

ORIGINAL ARTICLE

A comparative study of mid-day meal beneficiaries and private school attendeesMadhavi Bhargava¹, S D Kandpal², Pradeep Aggarwal³, H Sati⁴¹Post Graduate 3rd Year, ²Professor, ³Associate Professor, ⁴Statistician, Dept of Community Medicine, Himalayan Institute of Medical Sciences, SRH University, Swami Ram Nagar, Dehradun- 248 140, Uttarakhand

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Abstract

Background: India is undergoing a rapid demographic transition accompanied by an epidemiologic and nutritional transition. The nutritional status of school-going children who form a major section of the population, can give an indication of the changing trends in nutritional profile of the population. According to Planning Commission report, 2010, Mid Day Meal (MDM) Program has been successful in addressing classroom hunger and the objective of social equity in government school attendees. **Aims & Objectives:** To study the pattern of school lunch intake and nutritional status in private and government school-going children of district Dehradun. **Material & Methods:** This was an observational cross-sectional study in district Dehradun in government and private schools, with participants from class 1 to 12. A 24-hour dietary recall was done to measure caloric intake. Height and weight were measured using Microtoise (accuracy 0.1cm) and digital weighing machine (Omron Model: HN286, accuracy 100 gm). Statistical analysis was done using SPSS, version 22. Nutritional status was classified using WHO cut-offs and analyzed using AnthroPlus Software. Student t-test was used to compare caloric intake of subgroups. Association between nutritional status and other variables was assessed using Chi-squared test. **Results:** Using WHO cut-offs, the proportion of thin children was 5.4% in private school and 21.5% in MDM beneficiaries of government schools. The proportion of children who were overweight was 27.7% in private schools and 3.6% in government schools ($p < 0.05$). The caloric content of school lunch was 271 Kcal in private school attendees and 375 Kcal in MDM beneficiaries. Proportion of children who skipped school lunch increased as they progressed in higher classes, and this proportion was greater in students of government schools beyond class VIII. **Conclusion:** The study highlights the need for more large scale nutritional surveys with school lunch in focus.

Key Words

Mid-day meal; School-going children; school lunch; nutritional status

Introduction

India is going through both development and nutrition transition along with demographic and epidemiologic transition [1]. There has been rapid urbanization, internal migration and changes in food consumption patterns. There are reports from Indian subcontinent which indicate a trend of increasing prevalence of overweight among children and adolescents during last decade [2] co-existing with a high prevalence of undernutrition [3]. With school children spending more than 6 hours a day in school, school lunch becomes an important determinant of

overall nutrition in these children. The mid-day meal (MDM) program was started by government of India with the vision to improve nutrition in school children and boost school enrolment [4, 5]. The impact on enrolment level was not found to be uniformly significant [6]. The mid day meal program was first initiated in 1963 as a part of Applied Nutrition Program in Karnataka for school children 6-11 of age with the assistance of the Co-operative for American Relief Everywhere (CARE) [7]. This was later extended throughout the country and is now provided to school children upto class VIII in all government schools. According to Planning

Commission report, 2010, MDM Program has been successful in addressing classroom hunger and the objective of social equity in government school attendees [8]. The private school children, on the other hand usually bring their own lunch.

The present study was conducted to assess the nutritional status of school-going children, their pattern of lunch intake in school, and compare the MDM and home cooked lunch.

Aims & Objectives

1. To study the pattern of school lunch intake in school-going children of district Dehradun with reference to their 24-hour caloric intake.
2. To study the nutritional status of mid-day meal beneficiaries of government schools and private school attendees.

Material and Methods

The present cross sectional observational study was conducted by Department of Community Medicine in urban and rural schools of district Dehradun, from May 2013 to February 2014. Both government and private schools were selected by purposive sampling depending on the willingness of school authority for participation in the study. Within each school, participants were enrolled by simple random sampling from class 1 to 12. A total of 1266 participants were enrolled in the study. A written informed consent was taken from the parents and verbal assent was taken from the participants themselves. A 24-hour dietary recall was used to measure caloric intake of the participants. Caloric intake of food taken as lunch at school was also calculated separately. Height and weight were measured using Microtoise (accuracy upto 0.1cm) and digital weighing machine (Omron® Digital Model: HN 286, accuracy upto 100 gms). The weighing machine was calibrated using known weights at monthly interval during the study period. Weight was done after removing heavy clothing, belts and shoes. Height was measured after making the child stand without shoes on a flat surface with back, head, shoulder blades, buttocks and heels touching the wall and head in Frankfurt plane [9]. Body Mass Index (BMI) was calculated using the formula: weight in kilogram/ height in meter².

WHO Growth Standards, 2007 [10] and BMI-for-age z-score (BAZ) were used in this study for defining cut-offs for nutritional status.

Thinness, overweight and obesity of all age groups were defined in the following terms: Underweight: <

-2SD, Normal: > -2SD and < +1SD, Overweight: > +1SD, Obese: > +2SD.

Statistical analysis was done using SPSS, version 22. Nutritional status was assessed using WHO AnthroPlus Software [11]. Student t-test was used to compare caloric intake of subgroups and nutritional categories were compared using Chi-squared test. A p-value of less than 0.05 was taken as significant. The study was done with prior approval of Institutional Ethics Committee

Results

There were a total of 1266 participants in the study, of these 632 were from urban and 634 were from rural schools, with 616 boys and 650 girls. There were 312 (24.6%) participants were from urban private schools, 320 (25.4%) were from urban government schools, 317 (25%) from rural private schools and 317 (25%) were from rural government schools. The participants were divided in four broad age categories: 6-9 years; 9-12 years; 12-15 years and 15-17 years in each of the subgroup.

Participants were enquired about their routine pattern of lunch intake at school. [Table 1](#) shows that 22.7% study participants did not routinely eat lunch at school. A higher proportion of children in urban schools, about 25.9% children (Private: 19.2%; Government: 32.5%) did not eat lunch at school compared to those in rural schools, 19.4% participants (Private: 14.8%; Government: 24.3%), and this difference was statistically significant ($p < 0.05$). MDM is available in government schools upto class VIII in both urban and rural schools. Overall, 10.4% did not eat the MDM that was made available to them in the school. Many children in urban government schools did not eat the lunch provided by the school (17.5%). The reasons quoted by such children included, "did not like the taste, not hungry on that day, did not bring the serving plate, etc". On the other hand the number of MDM beneficiaries who skipped lunch was only 1.5% in rural counterparts.

[Table 2](#) shows the comparison of school lunch intake stratified by age. It was found that there was no difference in proportion of children eating lunch at school in both private schools and government schools in 6 to 12 years of age. In the age group 12-15 years, a higher proportion of private school attendees skipped school lunch; 56.6% participants reported eating lunch at school in comparison to 80% in MDM beneficiaries. This proportion of

children skipping lunch at school further increased in the age group 15-17 years. Similarly, government school participants in older age groups who do not receive MDM also start skipping school lunch (58.7%). In these age-groups, more private school participants were skipping school lunch compared to government school attendees and this difference was found to be statistically significant.

Caloric intake was calculated using tables of nutritive value of Indian Foods [12]. [Table 3](#) shows the comparison of caloric intake, during school lunch in both MDM beneficiaries and private school attendees in urban and rural schools. It was found that mean caloric intake during the day was higher in private school attendees (1662.2 Kcal; ± 426.8) as compared to MDM beneficiaries from government schools (1413.3 Kcal; ± 388.0). On the other hand, caloric intake during school lunch was lower in private school attendees (271.6 Kcal; ± 117.8) as compared to MDM beneficiaries (375.6 Kcal; ± 166.7). These differences in caloric intake was found to be statistically significant ($p < 0.05$).

[Table 4](#) shows that using WHO cut-offs, overall prevalence of thinness in the study was 13.6%, that of overweight and obesity was 15.6% (of which 5.4% were obese). There was no statistically significant association between pattern of eating lunch at school and nutritional status. But on exploring the association of nutritional status with the type of lunch (MDM vs. personal lunch), the proportion of thin children in MDM beneficiaries from government schools was 21.5%, which was 7.4% in private school attendees. It was also found that proportion of overweight children eating personal lunch brought from home was 24.9% (of which 8.9% were obese). This difference in nutritional status with regard to type of school lunch was found to be statistically significant ($p < 0.001$).

Discussion

In our study of 1266 urban and rural school going children we found a significant prevalence of both overweight and obesity and undernutrition. While previous studies have compared children across the urban and rural strata, our study has provided comparisons across socioeconomic status (private schools represent upper socio-economic status and government represent lower socio-economic status), which is a major determinant of childhood nutrition. Children of government schools who were beneficiaries of the MDM scheme had significantly

lower total caloric intakes and had higher proportions of thinness compared to private school attendees, and the mid-day meal formed more than a quarter of their total 24 hour caloric intake. The study found that the acceptance of the MDM was very high in rural school going children whereas a significant of urban government schools did not partake of the MDM due to various reasons. A disturbing pattern of skipping a lunch at school among older children was an important finding of the study. Our study highlights the importance of the school lunch in the overall nutrition of children attending government schools.

While there are studies that review the mid-day meal program in India [13], there are not many studies in India that compare school lunches of private and government schools. Our study explored the caloric intake in school lunch; MDM and personal lunch and overall 24-hour caloric intake.

The mean caloric intake in mid-day meal was higher (375.6 Kcal) as compared to that in personal lunch (271.6 Kcal); the difference being statistically significant. According to Supreme Court order, 2001, the school meal is supposed to provide 300 Kcal and 8-10 grams of protein [5]. Our calculations of the school lunch provided by the MDM suggest that the MDM provides caloric intakes in line with recommendations of the SC.

In a study by Laxmaiah et al, the calories provided by MDM were 303 Kcal (14). According to a study by Afridi, 2010, daily intake of nutrients increased by 49% to 100% when 24-hour recall of school day and non-school day were compared [15].

When mean 24- hour caloric intake was compared in both private school attendees and MDM beneficiaries, the mean intake in former was more (1662.2 Kcal) and which was less (1413.3 Kcal) in MDM beneficiaries from government schools. This difference in mean 24 hour caloric intake of private lunch consumers vs. MDM beneficiaries was significant ($p < 0.001$).

The association of skipping of school lunch in both groups with nutritional status was not found to be statistically significant ($p > 0.05$). On comparing nutritional status with the type of school lunch, it was found that more MDM beneficiaries were thin as compared to private school attendees. But on the other hand, the prevalence of overweight and obesity was more in children who brought their own personal lunch (16% and 8.9%) as compared to those who ate the mid-day meal (2.8% and 0.8%). There

are two possible explanations to this association. Firstly, it could be due to confounding effect of socio-economic status, as children who eat their personal lunch are also the children who are studying in private school which represents upper socio-economic status. The other possibility is that the mid-day meal is cooked fresh and less likely to be high in calories and oil as compared to lunch boxes brought from home which are likely to have calorie dense preparation methods to improve taste even when eaten cold (eg: sandwiches, noodles, puris, etc).

Conclusion

Our study shows evidence of a nutritional transition that is underway in India. The midday meal is a significant source of caloric intake among government school attendees who otherwise suffer higher prevalence of undernutrition. Efforts are required to secure a balanced and nutritious diet for older children who are not included in MDM and who tend to skip lunch at school. Universal and nutritious MDM is an important step towards allaying undernutrition in school age children which is significant as suggested by this study. At the same time, a balanced home cooked lunch, which does not contribute to rising proportion of overweight and obesity in children of upper socio-economic class, requires equal attention. Our study points to the need for larger surveys of dietary intake in school going children and qualitative research which can explore their eating practices and their implications for nutrition during this important developmental period.

Recommendation

Clear guidelines for school lunch, whether MDM or personal lunch in private schools, which includes healthy foods and is devoid of pre-packed junk food are essential to balance the double burden of undernutrition and over nutrition.

Limitation of the study

Purposive sampling in the study does not allow generalizations for all school going children of the region.

Relevance of the study

India is a country undergoing nutritional transition facing a double burden of undernutrition and over nutrition. Positive food habits developed during childhood can go a long way in preventing non-communicable diseases in adulthood.

Authors Contribution

MB: Concept, Study Design, Literature review, Data collection and analysis. SDK and PA: Concept, drafting, critical inputs and finalization of manuscript. HS: Expert inputs in analysis

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Tables

TABLE 1 PATTERN OF LUNCH INTAKE AT SCHOOL IN STUDY PARTICIPANTS

	Urban (N=632)		Rural (N=634)		Total
	Pvt	Govt	Pvt	Govt	
Lunch at School					
Yes	252 (80.8)	216 (67.5)	270 (85.2)	241(76.0)	979 (77.3)
No	60 (19.2)	104 (32.5)	47 (14.8)	76 (24.3)	287 (22.7)
Government sponsored Mid-day meal					
		Urban Govt	Rural Govt	Total	
Available (Up to class 8)		246 (76.9)	196 (61.8)	442 (69.4)	
Available but do not eat		43 (17.5% of 246)	3 (1.5% of 196)	46 (10.4% of 442)	

Figures in parenthesis indicate percentages; Pvt = Private; Govt = Government

TABLE 2 COMPARISON OF SCHOOL LUNCH INTAKE STRATIFIED BY AGE-GROUP

Age Group (years)	School Lunch	Pvt (Personal Lunch)#	Govt(MDM)*	p value(Chi-square)
6-9	Yes	171 (95.5)	177 (94.7)	p>0.05
	No	8 (4.5)	10 (5.3)	
9-12	Yes	158 (90.8)	146 (91.3)	p>0.05
	No	16 (9.2)	14 (8.8)	
12-15	Yes	99 (56.6)	125 (80.1)	p<0.001
	No	76 (43.4)	31 (19.9)	
15-17	Yes	29 (26.6)	74 (58.7)	p<0.001
	No	80 (73.4)	52 (41.3)	
Total (1266)		637	629	

Figures in parenthesis indicate percentages; Pvt = Private and Govt = Government # Personal Lunch: Lunch brought from home; * MDM: Mid-day meal

TABLE 3 CALORIC INTAKE: SCHOOL LUNCH AND 24-HOUR RECALL

	N	Mean (Kcal)	SD	t-test
School Lunch Calories				
MDM Beneficiaries	457	375.6	± 166.7	<0.001
Private School Attendees	522	271.6	± 117.8	
24-Hour Caloric Intake				
MDM Beneficiaries	457	1413.3	± 388.0	<0.001
Private School Attendees	522	1662.2	± 426.8	

MDM: Mid-day meal; SD: Standard Deviation; Kcal: Kilo Calories

TABLE 4 SCHOOL LUNCH AND NUTRITIONAL STATUS OF THE PARTICIPANTS

	Nutritional Status (According to BAZ)			Total N= 1266	p value (Chi-square)
	Normal -2SD to +1SD	Thin <-2SD	Overweight & Obese >+1SD		
Lunch intake in school					
Yes	692 (70.7)	128 (13.1)	159 (16.2)	979	p>0.05
No	205 (71.4)	44 (15.3)	38 (13.2)	287	
Total	897 (70.9)	172 (13.6)	197 (15.6)	1266	
Type of school lunch: MDM vs. Private Lunch					
Mid-day meal	297 (75.0)	85 (21.5)	14 (3.5)	396	p<0.001
Personal lunch	395 (67.8)	43 (7.4)	145 (24.9)	583	
Total	692 (70.7)	128 (13.1)	159 (16.2)	979	

Figures in parenthesis indicate percentages; BAZ = BMI-for-age z-scores