

# Fast Food Intake and Prevalence of Overweight/Obesity in Students: do Eating Habits have a Differential Impact on Gender?

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## ABSTRACT

**Introduction:** Nowadays, eating fast food and spending money on home away foods have been increased rapidly. As a result, the prevalence rate of both fast food consumption and overweight/obesity has been raised then previously.

**Material and methods:** In an analytical cross-sectional study, 106 students (50 males and 56 females) were selected randomly from two largest schools in Dhaka, center of Bangladesh, studying in primary, secondary, or middle school programs in 2020 between ages 5 and 15. Data collection was conducted by a prepared fast food questionnaire and anthropometric measures including height, weight, and Body Mass Index (BMI). T-test and multivariate logistic regression were used for statistical analysis.

**Results:** According to our results, overweight and obesity prevalence based on BMI in males was 24% (95% CI: 7.99, 8.44) and 34% (95% CI: 8.22, 9.65) respectively while in females was 12.5% (95% CI: 8.07, 9.06) and 14.3% (95% CI: 8.04, 9.7) respectively. According to our results, 40.56% (44% in males vs 37.5% in females) had at least one type of fast food consumption in the recent week including noodles (31.8%), chips (37.1%), burger (15.9%), pizza (5.3%), sandwich (8.48%), rissole (19.08%), potato rissole (15.9%), fried chicken (10.6%), french fries (16.96), chickpea (11.66%), water balls (13.78%), mixed crispy (16.96%), cake (21.2%), pastry (10.6%), chocolate (12.72%), ice cream (15.9%), sweets (9.54%), and cold drinks (20.14%). Fast-food consumption for at least 3-4 days (OR: 10.66, 95% CI = 2.26–50.24) and 5-6 days (OR: 2.89, 95% CI = 1.14–7.32) in a week was related to BMI cut-off points for all males and females ( $P < 0.05$ ) respectively. But fast-food sources were related to BMI cut-off points for all males ( $P < 0.05$ ) only.

**Conclusion:** The prevalence of fast food consumption and obesity/overweight in Bangladeshi students is high and so healthy food and improved nutrition should be a high priority on every school agenda.

**Keywords:** Obesity; Overweight; Fast Foods.

## INTRODUCTION

Fast food is also known as ready to make food and there is a remarkable difference between fast food and junk food. When foods contain no nutritional value, is called junk food.<sup>1</sup> Eating fast foods has been increased day by day and spending money on home away foods have been increased rapidly. In 1970, money spent on away-from-home foods represented 25% of total food spending and the percentage of spending money on fast foods increased to 53% in 2010.<sup>2</sup> The number of fast foods restaurant is also increased even doubled from 1972 to 1995.<sup>3</sup> Fast foods are widely available in the school environment and it always competes with the

nutritional foods which are also found in the area of the school.<sup>4</sup> Children aged from 6 to 11 years gained at least 20% of their needed energy from beverages, snacks, food juices, etc., which was indicated in NHANES III data.<sup>5</sup> The habit of consuming fast foods varies from region to region although, in Bangladesh, it seems that the habit of consuming fast foods is increasing day by day. People in urban areas have a high tendency to take fast foods than rural. The time factor is one of the main reasons for this change as urban people have not much time to prepare food for their families.<sup>6</sup> The common fast foods in Bangladesh are rissole, potato rissole, water balls, french fries, chips, ice-cream, etc. The school environment influences much on the eating behavior of the children. Students are allowed to buy their tiffin from the school canteen or even from outside.<sup>7</sup> Many vendors from outside school areas sell fast foods of suboptimal nutritional quality.<sup>8</sup> Moreover, higher BMI is strongly correlated with higher fast food consumption and more prone to being overweight/obese is also a regarded concern.<sup>9</sup> High fast food consumption can cause obesity<sup>10</sup> which is the core of other diseases such as diabetes, hypertension, cardiovascular disease, hyperlipidemia, hypercholesterolemia, etc.<sup>11,12</sup> The high calories in fast foods stored by the body in fat cells.<sup>13</sup> A study found that advertisements for promoting fast food products influence the children to prefer more and by banning those advertisements, childhood prevalence of overweight can be reduced by 18%.<sup>14</sup> It is found that obese children tend

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to become obese adults in the future.<sup>15</sup> According to the World Health Organization (WHO)<sup>16</sup>, overweight and obesity is a global health problem. In Bangladesh, both under-nutrition and over-nutrition continue to be an economic burden.<sup>17</sup> The purpose of this study aimed to examine the gender differential effects of eating habits on overweight and obesity among school-aged children in Bangladesh.

## MATERIAL AND METHODS

This cross-sectional study was conducted on 106 students (50 males and 56 females) of two largest schools in Dhaka, center of Bangladesh, that randomly selected and studying primary, secondary, or middle school programs in winter 2020. Random multi-stage sampling was used. First, one of the deprived areas was selected from 4 different educational areas in Dhaka and then 2 different schools were selected as stratum based on different majors and governmental versus non-governmental schools. Finally, in each school, 53 students were selected by simple random sampling. A pilot test was conducted on 20 students to confirm the reliability of the questionnaire and Cronbach's alpha value was computed as 0.861. The questionnaire used was based on food frequency and included demographic characteristics including age, sex, type of school, study field, parental educational level, mother's occupation, and parental economic & cultural status. Twelve different questions were asked to assess the consumption of junk foods, homemade sandwiches, and noodles. Sample size calculation was based on the junk food consumption in previous studies and alpha error was 0.05. Therefore, minimum sample size calculated was 105 subjects. We assessed 150 first-eighth grade school students and 106 ones completed the questionnaires. Part A questionnaire assessed demographic information such as age, sex, type of school, study field, weight, height, parental educational level, mother's occupation, and parental economic & cultural status. Part B included questions about consumption of snacks, including noodles, chips, burger, pizza, sandwich, rissole, potato rissole, fried chicken, french fries, chickpea, water balls, mixed crispy, cake, pastry, chocolate, ice cream, sweets, and cold drinks. Consumption frequency for fast-foods was categorized as daily, 2-3 days/week, 4-5 days/week, and 6 days/week. Moreover, BMI was assessed by WHO provided cutoff points for Asia-Pacific as these categories; underweight (< 18.5 kg/m<sup>2</sup>), normal weight (18.5–22.9 kg/m<sup>2</sup>), overweight (23–24.9 kg/m<sup>2</sup>), and obese (≥25 kg/m<sup>2</sup>).<sup>18</sup> After obtaining the necessary coordination and obtaining permission from both schools' authority, the research team was referred to the selected schools, and the questionnaire distributed among eligible subjects after taking informed consent. Participants' consent was taken as per rules and the study objectives, pros, and cons of the study were discussed with the participants. Statistical analyses were performed using the SPSS software and the type one error considered at 0.05 level. The prevalence rate of overweight/obesity and fast-foods consumption were computed using descriptive statistics. The qualitative variables were reported as number and percentage and quantitative variables and

mean and standard deviation. Finally, multivariate logistic regression was used to control the potential confounders including job, educational level, field of study, and type of university.

## RESULTS

### Basic anthropometric characteristics

The demographic characteristics of studied school students in Dhaka city in 2020 are shown in Table 1. The response rate in the current study was 70.7% (106/150). The age range of participants was 5-15 years. Based on WHO classification the prevalence of underweight, overweight & obese in males was 6% (3 males), 24% (12 males), and 34% (17 males), respectively, while in females was 5.4% (3 females), 12.5% (7 females) and 14.3% (8 females), respectively. However, 36% (18 males), and 67.9% (38 females) had a normal BMI. Statistical analysis showed that the distribution, as well as the median of age, is different amongst the four groups of both sexes. Lowest median ages were found in both underweight subjects (3 males and 3 females) of our sample. Figure 1 displays the median age of both sexes by BMI classification across the four groups.

For male children, the mean age in years was 6.0, 7.33, 8.41, and 8.94 respectively for underweight, average, overweight,

Quantitative Variable	Number (%)
Gender	
Male	50 (47.2)
Female	56 (52.8)
School education system	
Primary school	35 (33.0)
Secondary school	41 (38.7)
Middle school	30 (28.3)
Income level per month (\$)	
249 or less	21 (19.8)
250-499	55 (51.9)
500 or more	30 (28.3)
School	
Governmental	55 (51.9)
Nongovernmental	51 (48.1)
Mother's job	
Staff	22 (20.7)
Homemaker	68 (64.2%)
Other	16 (15.1%)
Mother's education	
Illiterate	5 (4.7%)
Elementary	12 (11.3%)
High school	34 (32.1%)
College	55 (51.9%)
Father's education	
Illiterate	7 (6.6%)
Elementary	23 (21.7%)
High school	45 (42.5%)
College	31 (29.2%)
Qualitative Variable	Mean (SD)
Age (years)	8.09 (0.33)
BMI (kg/m <sup>2</sup> )	12.08 (2.21)
Weight (kg)	34.33 (09.95)
Height (cm)	121.86 (05.29)

**Table-1:** Demographic characteristics of study population

BMI categories	N (%)	Minimum	Maximum	Mean	SD	SE	P	95% CI (lower-upper)
Underweight	3 (6%)	5	7	6.0	1.0	0.58	.001*	3.51-8.4841
Normal	18 (36%)	5	9	7.33	1.53	0.36	.001*	6.5705-8.0961
Overweight	12 (24%)	7	9	8.41	0.67	0.19	.001*	7.9919-8.8414
Obese	17 (34%)	7	12	8.94	1.39	0.34	.001*	8.2262-9.6562

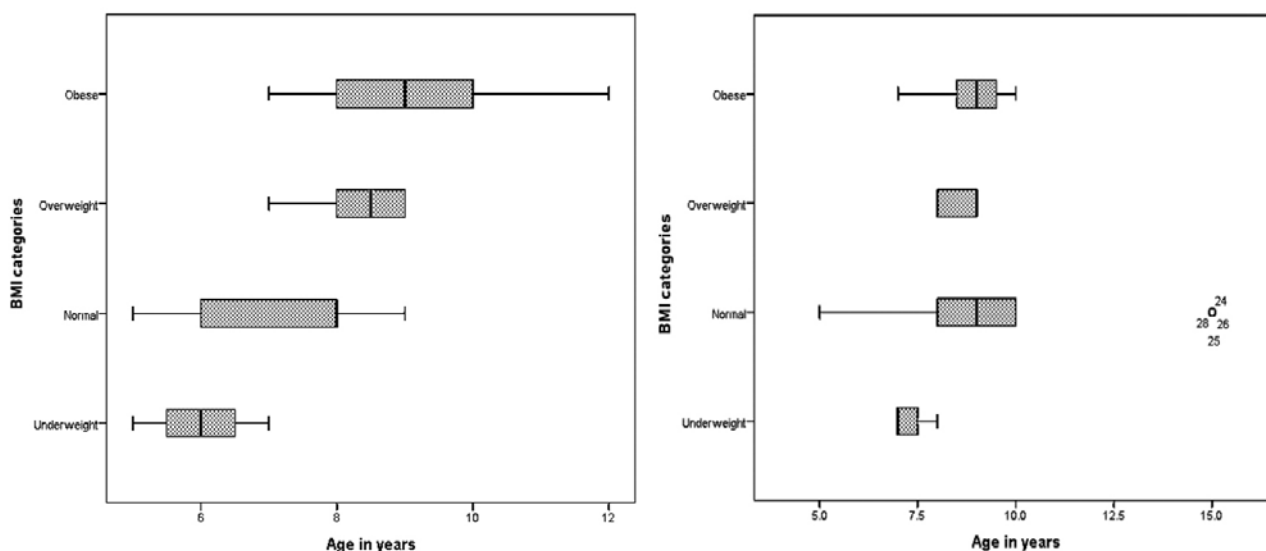
Note: \* Highly significant.

**Table-2:** Mean, minimum, maximum, SD, SE, p-value, and confidence interval (CI) for four quantitative BMI classification of male subjects.

BMI categories	N (%)	Minimum	Maximum	Mean	SD	SE	P	95% CI (lower-upper)
Underweight	3 (5.4%)	7	8	7.33	0.58	0.33	.001*	5.8991-8.7676
Normal	38 (67.9%)	5	15	9.34	2.20	2.20	.001*	8.6160-10.0682
Overweight	7 (12.5%)	8	9	8.57	0.53	0.53	.001*	8.0771-9.0658
Obese	8 (14.3%)	7	10	8.87	0.99	0.99	.001*	8.0465-9.7035

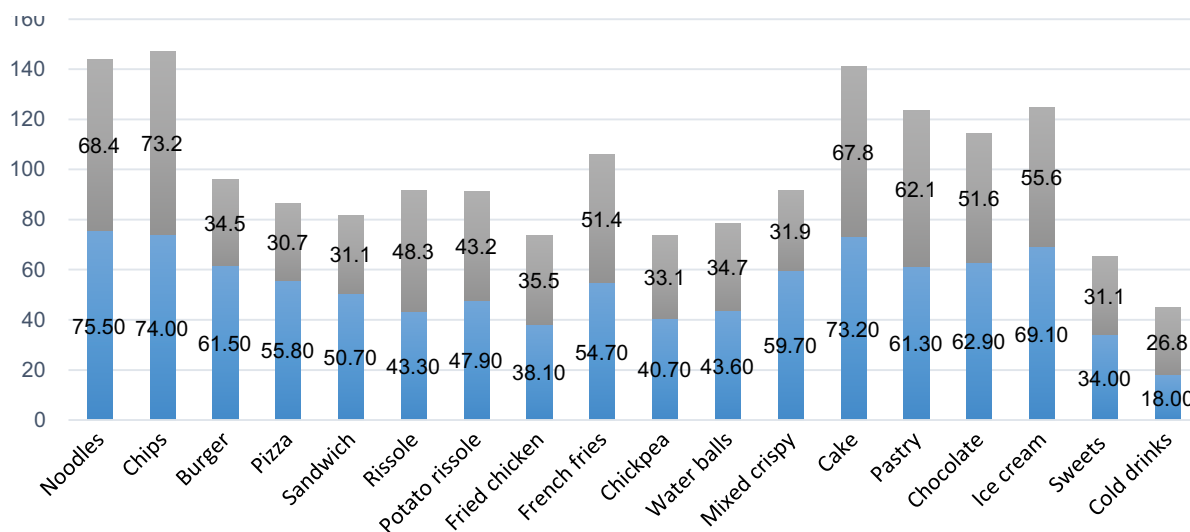
Note: \* Highly significant.

**Table-3:** Mean, minimum, maximum, SD, SE, p-value, and confidence interval (CI) for four quantitative BMI classification of female subjects.



**Figure-1:** Boxplots of median age by BMI categories; i) male subjects and ii) female subjects.

The results in table 2, 3 showed that the prevalence of overweight and obesity in males was higher than in females, while figure 2 showed that the consumption prevalence in some fast foods was very high for both sexes.



**Figure-2:** Prevalence of consumption of fast foods in studied subject previous week.

Male children (N=50)		No. (%)	Underweight No. (%)	Normal No. (%)	Overweight No. (%)	Obese No. (%)	OR (95% CI)	
Day to day eating practices	1-2 days	22 (44%)	1 (4.5%)	11 (50.0%)	8 (36.4%)	2 (9.1%)	Reference	
	3-4 days	10 (20%)	0 (0.0%)	0 (0.0%)	2 (20%)	8 (80%)	10.66 (2.26-50.24)*	
	5-6 days	15 (30%)	0 (0.0%)	6 (40.0%)	2 (13.3%)	7 (46.7%)	2.20 (0.95-5.11) <sup>†</sup>	
	7 days	3 (6%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0.06 (0.005-0.85) <sup>†</sup>	
	Home	22 (44%)	3 (13.6%)	10 (45.5%)	8 (36.4%)	1 (4.5%)	Reference	
Female children (N=56)	Street vendors, franchised stores: (KFC/ Burger King/ Pizza hut)		28 (56%)	0 (0.0%)	8 (34.8%)	4 (17.4%)	3.48 (1.63-7.42)*	
	Day to day eating practices	1-2 days	21 (37.5%)	3 (14.3%)	13 (61.9%)	4 (19.0%)	1 (4.8%)	Reference
		3-4 days	14 (25%)	0 (0.0%)	11 (84.6%)	2 (15.4%)	0 (0.0%)	1.03 (0.34-3.08) <sup>†</sup>
		5-6 days	14 (25%)	0 (0.0%)	9 (60.0%)	0 (0.0%)	6 (40.0%)	2.89 (1.14- 7.32)*
		7 days	7 (12.5%)	0 (0.0%)	5 (71.4%)	1 (14.3%)	1 (14.3%)	1.76 (0.54-5.66) <sup>†</sup>
Home	14 (25%)	0 (0.0%)	12 (75.0%)	3 (18.8%)	1 (6.2%)	Reference		
Street vendors, franchised stores: (KFC/ Burger King/ Pizza hut)		42 (75%)	3 (7.5%)	26 (65.0%)	4 (10.0%)	7 (17.5%)	1.70 (0.69-4.18) <sup>†</sup>	

Note: \*p<0.05, <sup>†</sup>p>0.05.

**Table-4:** Effects of fast food day to day eating practice, manufacturing place on general BMI cut-off points for all males and females

and obese, while the mean age of females was 7.33, 9.34, 8.57 and 8.87 respectively for underweight, average, overweight and obese children (Table 2 & 3). Male & female children ages 7.98-9.07 years and 7.98-9.17 years are more prone to being overweight and obese respectively.

**Assessment of the frequency of fast food consumption**

Figure 2 showed that the consumption prevalence in some fast foods was very high for both sexes. According to our data, 40.56% (44% in males vs 37.5% in females) in the last week had at least one type of fast food consumption including noodles (31.8%), chips (37.1%), burger (15.9%), pizza (5.3%), sandwich (8.48%), rissole (19.08%), potato rissole (15.9%), fried chicken (10.6%), french fries (16.96), chickpea (11.66%), water balls (13.78%), mixed crispy (16.96%), cake (21.2%), pastry (10.6%), chocolate (12.72%), ice cream (15.9%), sweets (9.54%), and cold drinks (20.14%).

According to our study, overall 42 (84%) male students ate fast foods as tiffin of which 14 (28%) students ate homemade, and 28 (56%) students ate restaurant made. On the other hand, 42 (75%) female students ate fast foods as tiffin of which 28 (50%) students ate homemade, and 14 (25%) students ate restaurant made. So, this study also showed that male students ate less homemade fast foods as tiffin than females and ate more fast foods from restaurants as tiffin than females.

Association between fast food consumption and manufacturing sources and general BMI cut-off points

For factors influencing BMI cut-off points, we found in males that eating practice for 3-4 days also significantly associated with BMI cut-off points (OR: 10.66, 95% CI = 2.26–50.24, p-value <0.05); fast food manufacturing at outside rather than in-home had a positive effect on the frequency of BMI classification (OR: 3.48, 95% CI = 1.63–7.42, p-value <0.05) (Table 4).

For factors influencing BMI cut-off points, we found in females that eating practice for 5-6 days also significantly associated with BMI cut-off points (OR: 2.89, 95% CI = 1.14–7.32, p-value <0.05); but fast food manufacturing at outside rather than in-home having no positive effect on the frequency of BMI classification (OR: 1.70, 95% CI = 0.69–4.18, p-value >0.05) (Table 4).

**DISCUSSION**

In developing countries like Bangladesh, fast food eating plays a major role in being overweight and obese.<sup>19</sup> In the present study, we provided a comprehensive evaluation of fast food consumption scenarios based on data from 106 participants at two different schools, in Dhaka Bangladesh. In this study, 14.3% of the female students were found to be obese and 12.5% were found to be overweight. This study may be compared to a study which showed that prevalence rates of overweight and obesity among children in Bangladesh varied widely from 1.0% to 20.6%.<sup>20</sup> Saha et al. found that most of the male (63.64%) & female (62.5%) obese students were in the age group of 7.92-9.17 years and 7.92-10.42 years respectively<sup>21</sup> and the current study

findings also declare the same age ranges as more prone to being overweight and obese. A study conducted in 2014 by Rahman et al.<sup>22</sup> revealed that male children were 1.35 times higher risk of being obese than females while the current study found this as 2.38 times and we seem this as may be due to the availability of *fast foods become extremely easier than previous*. According to our study, 40.56% (44% in males vs 37.5% in females) had at least one type of fast food consumption in the study week which is consistent with the results of the study conducted by Kayisoğlu & İçöz.<sup>23</sup>

In our current findings, it was found that 44% male children and 37.5% female children consumed fast foods 1–2 days, 20% male children and 25% female children consumed fast foods 3–4 days in a week, 30% male children and 25% female children consumed 5–6 days per week, 6% male children and 12.5% female children consumed fast foods weekly. This study may be compared to a study which showed that 14.7% of males and 9.6% of females consumed fast foods daily, 44% male children and 33.3% female children consumed fast foods few times a week, 18.6% male children and 27.2% female children consumed weekly.<sup>23</sup> In this study, male students who consumed fast foods for 3–4 days a week (Odds: 10.66, 95% CI: 2.26-50.24), 5–6 days a week (Odds: 2.20, 95% CI: 0.95-5.11) and a week (Odds: 0.06, 95%: 0.005-0.85) were observed as a potential risk factor towards overweight or obesity. And in females, who consumed fast foods for 3–4 days a week (Odds: 1.03, 95% CI: 0.34-3.08), 5–6 days a week (Odds: 2.89, 95% CI: 1.14- 7.32) and a week (Odds: 1.76, 95%: 0.54-5.66) were observed as a potential risk factor towards overweight or obesity in this study. These potential risk factors were not similar to the study conducted by Alam et al.<sup>24</sup> where eating fast food both for 3–5 days per week (AOR = 3.67, 95% CI: 1.54–8.75) and for 6–7 days per week (AOR = 3.05, 95% CI: 1.04–8.92) were observed as a potential risk factor towards overweight or obesity. Findings also described that both male (56%) and female (75%) children preferred fast foods from outside rather than home-made ones.

## CONCLUSION

The prevalence of fast food consumption and obesity/overweight in Bangladeshi students is high. Studying in both governmental and nongovernmental schools, the prevalence of overweight and obesity is more evident to male children than to female children. High consumption of sugar, saturated fat, salt, and calorie in childhood can cause weight gain, and consequently obesity. Healthy nutrition interventions need to occur early in childhood to prevent or reverse the adverse health effects of overweight and poor eating habits. Childhood is a critical period for diets of high nutritional quality as the physiological need for nutrients is high relative to energy needs. Also, many core eating habits and behavioral patterns are developed that may persist throughout adulthood. Schools can provide an important opportunity for prevention, because they provide the most effective method of reaching large numbers of people, including youth, school staff, families, and community members. So, healthy

food and improved nutrition should be a high priority on every school agenda because of the positive effect on child well-being, and subsequent enhanced learning ability and academic performance. Additionally, policies and strategies from government agencies are needed to tackle this rapidly growing issue in a timely and appropriate manner.

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