

Pattern of Food Consumption and Nutrition Knowledge Assessment of 12- 15 Year Old Adolescents from Mumbai City

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Abstract: Aim is to study frequency of food consumption and nutrition knowledge of adolescents from low socio-economic strata and high socio-economic in Mumbai city.

A cross sectional study was conducted in 201 (95 boys) adolescents aged 12 – 15 years from low socio-economic strata and high socio-economic strata. Food frequency questionnaire was used to collect information regarding frequency of different food consumption. A pretested questionnaire was used to assess nutrition knowledge of adolescents. Frequency of food consumption of various food groups in boys and girls are described and showed a significant association with school type demonstrating a significant difference in food consumption of private and municipal school children ($p < 0.05$). Out of the 201 children, 119 (59.2%) skipped meals, 102 (50.7%) did not have breakfast, 78 (38.8%) school timings affected what they eat, 98 (48.8%) ate from outside when mother is unable to cook, 84 (41.8%) ate out often, 116 (57.7%) liked to carry junk or farsan to school, 138 (68.7%) tiffin's consisted of healthy homemade foods, 115 (57.2%) advertisements influenced their food choices, 46 (22.9%) suffered from dental carries, 82 (40.8%) suffered from constipation, 24 (11.9%) suffered from diarrhoea, 165 (82.1%) felt tired at the end of the day, 196 (97.5%) were provided nutrition counselling and 195 (97%) were being provided mid-day meal. In boys, significantly higher percentage of private school boys ate out often and their tiffin's consisted of healthy foods prepared at home as compared to municipal school boys ($p < 0.05$). In girls, significantly higher percentage of private school girls food decisions were affected by school timings as compared to municipal school girls ($p < 0.05$). Significantly higher percentage of boys and girls from municipal school food choices were influenced by advertisements, suffered from constipation, diarrhoea and felt tired at the end of each day as compared to private school girls ($p < 0.05$). Food consumption and nutrition knowledge differed significantly in boys and girls from the 2 socio-economic strata. Efforts need to be undertaken to improve food intake and nutrition knowledge of boys and girls from lower socio-economic strata.

Keywords: Consumption, Nutrition, Constipation, Diarrhea, Advertisement, Tiffin, Breakfast.

1. INTRODUCTION

School going children aged (6-15yrs) are required to eat a variety of foods from each food group to ensure optimal intake of all vitamins and minerals.[1] At the same time, they may face new challenges regarding food choices and habits[2] Decisions about what to eat are partly determined by what is provided in school, at home, the influences from friends at school, and the media, especially television.[4] Poor nutrition compromises both the quality of life of school-aged children but also their potential to benefit from education.[7] Attaining optimal nutrition involves eating three meals a day and two nutritious snacks, as well as limiting the intake of high sugar and high fat foods[6]. Consuming generous amounts of fruits, vegetables, lean meats and low fat dairy products, including three servings of milk, cheese or yoghurt to meet their calcium requirement, can also prevent many medical problems.[8] This includes becoming overweight, developing weak bones, and developing diabetes.[3] Adequate nutrition of school aged children will also ensure they grow to their full potential, and provide the stepping stones to a healthy life.[5]

2. METHODOLOGY

A cross sectional study was conducted in 201 (95 boys) adolescents aged 12 – 15 years from 2 socio-economic strata. Food frequency questionnaire was used to collect information regarding frequency of different food consumption. A pretested questionnaire was used to assess nutrition knowledge of adolescents. The anthropometric measurements such as height, weight, BMI, Muac, Skinfold thickness were done. Analyses were performed using SPSS software for Windows (version 16.0, 2007, SPSS Inc, Chicago, IL). Data are presented as frequency (percentage). The frequency distributions were tabulated for various parameters according to school type and were compared using cross tabulations and chi-square test P-value < 0.05 was considered to be statistically significant.

3. RESULTS AND DISCUSSION

Data were analysed on 201 (95 boys) with mean age of 13.5.5 years.

Food Frequency:

Data regarding food intake of children was collected.

When cereal intake on daily basis was assessed, off the 201 adolescents, 136 (67.7%) consumed rice, 112 (55.7%) consumed cereals other than rice, 36 (17.9%) consumed white bread, 48 (23.9%) consumed whole wheat bread and 12 (6%) consumed pasta on daily basis. Figure 1.1 and 1.2 gives percentage of food frequency for rice, cereals other than rice, white bread, whole wheat bread and pasta for boys and girls according to school type. There was a significant association of rice [boys ($\chi^2=24.965$, $p<0.001$); girls ($\chi^2=35.776$, $p<0.001$)], cereals other than rice [boys ($\chi^2=11.392$, $p=0.010$); girls ($\chi^2=9.423$, $p=0.024$)], white bread [girls ($\chi^2=7.479$, $p=0.003$)]; whole wheat bread [boys ($\chi^2=56.294$, $p<0.001$); girls ($\chi^2=37.440$, $p<0.001$)], and pasta [boys ($\chi^2=47.335$, $p<0.001$); girls ($\chi^2=46.135$, $p<0.001$)] with school type in both boys and girls (Figure 1.1 & Figure 1.2). There was no significant association of bread with school type in boys ($\chi^2=7.479$, $p=0.187$). Rice and others cereals were consumed more by the municipal school boys and girls as compared to private school boys and girls. The study by Davis et al., (2012) reported that consumption of rice on regular basis contributed to the increase in arsenic exposure in the children.[9]

When protein intake on daily basis was assessed, off the 201 adolescents, 107 (53.2%) consumed milk and curd, 19 (9.5%) consumed paneer, 49 (24.4%) consumed cheese, 47 (23.4%) consumed egg, 44 (21.9%) consumed meat, poultry & fish and 109 (54.2%) consumed pulses & legumes on daily basis. Figure 2.1 and 2.2 gives percentage of food frequency for protein rich foods for boys and girls according to school type. There was a significant association of milk and curd [boys ($\chi^2=25.564$, $p<0.001$); girls ($\chi^2=16.206$, $p<0.001$)], paneer [boys ($\chi^2=38.459$, $p<0.001$); girls ($\chi^2=59.166$, $p<0.001$)], cheese [boys ($\chi^2=49.560$, $p<0.001$); girls ($\chi^2=42.174$, $p<0.001$)], egg [boys ($\chi^2=14.731$, $p=0.021$)]; meat, poultry & fish [boys ($\chi^2=38.251$, $p<0.001$); girls ($\chi^2=23.492$, $p<0.001$)] with school type in both boys and girls (Figure 2.1 & Figure 2.2). There was no significant association of pulse & legumes [boys ($\chi^2=6.645$, $p=0.248$); girls ($\chi^2=9.763$, $p=0.082$)] with school type in both boys and girls (Figure 2.1 & Figure 2.2). There was no significant association of egg intake with school type in girls ($\chi^2=3.180$, $p=0.365$) (Figure 2.2). Protein intake was higher in private school children as compared to municipal school children. In a study by Mudryj et al, (2014) showed that the phytochemicals, saponins, and tannins found in pulses possess antioxidant and anti-carcinogenic effects, indicating that pulses may have significant anti-cancer effects [10]. In a study by Brady et al (2014) showed that milk and milk products like paneer, cheese and milk and curd were seen to be a dietary source of protein as well as potassium and calcium in the diets of the subjects [11].

When fruits and vegetables intake on daily basis was assessed, off the 201 adolescents, 122 (60.7%) consumed fruits, 5 (2.5%) consumed green leafy vegetables, 124 (61.7%) consumed other vegetables and 52 (25.9%) consumed dry fruits on daily basis. Figure 3.1 and 3.2 gives percentage of food frequency for fruits and vegetables boys and girls according to school type. There was a significant association of fruits [boys ($\chi^2=28.640$, $p<0.001$); girls ($\chi^2=19.059$, $p<0.001$)], other vegetables [boys ($\chi^2=28.368$, $p<0.001$)], green leafy vegetables [boys ($\chi^2=14.441$, $p=0.006$)], dry fruits [boys ($\chi^2=23.816$, $p=0.021$)] with school type in both boys and girls (Figure 2.1 & Figure 3.2). There was no significant association of other vegetables ($\chi^2=1.460$, $p=0.691$), green leafy vegetables ($\chi^2=6.388$, $p=0.172$) and dry fruits ($\chi^2=6.231$, $p=0.183$) with school type in girls (Figure 3.2). The consumption of fruits and vegetables was higher in private school children. In a study by Slavin et al (2012) showed that Fruits and vegetables also supply vitamins and minerals to the diet and are sources of phytochemicals that function as antioxidants, phytoestrogens, and anti-inflammatory agents and through other protective mechanisms.[12]

When bakery and confectionary product intake on daily basis was assessed, off the 201 adolescents, 90 (44.8%) consumed biscuits, 72 (35.8%) consumed parle-G, 46 (22.9%) consumed cream biscuit, 26 (12.9%) consumed cookies and 91 (45.3%) consumed chocolate & pastry on daily basis. Figure 4.1 and 4.2 gives percentage of food frequency for bakery & confectionary products for boys and girls according to school type. There was a significant association of biscuits [girls ($\chi^2=15.689$, $p=0.003$)], parla-G [boys ($\chi^2=13.779$, $p=0.017$); girls ($\chi^2=18.299$, $p=0.003$)], cream biscuit [girls ($\chi^2=34.386$, $p<0.001$)], cookies [boys ($\chi^2=22.526$, $p<0.001$); girls ($\chi^2=15.747$, $p=0.008$) and chocolate & pastry [boy ($\chi^2=12.550$, $p=0.028$); girl ($\chi^2=19.647$, $p=0.001$) with school type in both boys and girls (Figure 4.1 & Figure 4.2). There was no significant association of biscuits ($\chi^2=4.145$, $p=0.529$), cream biscuit ($\chi^2=11.511$, $p=0.074$) with school type in boys (Figure 4.1) The consumption of biscuits and cookies was higher in municipal school children. In a study by Cleave(2013) showed that bread increases sugar level, cholesterol, low in essential nutrients, anti-nutrient and phytic acid in children.[13]

When fast food products intake on daily basis was assessed, off the 201 adolescents, 11 (5.5%) consumed French fries, 62 (30.8%) consumed chips, 2 (1%) consumed burgers and pizza, 51 (25.4%) consumed sandwich, 30 (14.9%) consumed sandwich and 91 (45.3%) consumed chat, bhajiya & samosa on daily basis. Figure 5.1 and 5.2 gives percentage of food frequency for fast food products for boys and girls according to school type. There was a significant association of French fries [boys ($\chi^2=47.335$, $p<0.001$); girls ($\chi^2=46.135$, $p<0.001$)], chips [boys ($\chi^2=25.065$, $p<0.001$); girls ($\chi^2=45.091$, $p<0.001$)], burger [boys ($\chi^2=43.641$, $p<0.001$); girls ($\chi^2=56.011$, $p<0.001$)], pizza [boys ($\chi^2=37.943$, $p<0.001$); girls ($\chi^2=44.446$, $p<0.001$)], Chinese [boy ($\chi^2=34.463$, $p<0.001$); girl ($\chi^2=53.022$, $p<0.001$)], sandwich [boys ($\chi^2=29.469$, $p<0.001$); girls ($\chi^2=27.242$, $p<0.001$)], chat, bhajiya & samosa [boys ($\chi^2=48.146$, $p<0.001$); girls ($\chi^2=62.300$, $p<0.001$) with school type in both boys and girls (Figure 5.1 & Figure 5.2). Chat, bhajiya, samosa consumption was higher in municipal school children. In a study by Lustig et al, (2012) fast-food consumption in children was linked with many dangerous precursors for obesity. According to this study, kids who ate fast food were more likely to consume a higher amount of calories, fat, carbohydrates and added sugars in one fast food meal.[14]

When various drinks intake on daily basis was assessed, off the 201 adolescents, 67 (33.3%) consumed tea/ coffee, 47 (23.4%) consumed soft drinks and 68 (33.8%) consumed fruit juices on daily basis. Figure 6.1 and 6.2 gives percentage of food frequency for fast food products for boys and girls according to school type. There was a significant association of tea & coffee [boys ($\chi^2=38.440$, $p<0.001$); girls ($\chi^2=17.639$, $p=0.003$)], soft drinks [boys ($\chi^2=21.028$, $p<0.001$)] and fruit juice [boys ($\chi^2=20.583$, $p=0.002$); girls ($\chi^2=49.179$, $p<0.001$) with school type in both boys and girls (Figure 6.1 & Figure 6.2). There was no association of soft drinks and school type in girls ($\chi^2=5.467$, $p=0.362$). The consumption of tea was higher in municipal school children whereas the consumption of fruit juices was significantly higher in private school children. In a study by Seifert et al, (2011) it was concluded that in the short-term, pediatricians need to be aware of the possible effects of energy drinks in vulnerable populations and screen for consumption to educate families. Long-term research should aim to understand the effects in young populations. Toxicity surveillance should be improved, and regulations of energy-drink sales and consumption should be based on appropriate research.[15]

Attitude of children:

Knowledge and attitude of children regarding nutrition was assessed. Out of the 201 children, 119 (59.2%) skipped meals, 102 (50.7) left from home without having breakfast, 78 (38.8%) reported that school timings affect their decisions about what they eat, 98 (48.8%) reported that they eat from outside in case their mother is unable to cook, 84 (41.8%) reported that they eat out often, 116 (57.7%) liked to carry biscuits, cakes, chips or any other farsan to school, 138 (68.7%) tiffin's consisted of healthy foods prepared at home, 115 (57.2%) reported that advertisements influenced their food choices, 46 (22.9%) suffered from dental carries, 82 (40.8%) suffered from constipation, 24 (11.9%) suffered from diarrhoea, 165 (82.1%) felt tired at the end of the day, 196 (97.5%) were provided nutrition counselling by school and 195 (97%) were being provided mid-day meal at school. Table 1 represents knowledge and attitude of boys and girls when classified according to school type. In boys, significantly higher percentage of private school boys ate out often and their tiffin's consisted of healthy foods prepared at home as compared to municipal school boys ($p<0.05$) (Table 1). As against this, significantly higher percentage of boys from municipal school food choices were influenced by advertisements, suffered from dental carried, constipation, diarrhoea and felt tired at the end of each day as compared to private school boys ($p<0.05$). In girls, significantly higher percentage of private school girls food decisions were affected by school timings as compared to municipal school girls ($p<0.05$). As against this, significantly higher percentage of girls from municipal school food choices were influenced by advertisements, suffered from constipation, diarrhoea and felt tired at the end of each day as compared to private school girls ($p<0.05$). In a study by Tin et al, (2011) there was prospective evidence that

skipping breakfast predicts a greater increase in BMI among children. As breakfast is a modifiable dietary habit, the results may have important implications for weight control. Children who skipped meals and ate more protein were more likely to have excess body fat. Uncontrolled eating behaviour, such as eating fast, emotional overeating and lower satiety responsiveness were also associated with higher body adiposity.[16]

4. CONCLUSION

It can be stated from the above study that children from low socio economic strata suffer from constipation, diarrhea and dental carries indicating that the consumption of fiber is low in their diet. The consumption of rice and other cereals was found to be higher in the municipal school children as compared to private school children whereas the consumption of protein containing foods ,fruits and vegetables was higher in private school children. Private school children consumed more of bakery products and municipal school children ate more fast foods and consumed more of tea and coffee. School children should be encouraged to eat healthy food and foods such as fruits, vegetables, cereals, pulses and milk which will also provide children with proteins, fiber, iron, calcium and will ensure their proper growth and functioning.. More research is needed to demonstrate the best ways in which to encourage children to adopt healthier eating practices at school and throughout the day and to counteract pressures from advertising and elsewhere that encourage the consumption of foods high in fat, salt and sugar and that may promote over-eating and weight gain.

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APPENDIX – A

LIST OF FIGURES:

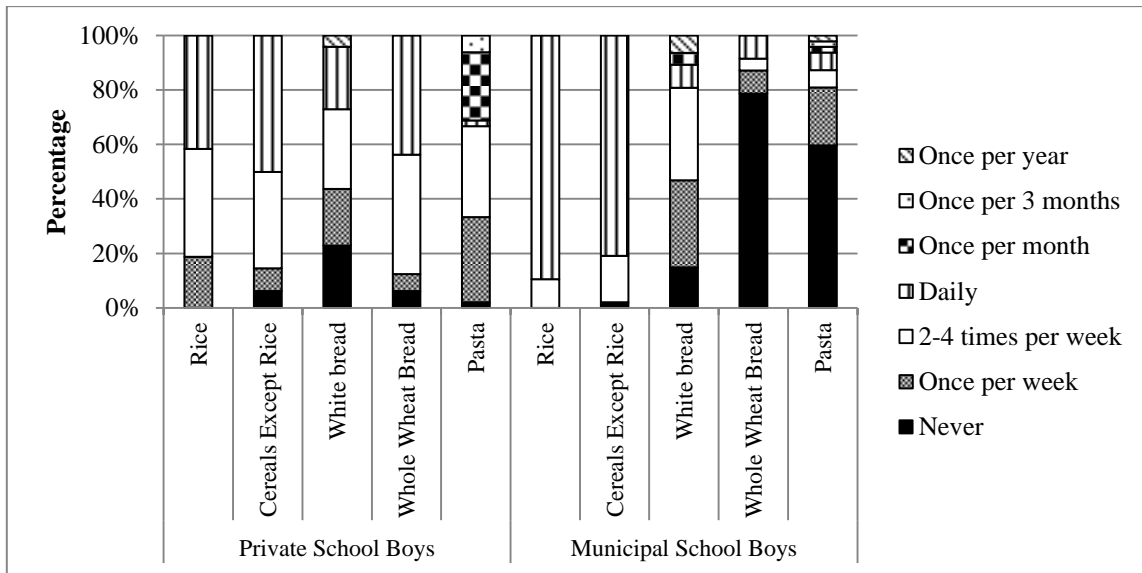


Figure 1.1: Food frequency of cereals in private and municipal school boys

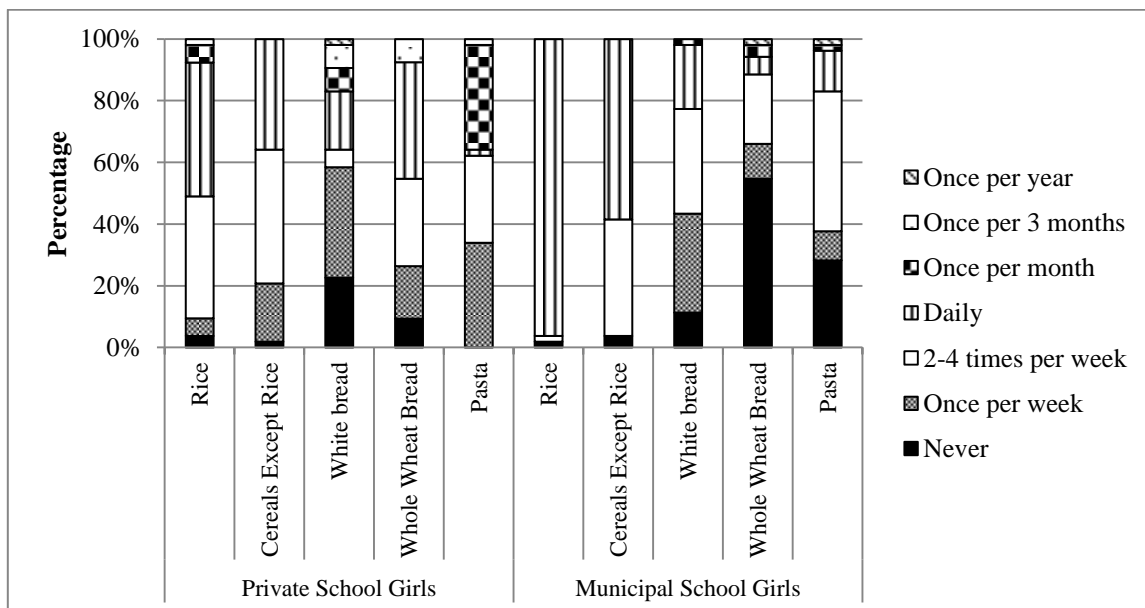


Figure 1.2: Food frequency of cereals in private and municipal school girls

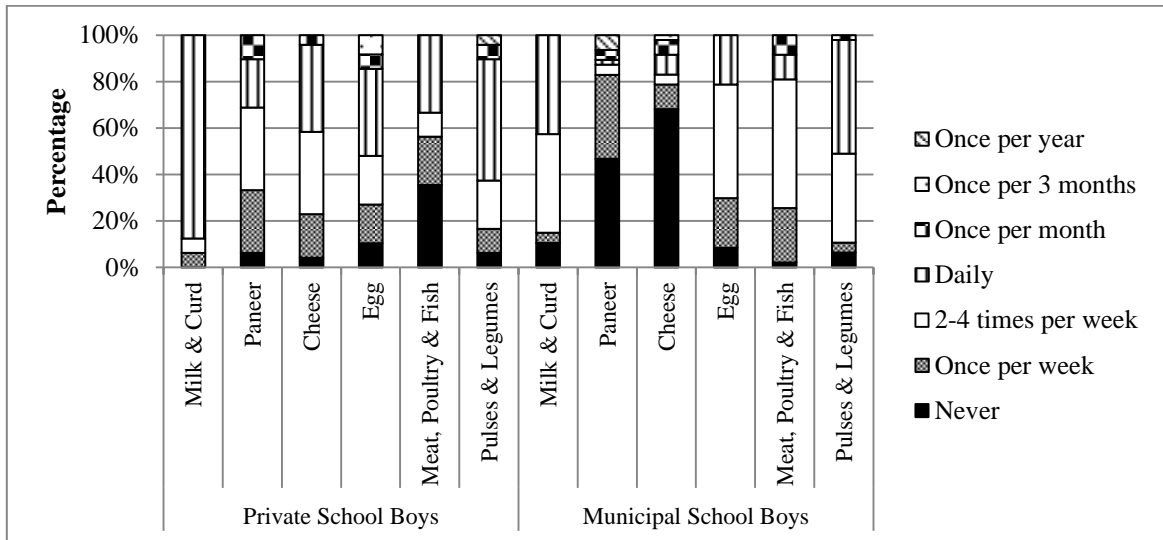


Figure 2.1: Food frequency of proteins in private and municipal school boys

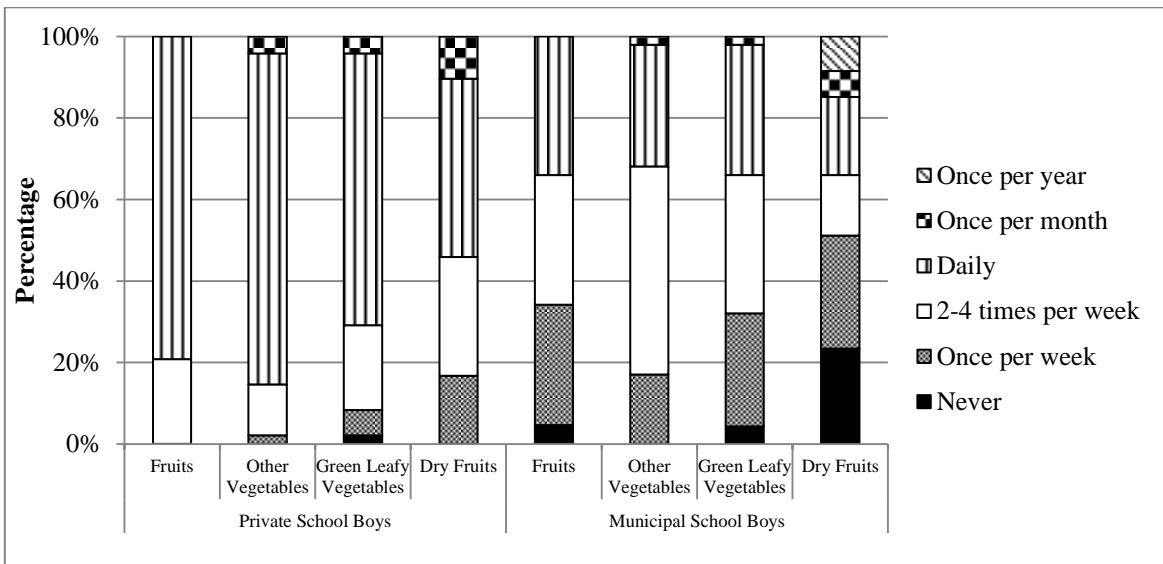


Figure 3.1: Food frequency of fruits and vegetables in private and municipal school boys

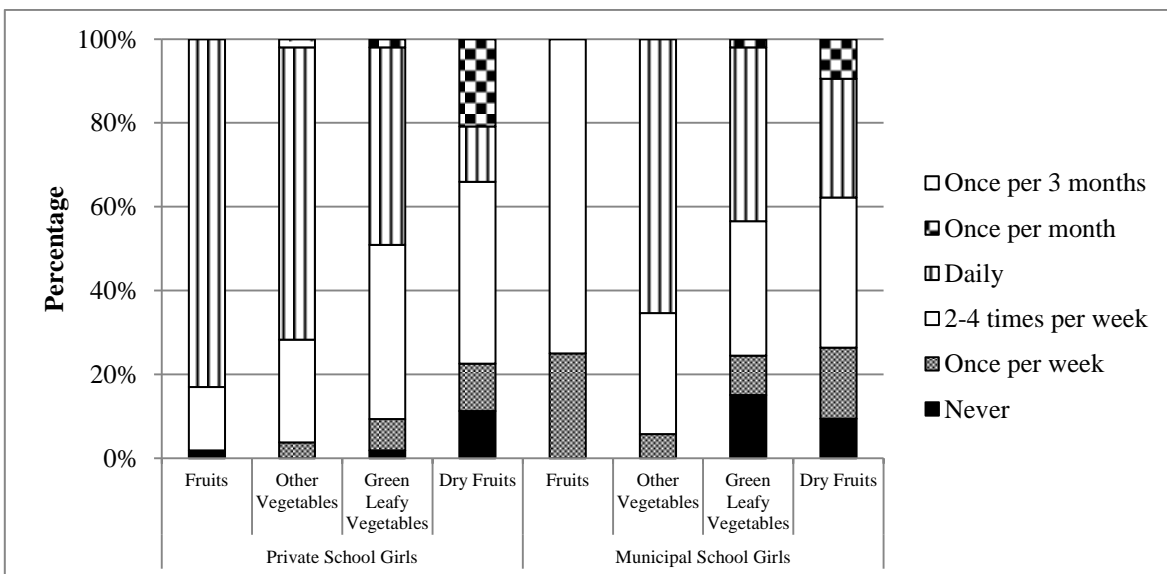


Figure 3.2: Food frequency of fruits and vegetables in private and municipal school girls

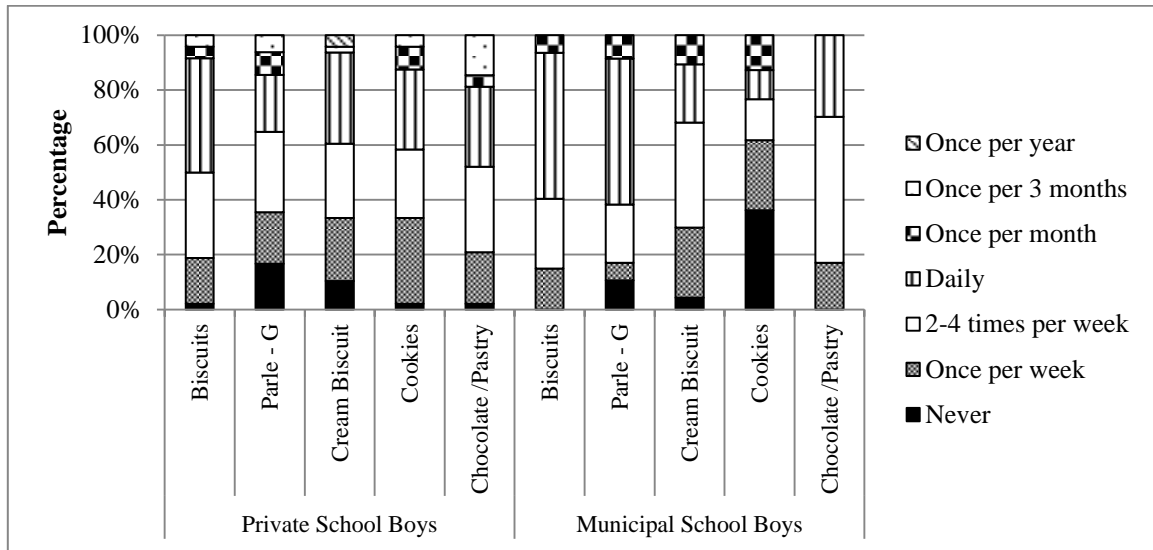


Figure 4.1: Food frequency of bakery & confectionary products in private and municipal school boys

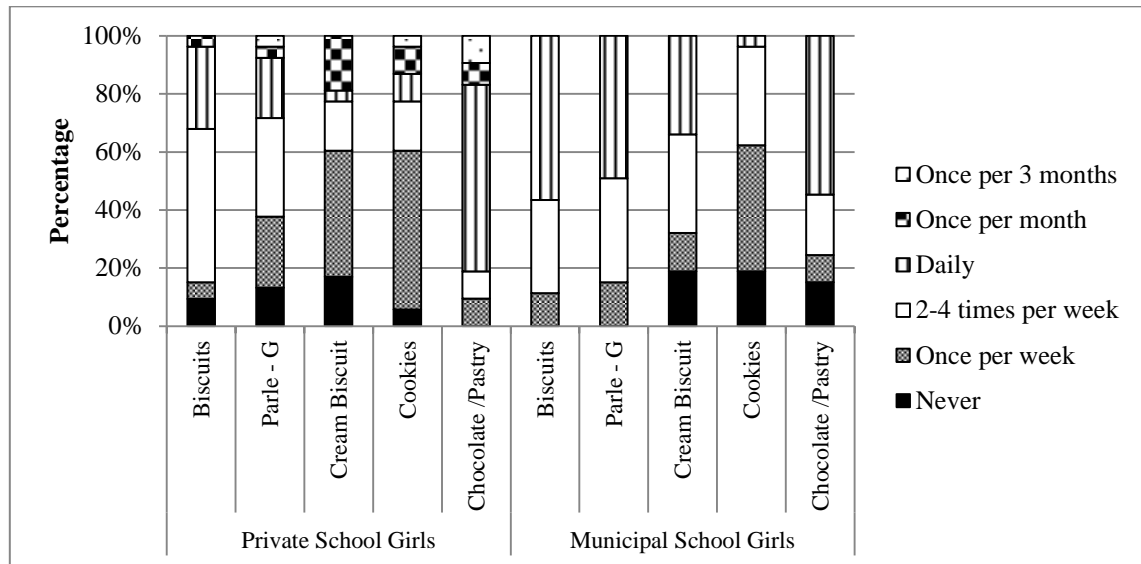


Figure 4.2: Food frequency of bakery & confectionary products in private and municipal school girls

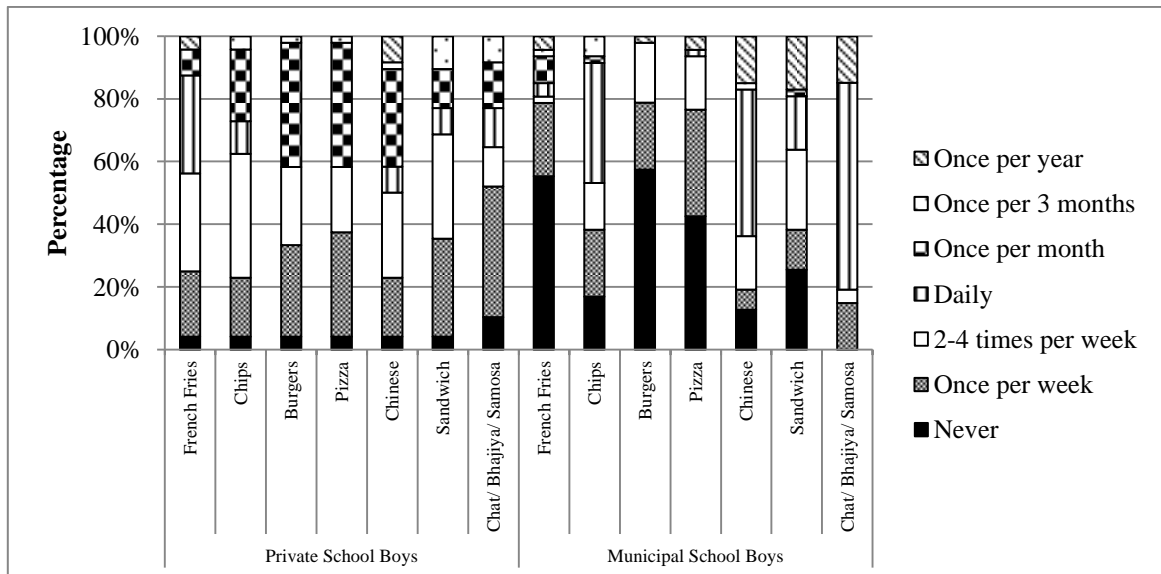


Figure 5.1: Food frequency of fast food products in private and municipal school boys

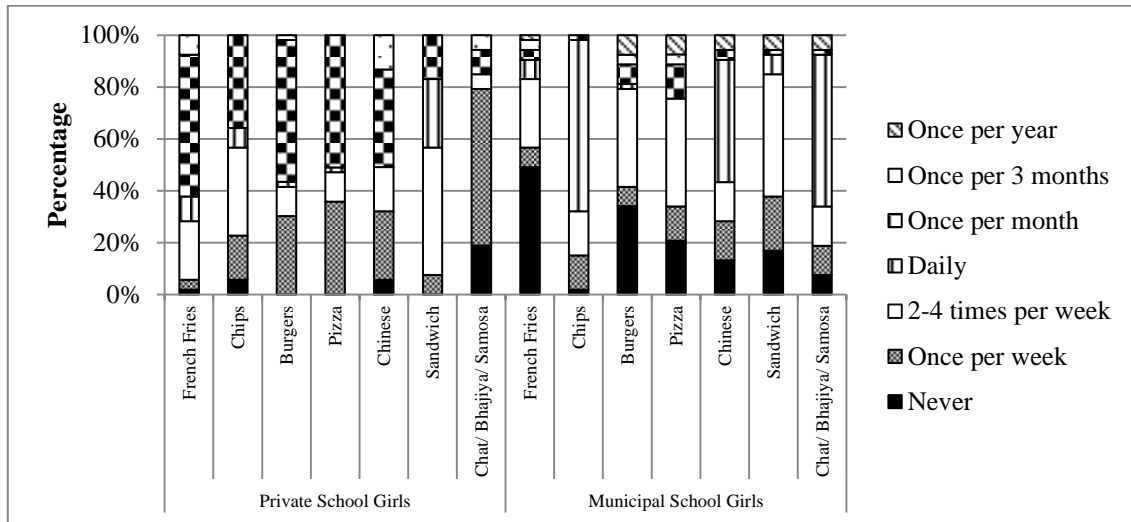


Figure 5.2: Food frequency of fast food products in private and municipal school girls

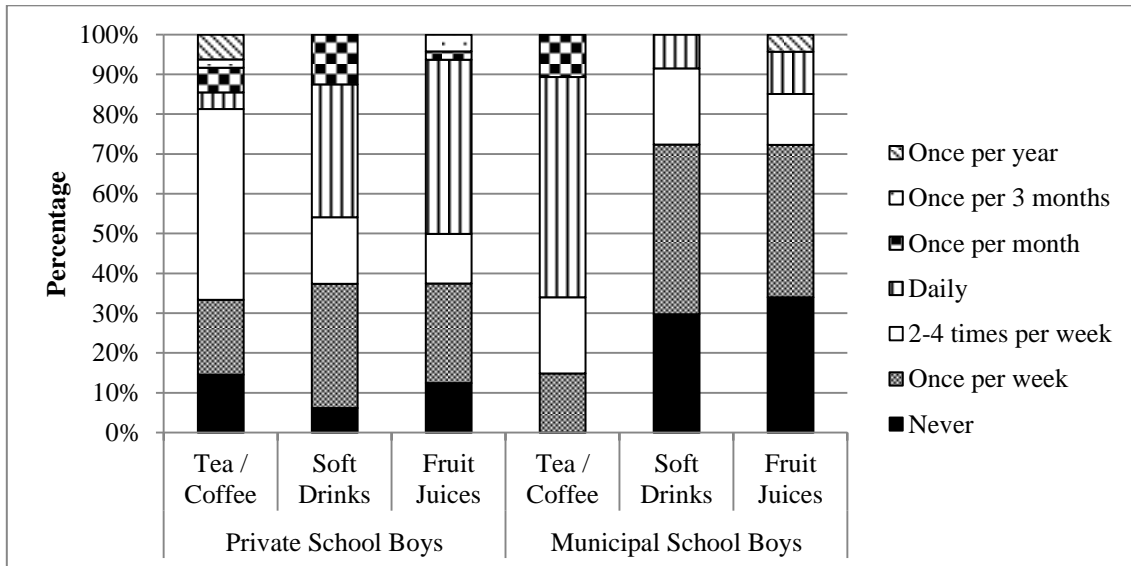


Figure 6.1: Food frequency of various drinks in private and municipal school boys

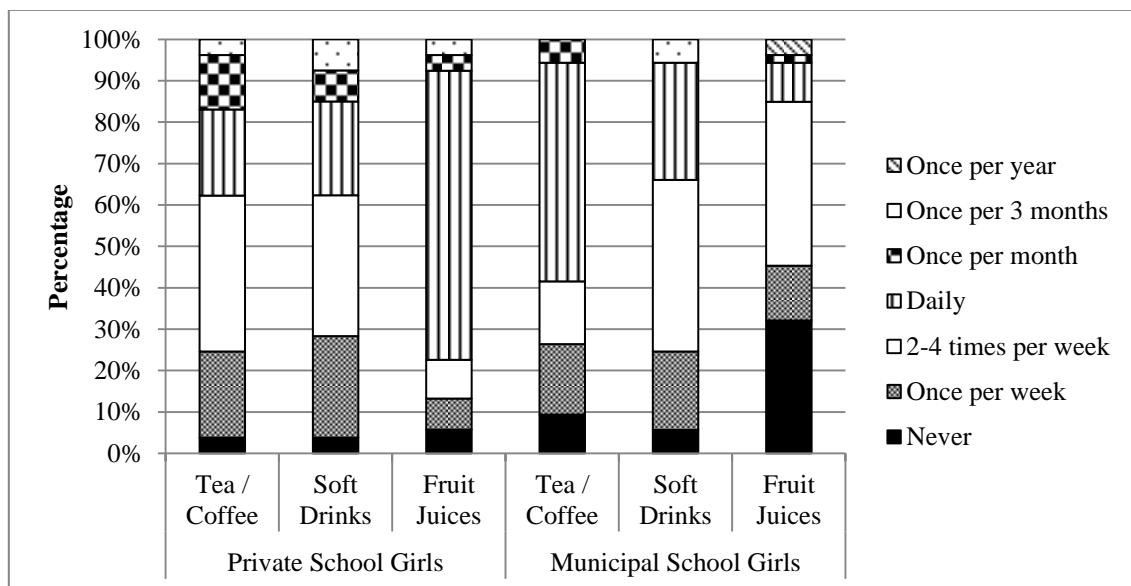


Figure 6.2: Food frequency of various drinks in private and municipal school girls

APPENDIX - B

Table 1: Knowledge and attitude of boys and girls according to school type

Attitude based questions	Boys (n=95)		χ^2	Girls (n=106)		χ^2
	Private school (n=48)	Municipal School (n=47)		Private school (n=53)	Municipal School (n=53)	
Do you skip any meal?	27 (56.2)	28 (59.6)	0.108	27 (50.9)	37 (69.8)	3.943
Do you leave home without having breakfast?	26 (54.2)	26 (55.3)	0.013	19 (35.8)	31 (58.5)	5.451
Do school timings affect your decisions about what you eat?	25 (52.1)	19 (40.4)	1.298	25 (47.2)	9 (17)	11.085*
Do you eat food from outside in case your mother is unable to cook?	22 (45.8)	28 (59.6)	1.799	27 (50.9)	21 (39.6)	1.371
Do you often eat outside?	28 (58.3)	17 (36.2)	4.679*	16 (30.2)	23 (43.4)	1.988
Do you like carrying biscuits, cakes, chips or any other farsaan to school?	28 (58.3)	23 (48.9)	0.843	29 (54.7)	36 (67.9)	1.949
Does your tiffin consist of healthy foods prepared at home?	36 (75.0)	24 (51.1)	5.847*	37 (69.8)	41 (77.4)	0.777
Does advertisement influence your food choices?	21 (43.8)	31 (66.0)	4.727*	21 (39.6)	42 (79.2)	17.256*
Do you suffer from dental carries?	5 (10.4)	17 (36.2)	8.851*	13 (24.5)	11 (20.8)	0.215
Do you suffer from constipation?	0 (0)	35 (74.5)	56.596*	1 (1.9)	46 (86.8)	77.407*
Do you suffer from diarrhoea?	2 (4.2)	11 (23.4)	7.441*	2 (3.8)	9 (17.0)	4.970*
Do you feel tired at the end of the day?	26 (75)	46 (97.9)	10.518*	34 (64.2)	49 (92.5)	12.493*
Does your school provide nutrition counselling?	46 (95.8)	47 (100)	2.000	50 (94.3)	53 (100)	3.087
Are you being provided mid-day meal at school?	45 (93.8)	47 (100)	3.003	50 (94.3)	53 (100)	3.087