

# The Effect of Dietary Practices on the Physical and Mental Well-Being Status of Bangladeshi Adolescents: A Nationwide Cross-Sectional Study

Sumaia Sahrin<sup>1\*</sup>, Ayesa Begum Nila<sup>1</sup>, Md Riazul Islam<sup>2</sup>, Mafruha Shoshi<sup>1</sup>, Sabiha Sultana<sup>2</sup>

<sup>1</sup>Department of Human Nutrition and Dietetics, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh

<sup>2</sup>Department of Biochemistry and Food Analysis, Faculty of Nutrition and Food Science, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh

## Authors Email:

Sumaia Sahrin: s.sahrin[at]pstu.ac.bd  
Ayesa Begum Nila: ayshanila1421[at]gmail.com  
Md Riazul Islam: nstriazulraaz[at]gmail.com  
Mafruha Shoshi: mafruha.shoshi[at]gmail.com

## Corresponding Author:

Sumaia Sahrin\*: s.sahrin[at]pstu.ac.bd

**Abstract:** *The study aimed to identify the impact of dietary practices on the physical and mental well-being status of Bangladeshi Adolescents. The web-based cross-sectional survey was carried out among 8900 high school and college students between March 12 to May 16, 2020. Questionnaires on three encouraged dietary behaviors (consumption of fruits, vegetables, and milk) and three discouraged behaviors were used to know participants' eating habits (skipping breakfast and consumption of fast food and soft drinks). Participants were also asked about their general and oral health, happiness, sleep satisfaction, stress, depressed mood, and suicide ideation. After adjusting for sex, school grade, residential region, socioeconomic position, and other dietary habits, excessive fast food and soft drink consumption, as well as frequent breakfast skipping, were all linked to poor physical and mental health. In addition, a high diet of fruits, vegetables, and milk was linked to higher overall health, oral health, happiness, and sleep satisfaction. In a large nationally representative sample of adolescent in Bangladesh, evidence was found that good dietary practices have beneficial effects on individuals physical and mental wellbeing status.*

**Keywords:** adolescent, dietary practices, physical and mental wellbeing

## 1. Introduction

Adolescents have experienced significant physical, neurological, cognitive, emotional, social, and behavioral development so that they are more susceptible to environmental changes. [1] At this stage, various health-related behaviors begin that can affect future life, such as smoking and drinking, obesity, lack of physical activity, [2] and many mental disorders. [3] Also, compared to teens with low-risk lifestyles, teens with high-risk lifestyles are more likely to be in poor health during adolescence and adulthood. [4] Research on youth appears to be critical, because adolescent behavior affects future health. Eating habits have a great impact on the development and health of adolescents. On the other hand, compared to children or the elderly, adolescent health has received much less research. [5] Several recent studies have been published on adolescent eating behaviors and their relationship to health, although they focus on how eating behaviors are related to externalized behaviors (such as hyperactivity) rather than internalized behaviors (such as symptoms of depression, anxiety). [6] The link between eating habits and internalizing behavior has received more attention recently, [6-8] although the results so far are not consistent, more research is needed. Although a meta-analysis [6] found consistent evidence that unhealthy foods are linked to poor mental

health, it could not find consistent evidence that nutritious foods can improve adolescent mental health. Significant changes in the lifestyles of adolescents in Bangladesh have recently been observed. An important change is your eating habits. Adolescents in Bangladesh received more westernized diets, which resulted in weight and height gain and delayed onset of puberty. [9] Teenagers who follow a Western-style diet are less likely to eat fruits, vegetables, dairy products, and whole grains, but prefer non-alcoholic beverages and fast food. [10] Several studies have analyzed the dietary trends of adolescents in Bangladesh and their links to health problems, such as risk factors related to obesity, [11] depression, [12] and distorted body image. [13] To the best of our knowledge, no studies have examined the connection between various dietary habits and various physical and mental health outcomes of adolescents in Bangladesh. In a representative sample of adolescents in Bangladesh, the current study analyzes the link between eating patterns and self-reported physical and mental health.

## 2. Methods

### Data sources

From March 12 to May 16, 2020, a web-based cross-sectional survey was conducted to correlate dietary behavior and perceived physical and mental health of adolescents in

Bangladesh. Data was collected online using snowball sampling technology, in which the research team distributed the survey link to all districts in Bangladesh using the following methods. Initially, seven participants were sampled to begin making snowballs. They then shared links between 10-19 year-old Bangladeshi residents, high school students and college students. A total of 8,450 respondents (3500 high school students and 4950 college students) from all regions participated in the survey.

### Procedures

Predictors include three encouraged eating behaviors (i.e., eating fruits, vegetables, and milk) and three discouraging eating behaviors (i.e., skipping breakfast, eating fast food, and cold drinks), which are based on adolescent-based dietary guidelines. [14] research team asked them how often they engaged in each type of eating behavior in the past week; Based on their responses, the participants of the six eating behaviors were divided into two groups. To skip breakfast (excluding milk or juice), participants were divided into high skipping group (skipping 5 times or more per week) and low skipping group (skipping less than 5 times per week). For the consumption of fast food (such as pizza, burgers, fried chicken) and cold drinks, they are divided into groups of consumption of high (3 times or more per week) and low frequency (less than 3 times per week). For the consumption of vegetables, they are divided into high consumption (two or more per day) and low frequency consumption (less than twice a day). For the consumption of fruits (excluding juice) and milk (including white milk and flavored milk), they are divided into groups of high consumption (one or more times a day) and low-frequency consumption (less than once a day). Eating behavior should be considered as a whole, because they are interrelated. [15] Therefore, the eating behavior score is a discouraged behavior that is calculated by adding 1 point to each encouraged eating behavior. Therefore, the score for this eating behavior ranges from 0 to 6, and the higher the score, the healthier the behavior.

Sociodemographic variables include gender, school performance, residential area (that is, rural area, small city or large city), and perceived socioeconomic status (SES). 17 Socioeconomic status is assessed on a 5-point Likert scale (for example, (i) low, (ii) low-middle, (iii) middle, (iv) middle-high, and (v) high.[16]

Outcome variables include seven physical and mental health variables. General health and self-rated oral health are assessed by the following questions: "How do you normally feel?" And "In general, what do you think of your oral health, such as healthy teeth and gums?", Respectively. The response options are: (i) very healthy, (ii) healthy, (iii) average, (iv) unhealthy, or (v) very unhealthy. Self-perceived happiness is assessed by the following questions: "How happy do you usually feel?" Participants chose one of the following answer options: (i) very happy, (ii) happy, (iii) fair, (iv) unhappy or (v) very unhappy. Use the following questions to evaluate your sleep satisfaction: "Did you have enough sleep to overcome fatigue in the past 7 days?" The following response alternatives were available to participants: I very adequate, (ii) adequate, (iii) Average, (iv) not adequate, or (v) not very adequate. Perceived stress is

measured by the question "How much stress do you usually have?" Participants chose between (i) very much, (ii) somewhat, (iii) average, (iv) not so much, or (v) not at all. For all of the above questions, participants were divided into the following groups: those who chose option 1 or 2 were classified as "above average group", and those who chose options 3 to 5 were classified as "average or Below average" group. [16, 17]

### Data analysis

For statistical analysis, we used multiple logistic regression analysis to calculate the association between each physical and mental health variable (main outcome) and each eating behavior (main predictor variable) after adjusting for sex, school grade, residential area, SES, and dietary behaviors other than principal predictor. Odds ratios and 95% confidence intervals were derived. In order to investigate the relationship between overall healthy eating behavior and perceived health status, using perceived health as the main outcome variable, eating behavior score as a predictor, and adjusting gender, grade, school, residential area and region, a series of logistic regression analysis was performed. We use SPSS Statistics 21.0 (IBM Corp., Armonk, NY) to define statistical significance as an alpha level of 0.05. To obtain the Bonferroni-corrected p-value, we divide the original  $\alpha$ -value by the number of analyses performed on the dependent variable. Therefore, after Bonferroni correction, the statistical threshold was adjusted to 0.008 ( $P = 0.05 / 6$  eating behavior).

### 3. Results

Table 1 shows the demographic characteristics of the participants. Approximately 27% of participants skipped breakfast five or more days a week, 31% drank soft drink 3 or more times a week, and 20% ate fast food 3 or more times a week.

**Table 1:** Demographic and health characteristics of Bangladeshi adolescents (n=8900)

	n%
<b>Sex</b>	
Male	5447(61.2)
Female	3453(38.8)
<b>Educational status</b>	
Secondary grade	1965(22.0)
Higher secondary grade	6935(78.0)
Age, mean $\pm$ SD (years)	16.98 $\pm$ 1.34
Weight mean $\pm$ SD(kg)	58.36 $\pm$ 11.34
<b>Residence</b>	
Rural	1100(12.3)
Urban	4130(46.4)
Sub Urban	3670(41.3)
<b>Socioeconomic status</b>	298(3.3)
Lower class	3730(41.9)
Lower middle class	4167(46.8)
Upper middle class	705(7.9)
Higher class	
<b>Dietary behaviors</b>	2490(27.9)
Skipping breakfast $\geq$ 5 days/week	2869(32.2)
Fruits $\geq$ 1 times/day	2380(26.7)
Vegetables $\geq$ 2 times/day	2167(24.3)
Milk $\geq$ 1 times/day	1800(20.2)
Fast food $\geq$ 3 times/week	2803(31.4)
Soft drinks $\geq$ 3 times/week	

As shown in Table 2, all discouraged dietary practices were related to lower odds of good physical and psychological state. All encouraged dietary practices were related to higher

odds of perceived general health, oral health, happiness, and sleep satisfaction however no association with perceived stress or depressive mood.

**Table 2:** Associations of every dietary practice with health status of Bangladeshi adolescents

	Skipping breakfast ≥5 days/week AOR (95% CI)	Fruits ≥1 times/day AOR (95% CI)	Vegetables ≥3 times/day AOR (95% CI)	Milk ≥2 times/day AOR (95% CI)	Fast food ≥3 times/week AOR (95% CI)	Soft drinks ≥3 times/week AOR (95% CI)
Perceived general health	0.83(0.80–0.87)*	1.12 (1.00–1.25)*	1.33 (1.27–1.39)*	1.28(1.19–1.37)*	0.80 (0.75–0.85)*	0.89 (0.84–0.94)*
Perceived oral health	0.85(0.83–0.87)*	1.25 (1.11–1.28)*	1.33 (1.31–1.35)*	1.14 (1.12–1.16)*	0.87 (0.84–0.90)*	0.80 (0.77–0.83)*
Perceived happiness	0.83 (0.81–0.86)*	1.18 (1.11–1.26)*	1.20 (1.16–1.25)*	1.10 (1.03–1.18)*	0.82 (0.80–0.85)*	0.87 (0.83–0.91)*
Perceived sleep satisfaction	0.83 (0.80–0.86)*	1.13 (1.06–1.20)*	1.17 (1.15–1.20)*	1.11(1.04–1.18)*	0.81 (0.79–0.83)*	0.83 (0.80–0.87)*
Perceived stress	1.31 (1.29–1.34)*	0.97 (0.94–1.00)	1.02 (0.98–1.06)*	0.99 (0.97–1.01)	1.25 (1.21–1.30)*	1.18 (1.12–1.25)*
Depressive mood	1.21 (1.13–1.29)*	1.01 (0.97–1.06)	1.02 (0.97–1.08)	1.02 (0.96–1.08)	1.40 (1.33–1.48)*	1.26(1.20–1.31)*

- Adjusted for sex, school grade, residential area, socioeconomic status, and other dietary practices
- AOR, adjusted odds ratio; CI, confidence interval.
- \*P < 0.001.

As shown in Table 3, healthier dietary practices was related to higher odds of perceived general health, oral health, happiness, and sleep satisfaction, and lower odds of perceived stress and depressive mood.

**Table 3:** Association of adolescents' dietary practices scores with individual's health and health habits in Bangladesh

	Dietary practices scores (per 1 score increase)AOR (95% CI)
Perceived general health	1.18 (1.17–1.19)*
Perceived oral health	1.24 (1.22–1.27)*
Perceived happiness	1.19 (1.17–1.21)*
Perceived sleep satisfaction	1.15 (1.14–1.16)*
Perceived stress	0.89 (0.87–0.92)*
Depressive mood	0.88 (0.86–0.91)*

- Adjusted for sex, school grade, residential area, and socioeconomic status.
- AOR, adjusted odds ratio; CI, confidence interval.
- \*P < 0.001.

#### 4. Discussion

As indicated by our outcomes, debilitate dietary practices (for example frequently skipping breakfast, consuming fast food, drinking soft drink) were reliably connected with lower odds of perceived general health, oral health, happiness, and sleep satisfaction, and higher odds of perceived stress, depressive mood, and suicidal ideation. Encouraged dietary behaviors (i.e. fruits, vegetables, milk consumption) were only associated with higher odds of perceived general and oral health, happiness, and sleep satisfaction. These outcomes are viable with a previous meta-analytic investigation revealing steady relationship between undesirable food varieties and more terrible psychological wellness, however conflicting relationship of quality food sources with better mental health.

Bangladeshi teenagers that habitually skip breakfast would in general have lower perceived physical and emotional wellness. This outcome is predictable with previous investigations showing that people who as often as possible

skip breakfast have perceived general wellbeing and higher anxiety, discouraged inclination, and enthusiastic distress. [18,19] Adolescents who skip breakfast frequently have an undesirable lifestyle [20] like consuming snacks between main meals, food varieties high in sucrose, and liquor more regularly than do the individuals who routinely eat breakfast. [21] This relationship could be clarified by the part of carbohydrates. At the point when individual quick during rest, their blood glucose focus diminishes, while adrenalin and cortisol are delivered, creating crabbiness and anxiety. [22] When people have breakfast, cortisol creation is decreased, prompting a lower level of apparent pressure and positive mood. [23] Therefore, skipping breakfast is related with more regrettable physical just as more awful emotional wellness among teenagers.

The frequent consumption of fast foods was related to the deterioration of physical and mental health. Frequently consumed fast foods have adverse effects on personal health, such as endothelial dysfunction, inflammation and cardiovascular disease (CVD). [24, 25] This decreased physical health, in turn, can impact mental health (e.g. depression) [26, 78], Fast food consumption is related to low happiness, [28] high depression,[29], mental problems (for example, stress, misery, confusion, disappeared, tension, hostile and not valuable). [30] However, stress and depression might also increase consumption of fast food, leading to physical health problems. [31]

Soft drink beverages are consistently associated with type 2diabetes and metabolic disorder, and dental care. [32, 33]. This can be explained by the association between the consumption of soft drinks and a higher energy intake. Drinking soda has a high glycemic index, which causes people to eat more fast food [34], which in turn can be detrimental to their health. [35] Drinking soda is associated with depression, stress-related problems, suicidal ideation, [36] psychological distress. Sugar-sweetened soft drink is also associated with hyperactivity, [37] behavior problems, and drowsiness. [38]

Regular consumption of fruits and vegetables is associated with a higher probability of perceiving general health, oral health, well-being, and sleep satisfaction. According to previous research, [39, 40] eating fruits and vegetables can reduce the risk of cardiovascular disease, cancer, and even all-cause mortality. The fiber contained in fruits and

vegetables is associated with a lower risk of cardiovascular disease [41], obesity [42] and cancer. [43] In addition, fruits and vegetables contain vitamins and minerals that can prevent various physical illnesses [44] and poor sleep. [45] With regard to oral health, studies on fruit consumption have found that eating vegetables and greens can reduce the risk of oral cancer by 49% and 50%, respectively. [46] However, as noted in a previous meta-analysis, the effects of eating fruits and vegetables on mental health are inconsistent, so more research is needed to clarify the relationship.

Teens who drank milk one or more times a day were more likely to perceive overall health, oral health, well-being, and sleep satisfaction. This is consistent with previous research, showing that dairy products can reduce the risk of chronic diseases such as hypertension [47], type 2 diabetes, and metabolic syndrome [48] and improve sleep satisfaction 46 and oral health. 34 In addition, low milk intake during adolescence can lead to low bone mass and fracture risk in adulthood. [49]

Although none of the encouraged eating behaviors has an effect on perceived stress or depression, overall healthy eating behaviors (i.e., more encouraging eating behaviors and less depressive behaviors has a specific impact on eating behavior) is related to the better self-perception of physical and mental health in Korean adolescents. The lack of observation of the mental health benefits of stimulating eating behavior may be because less than 30% of participants met the recommended daily intake of these recommended foods. However, more research is needed to clarify the relationship between healthy food consumption and mental health.

## 5. Conclusion

In conclusion, the present study shows association between dietary practices and wellbeing status among 8900 adolescents from a nationally representative sample. The results demonstrate that discouraged dietary propensities have relatively detrimental impacts on individual's physical and mental health in Bangladeshi youths. Instruction on healthy dietary practices is required for young people who skip breakfast regularly and who frequently eat fast food and consume soft drinks.

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## 7. Declaration of Interest Statement

The authors declare no conflicts of interest.

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