8.54	2.002**
	Weight (kg.)	24.8±3.75	35.93±5.68	8.946**
10-12yrs.	Height (cm.)	137.43±9.40	138..63±12.10	0.428(NS)
	Weight (kg.)	33.33±6.11	42.4±7.93	4.955**

Figures was presented as (Mean± SD)
'**'denotes significant variation (*p*<0.01) between columns

The mean anthropometric measurement of Govt. and private school children were presented in Table-4. Under the age group of 7-9 years, the mean height (121.53±6.68 &

(125.5±8.54) and weight (24.8±3.75and 35.93±5.68) of Govt. and private school children varied significantly (*p*<0.01) where higher values were measured for private school children than those for Govt. school. Similar results with significant variation (*p*<0.01) were observed for weight (33.33±6.11 and 42.4±7.93) in Govt. and private school children leaving the variation of height non-significant under the age group of 10-12 years. The mean height and weight of 7-10 years of school going children of Allahabad district were significantly (*p*<0.05%) less than the National Centre for Health Statistics standards (Handa. *et al*., 2008) [6]. The findings of the present study resemble with the aforesaid reports. Observation of high values for height and weight in private school children may be attributed to higher nutritional status of the family based on economic background of private school parents. On the other hand, the general lower economic standard of the parents of Govt. school, may not maintain the recommended nutritional standard for their children for which the growth factors are adversely affected.

Diet and nutrient intakes
Table-5 revealed that all the children (100%) of both schools consumed cereals on daily basis Govt. school children consumed pulses daily (31.67%) and 4-6 times in a week (23.33%) whereas 61.67% and 38.33% children from Govt. school consumed pulses daily and 4-6 times in a week respectively. No children of Govt. and private school consumed green leafy vegetables, egg, fish and meat on daily basis. Intake of pulses, root and tuber, other vegetables are consumed more daily by private school children as compared to Govt. school children. Majority of private school children consumed milk and milk products daily but in very few children of Govt. school consumed milk and milk products daily. The low consumption of costly food items such as egg, fish, meat, fruits and nuts 4-6 times in a week by Govt. school children as compared to private school children. Low consumption of high quality protein from meat, eggs, margarines, fish and oils and African leafy vegetables by the school-going children in Machakos district of was the reason for poor anthropometric and nutritional status (David *et al.,* 2012) [2].

Table 5: Food consumption pattern by school children

N=120

Food Groups	Daily		4-6times/wk.		Fortnightly		Occasionally	
	Govt. school f (%)	Private school f (%)	Govt. school f (%)	Private school f (%)	Govt. school f (%)	Private school f (%)	Govt. school f (%)	Private school f (%)
Cereals	60 (100.0)	60 (100.0)	-	-	-	-	-	-
Pulses	19 (31.67)	37 (61.67)	41 (23.33)	23 (38.33)	-	-	-	-
Green leafy vegetables	-	-	7 (11.67)	12 (20.0)	30 (50.0)	26 (43.33)	23 (38.33)	22 (36.67)
Root and tubers	30 (50.0)	49 (81.67)	27 (45.0)	7 (11.67)	27 (45.0)	7 (11.67)	-	-
Other vegetables	18 (30.0)	44 (73.33)	23 (38.33)	12 (20.0)	16 (26.67)	4 (6.67)	3 (5.0)	-
Fruits	-	23 (38.33)	4 (6.66)	18 (30.0)	18 (30.0)	28 (46.67)	28 (46.67)	-
Milk and milk product	10 (16.67)	50 (83.33)	-	-	18 (30.0)	10 (16.67)	32 (53.33)	-
Egg	-	-	4 (6.67)	38 (63.33)	48 (80.0)	22 (36.67)	8 (13.33)	-
Fish	-	-	25 (41.66)	37 (61.67)	28 (46.67)	21 (35.0)	7 (11.67)	2 (3.33)
Meat	-	-	6 (10.0)	21 (35.0)	36 (60.0)	33 (55.0)	18 (30.0)	6 (10.0)
Sugar & jaggery	30 (50.0)	33 (55.0)	23 (38.33)	22 (36.67)	7 (11.67)	5 (8.33)	-	-
Nuts & oil seeds	-	16 (26.67)	-	17 (28.33)	15 (25.0)	24 (40.0)	45 (75.0)	3 (5.0)

Around half of the children from both Govt. and private school consumed sugar and jaggery daily. The consumption

of cereals, pulses and fat based foods in excess and vegetables and fruits in deficient manner were the reason for obesity in

school going children of Western Maharashtra (Kamble *et al*., 2016) [9]. However, all the school going children belonging to Trans Yamuna Region of Allahabad consumed cereals, pulses, sugar, fats and oils daily (Perween., 2018).

Private school children (7-12 yrs), the nutrient intake was significantly higher (*p*<0.01) than those of Govt. school children. But, in case of Govt. school children, it was less than the RDA value. The intake of energy, protein, CHO, fat, calcium, iron and vitamin-A by the children of Govt. school was deficit with respect to RDA of ICMR. On the other hand, the consumption of energy, protein, CHO, fat, calcium and iron by private school children were adequate and Vitamin-A was deficit basing on RDA of ICMR. The mean nutrient

intakes per day as well as how much this varies from the RDA can be seen in the Table -6, 7 8 and 9. The intake of protein, energy, calcium, iron, carotene, thiamine, riboflavin and niacin was lower and fat and ascorbic acid was more than the RDA in 7-9 years of school going children of Himachal Pradesh (Soni. *et al*., 2014) [11]. The obese school going children in Western Maharashtra were observed for excess energy and protein and deficit vitamins and minerals consumption (Kamble. *et al*, 2016) [9]. Consumption of all the nutrients by majority of the students (10-12 years) was comparatively less than the recommended dietary allowances (Handa. *et al*., 2008) [6].

Table 6: Average daily nutrient intake* of children (7-9 yr.) boys

N=30

Nutrients intake	ICMR RDA value	Children from Govt. School (n=15)	Children from Private School (n=15)	t-value
Energy (Kcl)	1690	1543.23±114.44	1906.73±301.36	4.367**
Protein (gm)	29.5	26.70±3.0	33.70±3.05	6.333**
CHO (gm)	253	238.79±47.22	286.93±18.26	3.394**
Fat (gm)	30	27.16±3.14	36.30±3.37	7.669**
Calcium (mg)	600	510.36±85.78	630.36±43.08	4.841**
Iron (mg)	16	14.17±2.22	16.50±2.15	3.373**
Vitamin-A (µg)	4800	2556.79±615.09	4195.34±595.78	7.410**

Figures was presented as (Mean± SD)
'**'denotes significant variation (*p*<0.01) between columns
'*' denotes Nutritive value of Indian foods

Table 7: Average daily nutrient intake* of children (7-9 yr.) girls

N=30

Nutrients intake	ICMR RDA value	Children from Govt. School (n=15)	Children from Private School (n=15)	t-value
Energy (Kcl)	1690	1536.56±86.02	1883.23±141.88	8.091**
Protein (gm)	29.5	26.71±2.23	33.37±1.90	9.365**
CHO (gm)	253	240.13±45.72	284.61±27.39	3.232**
Fat (gm)	30	27.09±3.04	35.97±2.34	8.943**
Calcium (mg)	600	512.79±87.12	627.02±68.11	4.177**
Iron (mg)	16	14.25±1.95	16.19±2.02	2.601**
Vitamin-A (µg)	4800	2541.74±651.52	4128.48±682.19	6.676**

Figures was presented as (Mean± SD)
'**'denotes significant variation (*p*<0.01) between columns
'*' denotes Nutritive value of Indian foods

Table 8: Average daily nutrient intake* of children (10-12 yr.) boys

N=30

Nutrients intake	ICMR RDA value	Children from Govt. School (n=15)	Children from Private School (n=15)	t-value
Energy (Kcl)	2190	1992.90±134.67	2420.40±119.16	9.207**
Protein (gm)	39.9	36.29±2.57	45.85±2.57	10.165**
CHO (gm)	328.5	286.11±53.78	370.83±17.74	5.793**
Fat (gm)	35	31.87±11.41	41.61±3.37	3.169**
Calcium (mg)	800	683.83±119.51	824.30±121.01	3.198**
Iron (mg)	21	18.65±2.40	21.71±1.23	4.384**
Vitamin-A (µg)	4800	2510.12±657.42	3963.45±669.53	5.998**

Figures was presented as (Mean± SD)
'**'denotes significant variation (*p*<0.01) between columns
'*' denotes Nutritive value of Indian foods

Table 9: Average daily nutrient intake* of children (10-12 yr.) girls

N=30

Nutrients intake	ICMR RDA value	Children from Govt. School (n=30)	Children from Private School (n=30)	t-value
Energy (Kcl)	2010	1828.65±80.19	2268.48±123.69	11.555**
Protein (gm)	40.4	36.11±3.33	45.04±3.65	6.996**
CHO (gm)	301.5	285.16±37.96	340.76±31.84	4.345**
Fat (gm)	35	31.96±5.23	41.96±4.24	5.746**
Calcium (mg)	800	685.00±124.44	821.70±100.59	3.308**
Iron (mg)	27	23.49±3.42	27.84±4.78	2.868**
Vitamin-A (µg)	4800	2508.57±969.02	4071.14±716.68	5.021**

Figures was presented as (Mean± SD)
'**'denotes significant variation ($p<0.01$) between columns
'*' denotes Nutritive value of Indian foods

The children of private school take comparatively better quality food than those in Govt. school. Therefore, in the present study adequate rate of energy, protein, CHO, fat, calcium, and iron consumption was observed in private school children. But, deficit of vitamin-A by may be due to less incorporation of fruits and vegetables rich in vitamin-A in the diet.

Conclusion
To sum up all these observations among 7-12 year old-school going children of Bhubaneswar city on anthropometry status of the children revealed that out of total children observed, the prevalence of thinness was 58.33% in Govt. school children whereas 28.33% of private school children were overweight and 11.67% were obese. The school going children of Govt. school were found to be stunted 6.67%. Under the age group of 7-9 years, the mean height and weight of Govt. and private school children varied significantly ($p<0.01$) where higher values were measured for private school children than those for Govt. school. Similar results with significant variation ($p<0.01$) were observed for weight in Govt. and private school children leaving the variation of height non-significant under the age group of 10-12 years. Govt. school children were found undernourished (thinness and stunting) than the children of private school because the children studying in Govt. school belong to lower socio-economic condition whereas private school children belong to upper socio-economic condition, they consumed fatty foods and were found normal to obese. In general negligible consumption of green leafy vegetables and minimal consumption of other vegetables and fruits due to which their diet deficient in vitamin-A were observed in the children of both schools.

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