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Research Article

Comparison of School Going Children Dietary Practices with My Pyramid Guidelines

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Abstract

Background: In Pakistan a total of 1.4 million children suffering from malnutrition, whereas 31% are underweight, 42% are stunted and 17.7% are suffering from severe wasting. The nutritional status of the population is not satisfactory and improper diet is affecting people of all ages especially children. This study will help to assess the nutritional status of school-going children with respect to their eating habits.

Objective: To evaluate the dietary practices of school-going children based on my pyramid guidelines in Pakistan

Methodology: The population of this study involved school-going children aged 8 - 14 years. The sample size was 385 children. The study was conducted in various private and public sector schools of Lahore city. Questionnaire involved questions about demographic features, anthropometric measurements, games usually played by students, 24-hour dietary recall and food frequency table including of food items from all food groups and their consumption by students about 40 food items were added in food frequency table. For the measurement of weight of school-going children weight machine and for wrist circumference and height inches tape was used.

Results: This study included 51% of males and 49% female students with mean age of 11 years. Results showed that from bread and cereal food group, 44% children consumed white-bread and 66% consumed local bread (roti) on daily basis while 61% children never consumed porridge. 30% children consumed egg and 12.5% consumed chicken on daily basis, 35% children never consumed red meat, 42.5% never consumed fish. 24% children consumed milk daily. 25% children never consumed green leafy vegetables and 40% consumed fresh fruits daily. Consumption of confectionery was 38.0% on daily basis. Daily consumption of fizzy drinks was 33%. Average total estimated caloric intake showed that only 29% children were consuming 2000 calories, 39% were consuming 1500 calories and 32% of children were consuming less than 1000 calories per day.

Conclusion: It is concluded that the dietary practices of school-going children of age 8 - 14 years are variable and unhealthy eating pattern is very common. A large number of students don't consume any vegetables and fruits according to the recommendations leading to micronutrient deficiencies and many other nutritional consequences. It has been found that some children in our study skip their lunch. The study showed that a large number of them are not eaten vegetables and fruits according to the recommendations which lead to hidden hunger and many other nutritional consequences.

Keywords: *Malnutrition; My Pyramid; Food Frequency; School Going Children, Body Mass Index*

Abbreviations

MUAC: Mid Upper Arm Circumference; FFQ: Food Frequency Questionnaire; BMI: Body Mass Index

Introduction

Chronic non-communicable diseases are mainly associated with lifestyle and dietary eating habits [1,2]. Dietary eating habits developed during childhood and it plays a significant role in chronic disease occurrences in adulthood [3-5]. Nutrition knowledge is very important to promote healthy eating habits [6]. But nutrition knowledge alone is not sufficient, positive attitude to change eating habits is also required [7-9]. There are some factors that affect food choices i.e. taste, time, availability, cost, meal patterns, culture, peer group, family and stress, attitude, mood, knowledge, belief and television food advertisements. School going children spend more time away from home and they are highly influenced by media and their friends [10-12]. Advertisements that are mostly televised are processed foods. Processed foods are convenient foods that are high in fat and sugar with little or no micronutrient content [13]. In current era, food concept has changed it is not only taken as to increase growth and fulfill hunger but it used as source of pleasure [14]. Mostly, in developing countries children have poor eating habits due to less knowledge and misconceptions regarding healthy foods [5,15]. So, there is greater need to educate parents and children to attain healthy eating habits and lifestyles.

School-based nutrition education must be given to the children because it is best way to improve nutrition knowledge regarding healthy eating foods. It also enhanced cognitive development and learning abilities of children [16,17]. Children spend most of their time at school. School-based nutrition education has more significant effect on children's eating habits. This is very important to concern that school environment should be friendly and conducive to learning and parents should take care what children actually eating from school canteens. School going children are more attractive toward junk food, snacks and soft drinks over healthy foods like fruits and vegetables. The meal has been replaced with snacks. Children who take snacks frequently except meal then it lead toward severe micronutrient deficiencies. Snacks are not considered a healthy diet because it does not contain much amount of micronutrients as fruits and vegetables contain [18]. In Pakistan, the dietary habits of school-going children are very poor. One study was conducted in school going children of Karachi in which the prevalence of overweight children was 70% and underweight children 63% [19].

Undernutrition and overnutrition both come under the category of malnutrition. According to National Nutrition Survey 2018, the prevalence of wasting in Pakistan under five years of age is 17.7%. While every four children out of ten have been reported as stunted. Similarly, 28.9% children are reported underweight and 9.5% overweight. Therefore, the present study was conducted to compare the dietary practices of school-going children with My Pyramid guidelines [20].

Aim of the Study

The main aim was to correct lifestyle, eating habits and prevent occurrences of non-communicable diseases.

Methodology

Study design

A descriptive cross-sectional survey was conducted at different private and government schools of Lahore, Pakistan by using both qualitative and quantitative research methods. Both research methods include structured interviews with children regarding their father and mother occupation, dietary habits, dietary intake and anthropometric measurements. This study was conducted on school-going children of 8 - 14 years of age.

Sample size

The sample size of the study was calculated by keeping the confidence level at 95% (1.96), margin of error at 5% and assumes a population proportion is 0.5, by keeping in mind the above assumptions the sample size calculated was 384 children (Mukherjee., *et al*. 2008):

$n = z^2 x \acute{\rho} (1- \acute{\rho})/e^2$

$n = 1.96^2 x 0.5 (1 - 0.5)/0.05^2$

$= 384.16$

Study site

The study was conducted in Lahore Grammar School, American Lycetuff School, Saint Peter School Anarkali, Government Salem Model School and Government Islamic High School. The study population was school-going children.

Sampling frame

The present study was conducted to analyze the nutritional status of school-going children age 8 - 14 years.

Study oversight

The study was approved by the Department of Food Science and Human Nutrition, University of Veterinary and Animal Sciences, Lahore. In order to ensure transparency upholding of the highest ethical standards.

Tools for data collection

A semi-structured questionnaire was developed and data regarding children's demographic features, anthropometric measurements and dietary recall was documented. Study topic was introduced and explained to children and interview technique was used to fill the questionnaire Age of the children was documented by using school records. Father and mother occupation was documented and the social group of the children was determined by interviewing the children. The social group was categorized into four groups i.e., the proletariat, lower Bourgeoisie, bourgeoisie oligarchy. Anthropometric measurements were taken by using standard approaches, weight and height readings were taken using a battery-powered digital Seca 803 weighing scale and Seca 216 portable stadiometer. Bodyweight and height was measured without any footwear. The 24-hour dietary recall was taken and the food frequency table was added in the questionnaire which consisted of about 40 different food items from all the five food groups mentioned in my pyramid.

Data collection

After a pre-testing and training of data enumerators we used face to face interviews to administer the questionnaire to the students and teachers alike. A more dominant number of children of 8 - 14 years of age group was present in classes 4 to 8. The inclusion criteria of our study were children age 8 - 14 years and exclusion criteria were children and parents who are not willing to participate in the study. Questionnaires administered to students asked information about their personal characteristics (sex, age, area of residence and religion) and dietary habits (number of meals intake per day and whether or not children receive money for food on school days. Anthropometric measurements were taken using standard procedures. Primary outcomes of the study are eating patterns of school-going children and secondary outcomes are growth parameters (weight and height).

Parameters measured

Growth patterns height and weight measured, BMI was calculated and Dietary intake was assessed by using a food frequency questionnaire based on locally available foods of Pakistan and 24-Hour Dietary recall.

Ethical approval

Prior ethical approval was taken from all the school principal of the study and also permission was granted from parents of the children in a parent-teacher meeting. Ethical approval was obtained from the Institutional Review Committee for Biomedical Research of University of Veterinary and Animal Sciences, Lahore was also obtained.

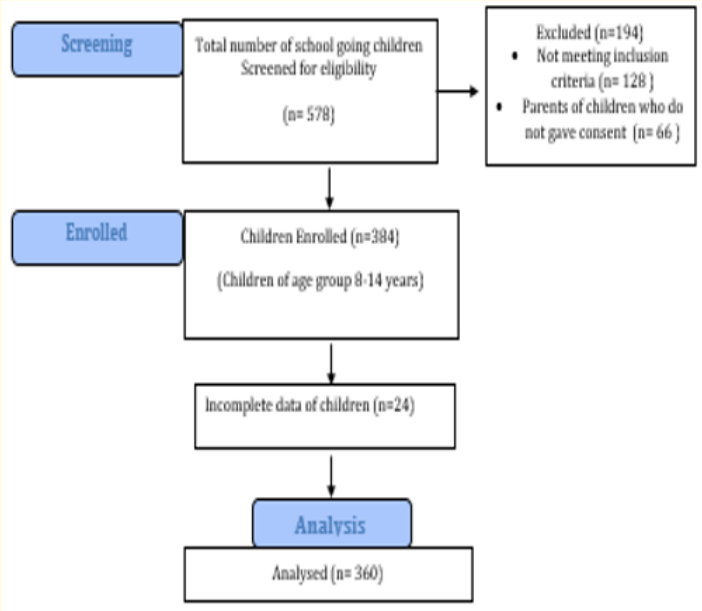

Figure 1

Results and Discussion

A total number of 385 students of the mean age 11 ± 1 were registered in the study. Out of 385 students, 51% students were male and 49% students were female. Most of the student's i.e. 55.5% belonged to the middle class and only a small fraction of 1.5% students belonged to upper class.

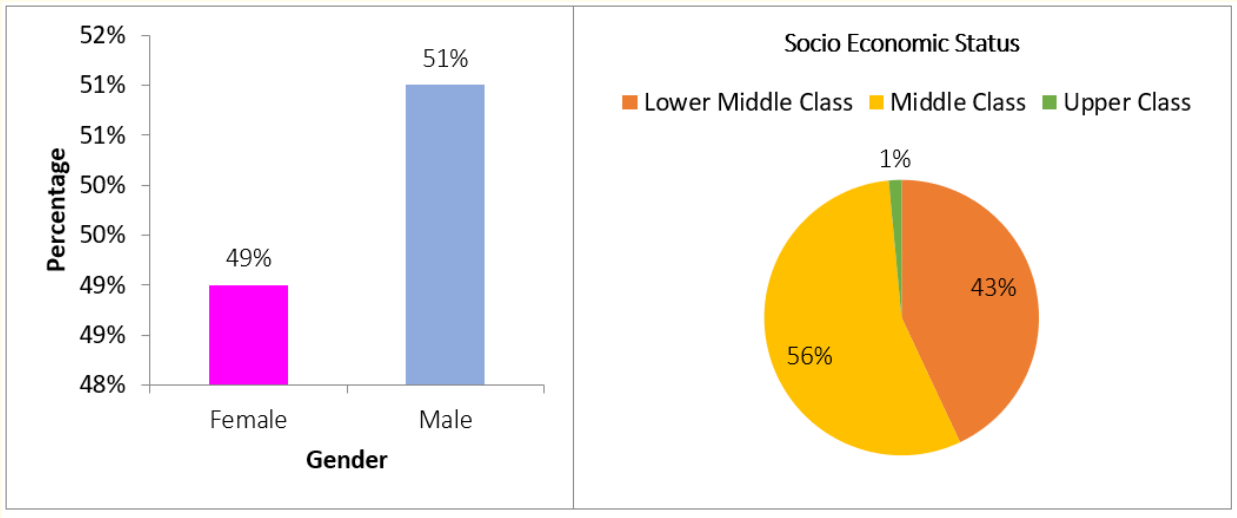

Figure 2

The body mass index (BMI) of school-going students is given in table 1. Most of the students have low body mass index (BMI) and a fair fraction of students are in obese and overweight class. This could be due to the imbalanced dietary habits of children. The reasons behind underweight children could be many, it can be due to less educated mothers, socioeconomic status [19,21], less affection, care from parents and food insecurity could be the contributing factors towards underweight children [22]. Like other developing countries Pakistan is also suffering from double burden malnutrition, childhood obesity can be witnessed in Pakistani schools. There are several studies supporting that less-educated parents have malnourished children, the parenting factor increases the possibility of childhood obesity by 2 - 3 folds [23,24].

BMI Category	Percentage of Students (%)
Underweight	40.5
Normal	37.9
Overweight	13.7
Obese	7.9

Table 1: *Data shows that 40.5% of school-going children are underweight, 37.9% students have normal 13.7% falls in overweight category and 7.9% students are obese.*

Food frequency of school-going children and comparison of My Pyramid guidelines and average intake from food groups is shown in figure 3 and table 2. This represents that most of the students take a larger portion of their calories from bread, rice and cereal groups. Consumption of fats, oils and sweets is more than the guidelines of My Pyramid. The average intake of fruits is critically lower than the recommendations. The intake of proteins is also in less. Socioeconomic status and parents' education is lending a hand towards imbalanced eating patterns of children. Rich families mostly like to dine out and buy their children oily junk foods [25]. The same goes with parents education, well-educated parents give their children nutrient-rich foods instead of calorie-dense foods, intake of fruits and vegetables is seen to be more in children who have educated parents [26]. Another factor contributing to dietary imbalance is children eat more instead of eating better at schools. The dietary diversity of school-going children is least to zero and they are strongly affected by their surroundings and friends circle [27]. Nutrition education programs, self-care practices and physical activity plans can increase nutrition knowledge of students henceforth their nutritional status also gets better [28].

Food Groups	My Pyramid	Average Intake (Servings)
Bread, cereals, rice and pasta	6 - 11	15 ± 4
Meat, poultry, dry beans, fish, nuts, eggs	2 - 3	2 ± 1.7
Fruits	2 - 4	1 ± 2.6
Vegetables	3 - 5	4 ± 1.5
Milk, yogurt and cheese group	2 - 3	1 ± 1.8
Fats, oils and sweets	Use Sparingly	8 ± 3.5

Table 2: *Shows the difference between the guidelines of My Pyramid and the average intake of food groups by school-going children.*

In school students, choices are more declined towards sweets like candies, cupcakes, etc. as compared to fruits and vegetables. In comparison with milk fizzy drinks are more preferred by children as shown in figure 3. Many participating factors can cause increased consumption of fizzy drinks, sweets, etc. A few of the factors could be similar intake practices of parents or elder siblings, taste fondness of soft drinks and sweets, easy access and availability of these food items at schools and homes, colorful television commercials [29,30]. Foods mostly available in school canteens or cafeterias are sweets, candies, carbonated beverages, cookies, etc. [31]

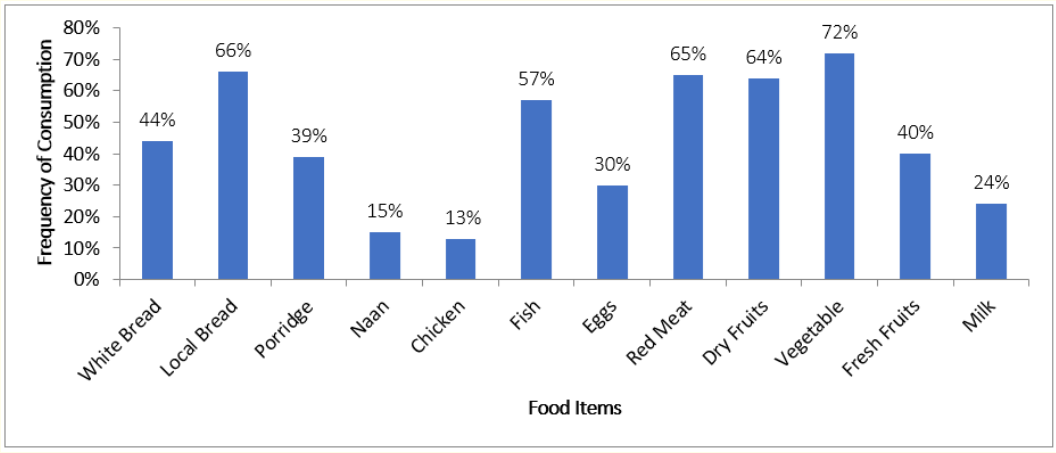

Figure 3: *Shows the frequency (%) of different food items consumed by school-going children.*

Calorie Intake (Kcal)	Percentage (%)
< 1000	32%
1500	39%
2000	29%

Table 3: *Shows average caloric intake in Kcal of school going children.*

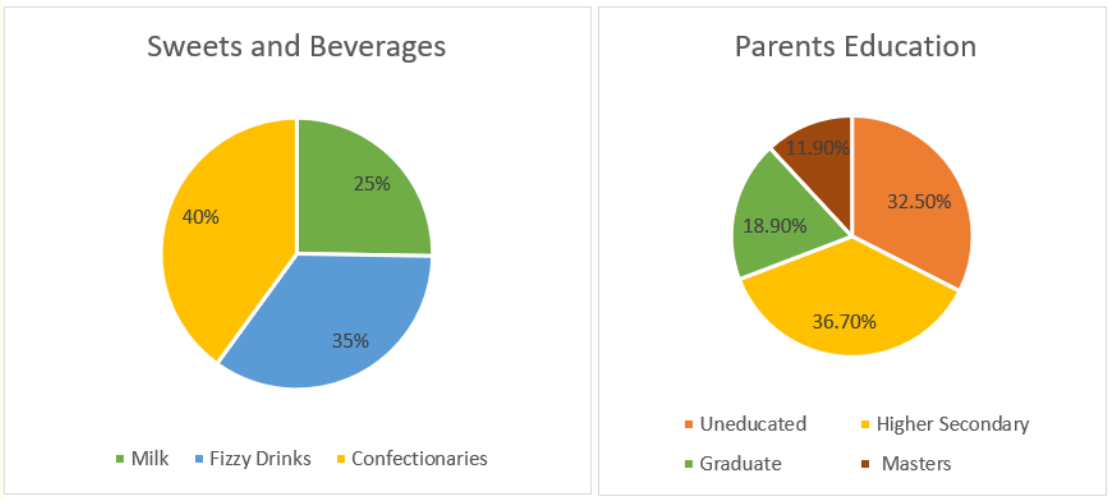

Figure 4: *Shows the intake frequency (%) of Milk, fizzy drinks and confectionaries and shows the education of parents.*

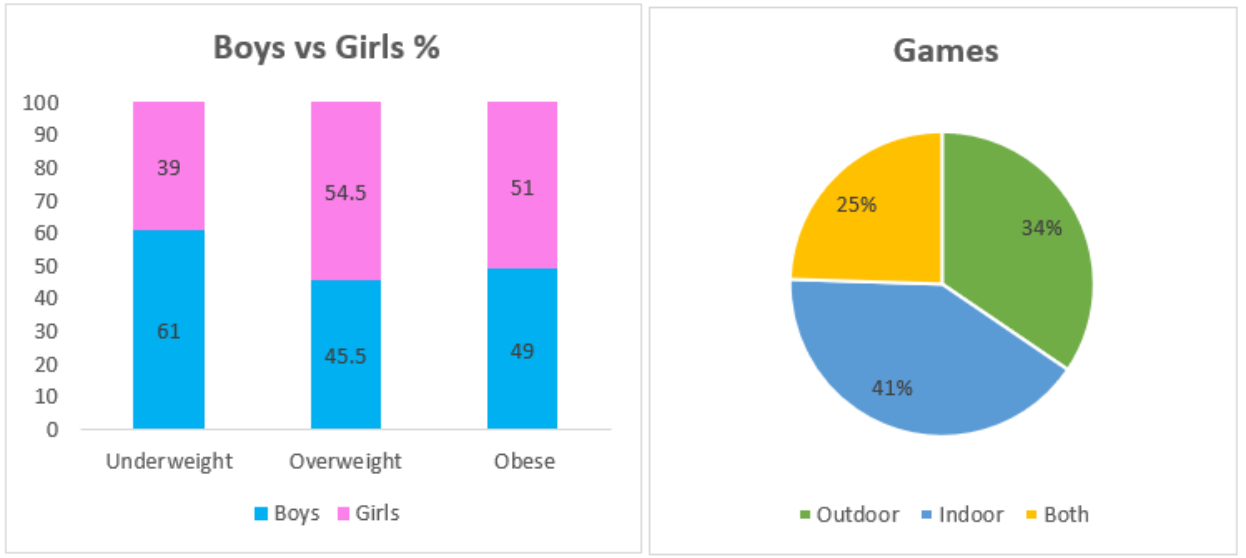

Figure 5: *Shows the fraction of boys and girls and shows playing games percentage %.*

Our findings on the prevalence of overweight in school-aged children are 13.7% which are in line with the results reported by Sandjaja., *et al*. who found that 14.6% of children are overweight. From 40.5% of underweight children figure 5 reveals that more boys than girls are underweight the reason may be that boys spend more time playing outdoors games than girls, possibly causing they are being underweight [21]. By contrast, the incidence of overweight in girls is slightly higher than that in boys as shown in figure 5. The present study confirms that the nutrient intake of both boys and girls is significantly lower. By estimating from FFQ the intake of fruits, vegetables and milk are very low. The prevalence of underweight is high among children of less-educated parents. Similarly, a study undertaken in Ethiopia by Wolde., *et al*. [32] found that less-educated parents are more likely to have underweight children as compared with the children of highly educated parents. Our study reveals that children of less-educated parents infrequently eat breakfast. Low levels of education levels negatively impact the parents' capacity to show health-related behavior provide high-quality care, including ensuring that children eat healthy breakfast and providing balanced diet with variety of foods. Overweight is prevalent among children of highly educated parents. Studies conducted in Turkey [25] and Malaysia [38], which are somehow similar to Pakistan, show that the incidence of overweight is higher among children of highly educated parents the finding of these studies in line with our study. Highly educated parents can obtain high earnings; thus, they buying more packaged or processed foods these ready to use foods have high content of fats and sugars. The food consumption of high wages families is high. Another possible explanation is that dine out to eat out rather than at home and foods served in restaurants typically contain increased amount of calories and fat and supplied with fewer vegetables and fruits [33]. The majority of children of highly educated mothers spend more time in sedentary activities and less time in physical activities. This condition contributes to the incidence of overweight among these children. Moreover in Pakistani culture most parents are likely to be proud when their children appearance chubby, which apparently makes their children look cute and may mirror their high socioeconomic status. However, the present study found that the consumption of micronutrients is very deprived among both underweight and overweight children. This finding shows that children do not consume sufficient amount of foods rich in vitamins and minerals, such as fruits, vegetables and milk. The use of fizzy drinks, confectionaries are 75% and only 25% children consume milk daily

as shown in figure 4 high caloric sweetened drink are more easily available at schools cafeterias [36]. The inaccessibility of several fruits and vegetables and/or picky eating behavior of children is possibly responsible for this occurrence. More studies on large scale are needed to investigate the eating behavior of children in Pakistan. The education and awareness of parents in providing and encouraging children to consume not only sufficient macronutrients but also micronutrients is essential. Because considering the fact that children in this age group are dependent on their parents [33,39]. Even at present, education on healthy eating in elementary schools only aims to prevent underweight, encouraging children to eat more. However, no talk on preventing overweight and on ensuring balanced physical activities. Overweight may cause adverse effects and leads to non-communicable diseases such as the risk of hypertension, diabetes mellitus type 2 and metabolic disorder that starts in childhood [1].

The prevalence of overweight is lower in children who habitually play outdoor games. Therefore, the inclusion of physical activities in health education in school should be executed, which will promote normal weight, physically active among children. Long hours of playing videogames and indoor activities are a risk factor for overweight and obesity among children. Possibly because at the present time, overweight children, who generally come from high socioeconomic families, spend much of their sedentary time playing with a tablet rather than with videogames [4,37]. The common practice, no regular monitoring of children's body weight and height in Pakistan's schools. Regular monitoring of children's anthropometrics depends on their own parents' awareness. The dietary intake of more than half of the children is below the RDA, except for carbohydrates. These low intake levels contribute to a high prevalence of underweight children. The caloric and protein intake among underweight children is lower than that of normal-weight children. The caloric intake among overweight and obese children is higher than that of normal-weight children this is parallel to the results of Agustina., *et al.* [34]. Moreover, carbohydrate intake is adequate in all groups of children because the Pakistan people consume a considerably high amount of carbohydrates in usage of bread, chapatti and naan (local bread). The findings of our study show that children in Pakistan, have low intake of micronutrients, such as calcium, iron, zinc, vitamin A and vitamin D after analyzing the dietary recall [35]. Thus, an intervention program to prevent and treat unbalanced diet is needed. School-based nutritional promotion effectively improves knowledge on nutrition and promotes consumption of balanced diet among children [33]. In addition, intervention that involves family members positively affects the children's weight.

Conclusion

It is concluded that the available data indicate that malnutrition is a public health concern in school going children of underdeveloped countries. The dietary practices of school-going children of age 8 - 14 years are variable and unhealthy eating pattern is very common. A large number of students don't consume any vegetables and fruits according to the recommendations leading to micronutrient deficiencies and many other nutritional consequences. It has been found that some children in our study skip their lunch. The study showed that a large number of them are not eaten vegetables and fruits according to the recommendations which lead to hidden hunger and many other nutritional consequences. The consumption of meat and meat products is very low which leads to anemia and cognitive behaviors disorders. Our findings highlight the necessity for nutrition interventions in school-aged children, delivery of integrated programs are recommended and more high-quality research to evaluate nutritional status in this age group.

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Conflict of Interest

Authors described no conflict of interest.

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