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Dietary Pattern and Nutritional Status of School-going Adolescents in Rural Areas of Bangladesh

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Abstract
Adolescence is a critical phase marked by rapid physical, cognitive, and psychosocial development. This study investigated the dietary patterns and health status of school-going adolescents in rural areas of randomly selected areas of Bangladesh. A cross-sectional study involving 378 participants. Data on socio-demographics, meal consumption patterns, food item frequencies, stunting, and BMI distribution were collected and analysed using descriptive statistics and chi-square tests. Socio-demographic analysis revealed diversity with variations in gender, age, parent's income, and occupation. Food consumption patterns indicated a preference for traditional three meals a day (64.3%). Moreover, daily dietary practice showed that 23.0%, 19.6%, and 6.0% of adolescents in rural areas do not intake fruit, chicken/fish, and vegetables, respectively, at least once a day, while 26% of participants consume fast food regularly. Therefore, BMI analysis showed 37.3% were overweight. Stunting prevalence was 36.0%, with 2.9% severely stunted. Significant associations were found between stunting severity and BMI categories (p < 0.001), gender (p = 0.003), and parents' monthly income (p < 0.001). Gender showed a strong association with BMI categories (p < 0.001), indicating nutritional variations, while age did not exhibit a significant association with BMI of adolescent. In conclusion, the study highlighted complex associations between stunting severity, BMI categories,

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class levels, and gender among rural adolescents in Bangladesh. Interventions to promote regular balanced diet consumption among school-going children are very important to address nutritional disparities and promote holistic adolescent health in the rural areas of Bangladesh.

Introduction

This research is intended to evaluate the nutritional status and eating habits of adolescent girls and boys enrolled in secondary schools in rural areas using a cross-sectional survey among school-going adolescents in randomly selected three different parts of Bangladesh. Then, the correlation between various socio-demographic parameters, including age, gender, and economic status, and the intake of daily diet patterns of the participants, BMI, and stunting category were evaluated.

Adolescence is a significant period in human life during which individuals undergo physical, cognitive, and psychosocial growth ending with gaining the ability to legally be independent of parents or guardians. There are an estimated 1.3 billion adolescents in the world today, which is 16% of the total population.[1] The UN define adolescence as the years from 10 to 19 years of age, although the WHO extends it to include people up to 24 years of age.[2] In this period, adolescents need a higher protein intake, adequate vitamins, minerals, and micronutrients due to the rapid linear growth and bone accretion.[3] Compared to younger children, adolescents generally prefer snack more, skip meals, eat outdoors, eat late, and eat fast food more frequently which is typically impacted by their body image, peers, and the media. It is also a common time for the initiation of other unhealthy habits, such as drinking, smoking, and lethargy.[4,5] In addition, adolescent health is also influenced by community determinants, risk factors, health protective measures, genetic factors, and changing social roles. Household factors, such as sociodemographic and economic status, as well as community factors including land availability and customs also play a role.[6,7] Therefore, overall poor dietary patterns and inadequate intake of nutrients can attribute moderate and severe primary or secondary malnutrition which may adversely modulate the progression of development and adult height.[8,9] A lack of micronutrients, a higher chance of increasing rates of overweight and obesity among adolescents and related diseases.[10] Studies in low- and middle-income countries have shown that early childhood undernutrition can lead to stunting, elevated cortisol levels, and reduced mental ability in school-age offspring.[9] Another study found that adolescents in South Asia are particularly vulnerable to undernutrition, with over 60% of school going adolescent consuming inadequate amounts of essential nutrients for proper body growth.[11]

The investigation of dietary pattern of adolescents is particularly significant in rural areas of developing countries like Bangladesh, where nutritional practices and access to diverse foods may be limited because of various reasons. For example, a study revealed that dietary patterns are frequently influenced by cultural practices, food availability, and economic constraints in Bangladesh.[12] Another, research reported that adolescents in semi-urban regions are more likely to consume a diet lacking in essential nutrients, which can lead to deficiencies and associated health issues.[13] Common dietary inadequacies include insufficient intake of fruits, vegetables, and protein-rich foods, coupled with a higher consumption of carbohydrates and fats.[14,15]

In efforts to improve the dietary patterns and health status of adolescents in urban, semi-urban, and rural areas, it is very important for a country to enhance nutritional education, improve food security, and foster healthier eating habits to ensure a healthier adolescent population.[16-18] There is a notable gap in comprehensive data regarding adolescent health in Bangladesh, particularly for rural areas. Limited studies have been conducted to understand and address the health status of adolescents, where healthcare facilities are less accessible compared to urban areas.

This study aims to assess dietary patterns and nutritional status of school going adolescent in rural areas by conducting a survey among the adolescent girls and boys attending secondary school. In addition, the association of stunting with dietary habits and some socioeconomic factors is also being explored here. We believe the findings of this study will help for increasing the awareness

and knowledge about balance diet intake among adolescents and policymakers formulate policies and strategies for the well-being of adolescent's health.

Materials and Methods
Study Area
This study was involved for the collection of data like socio-demographic characteristics, anthropometric measurements, and dietary habits of school-going adolescents in 12 randomly selected high schools in the rural area of three different parts of Bangladesh. The first area was the Savar area in Dhaka district, which is in the central part of the country; the second one was Cumilla district, located in the southeastern part; and the third area was Nougan district in the northern part of Bangladesh.

Study Population
The study population consisted of school-going adolescents aged 12 to 19 years. A total of 378 data points were collected from March to October 2023 from the students who were willing to participate. Socio-demographic characteristics, dietary habits, and other information about the participant were collected by face-to-face interview following a structured questionnaire. No one was forced to complete the questionnaire. Students below 12 years and above 19 years were not included in this study.

Sample Size Calculation
The sample size was calculated using the following equation [19]:

$$n = \frac{z^2 pq}{d^2}$$

Here, n = number of samples
z = critical value of the normal distribution
p = expected prevalence estimate
q = (1-p) = expected non-prevalence
d = precision limit or proportion of sampling error
The critical value (z) is included as 1.96 for a 95% confidence level. The precision limit, or proportion of sampling error (d), is usually considered to be a 5% confidence limit.

Therefore,

$$n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.05^2}$$

$$\Rightarrow n = 384.16$$

Assuming a 10% non-response rate, a sample size of 384 ≈ 378 participants was estimated.

Data Collection
The methodology adhered to a systematic and structured approach, encompassing the development of questionnaires, recruitment of study participants, rigorous data collection, and subsequent analysis. The questionnaire consisted of mixed-type (both open-ended and closed-ended) questions about dietary patterns, body-related measurements, and other various topics. Closed-ended items consisted of yes-or-no options, and in many cases, answers were predetermined. In open-ended items, space was provided for supplementary comments. Questionnaires were developed to collect information on socio-economic conditions, personal characteristics, dietary intake, and food habits. Dietary information was collected as part of the previous seven-day recall. Food measurements were based on servings, with one serving equalling one cup. The random sampling technique was used to ensure that the sample is representative of the population, reducing selection bias. Anthropometric measurements like height and weight of participants were measured using a stadiometer and weighing scale, respectively. The BMI of each participant was computed by using the formula weight (kg)/height (m^2) and was graded in different grades of nutritional status according to WHO guidelines.[20] Conducted a pilot test of the data collection tools to identify any issues, such as ambiguous questions or technical problems, and make necessary adjustments before the main data collection. In addition, provide training to all data collectors to ensure they understand the study protocol, the data collection instruments, and ethical considerations.

All procedures were conducted in accordance with the principles for human investigations (i.e., Helsinki Declaration). Participants were informed about the procedure and purpose of the study and the confidentiality of the information provided. All participants consented willingly to participate. A written consent was obtained from the parents or guardians of every participant prior to collecting information following a structured questionnaire.

Data Analysis Instruments
All data were analysed using SPSS version 25.0 (SPSS Inc., Chicago, II, USA). Descriptive statistics

(percentage, frequency, mean, etc.) and inferential statistics (p-value) were executed in the study. A chi-square test was used to evaluate the correlations between various kinds of variables. A p-value of <0.05 was set as statistically significant.

Results

The sociodemographic information of the participants is summarized in Table 1. The data were organized into categories such as gender, age, education, parents' income, and parental occupation, with both the numerical count (n) and corresponding percentages (%) provided for each category. The gender distribution shows 165 males (43.7%) and 213 females (56.3%), indicating a slight female majority. The age distribution reveals that 168 individuals (44.4%) fall within the 12 to 14 age categories, 31.5% are in the age range of 15 to 17, while 24.1% of participants are aged between 18 and below 20 years. In terms of education, 71

students (18.5%) adolescents are studied at the higher secondary level, while 40.2% are at the primary level, and the rest of them (about 41.3%) are at the secondary level. Economic perspectives, as reflected in parents' income, exhibit diversity. Those with an income of 20,000 BDT and above constitute the largest group at 43%, followed by 15,000 to 20,000 BDT (35.1%), 10,000 to 15,000 BDT (14.6%), and 5,000 to 10,000 BDT (7.4%). Occupationally, a majority of fathers are involved in farming (32.8%), followed by service holders (29.0%), businessmen (23.5%), and others (14.6%). Mothers, on the other hand, are predominantly housewives (79.6%), with a smaller percentage engaged in service roles (16.9%) and a minor proportion falling into the 'Others' category (3.4%). Beyond theses, the habit of meal intake in a day of the participants shows that 25.4% skip a meal (mostly breakfast) in a day, while about 57% take their meal.

Table1: Socio demographic information of the respondents (n=378)

Variables		Number (n)	Percentage (%)
Gender	Male	165	43.7
	Female	213	56.3
Age category	12 to 14	168	44.4
	15 to17	119	31.5
	18 to below 20	91	24.1
Formal education (standard)	Primary	152	40.2
	Secondary	155	41.3
	Higher secondary	71	18.5
Parent's income (BDT)	5000 to 10000	28	7.4
	10000 to 15000	55	14.6
	15000 to 20000	133	35.1
	>20000	162	42.9
Father's Occupation	Service holder	110	29.0
	Farming	124	32.8
	Businessman	89	23.5
	Others	55	14.6

Table 2 provides a detailed overview of the daily dietary patterns of adolescents in rural areas of Bangladesh. The majority of adolescents (62%) consume rice or bread three times daily. Around 90% of adolescents consume chicken at least once a day, whereas 37% do not consume fish at all. A significant portion (60.3%) consumes vegetables at

least once daily, while 44.4% do not eat any fruits regularly. Additionally, nearly 39% consume milk or milk products regularly, whereas 46% of adolescents consume sometimes. Around 26% of adolescents eat fast food regularly, and 29% consume red meat twice, whereas 26% of adolescents do not eat at all. This table clearly indicates that a remarkable

percentage of adolescents in the rural area do not consume fish, vegetables, and fruits regularly, whereas they prefer carbohydrate-rich foods like rice and bread in their daily meals.

Table 2: Daily dietary habits of the respondents

Category of Food	Duration (per day)	Frequency (n)	Percentage (%)
Number of meals	>3-times	67	17.7
intake per day	3-times	215	56.9
	2-times	96	25.4
Rice/bread consumption	3 times	271	61.9
	2 times	96	25.7
	1time	11	12.4
Fish consumption	2 times	74	19.6
	1 time	163	43.1
	Do not eat	141	37.3
Chicken consumption	2 times	116	30.7
	1 time	223	60.0
	Do not eat	39	10.3
Red meat consumption	2 times	110	29.1
	1 time	187	44.5
	Do not eat	81	26.4
Vegetables consumption	3 times	20	5.3
	2 times	106	28.0
	1 time	228	60.3
	Do not eat	24	6.3
Fruits consumption	3 or more	18	4.8
	2 in a day	60	15.9
	1 in a day	213	56.3
	Do not eat	87	23.0
Milk/milk products	Yes	185	38.9
	Sometimes	136	46.0
	No	57	15.1
Fast foods consumption	Regularly	98	25.93
	Sometimes	112	29.63
	No	168	44.44
Ready-to-eat or "instant" foods	Regularly	57	15.1
	Sometimes	143	37.8
	No	178	47.1

Table 3 shows that according to the BMI category, the majority percent of adolescents (about 70%) fall within the normal category, suggesting a healthy stature; only 20% are underweight, and the rest are overweight (8%) and obese (2%). By the Waterlow classification, 63% and 24.2% of adolescents were found in the normal and mild under nutritional categories, respectively.[21] In addition, 9.3% were moderate and 2.9% were severe stunting, respectively.

It is essential to understand the factors associated with stunting of adolescents in order to develop effective interventions. Therefore, this study examines the associations of stunting with gender, age and parents' monthly income of adolescents. Table 4 presents the distribution of stunting categories (Normal, Mild, Moderate, and Severe) across various characteristics. The chi-square (χ2) values and p-values for each characteristic's association with stunting are also provided. Gender

shows a significant association (χ2 = 19.500, p = 0.003), with the highest percentage of normal stunting observed in male (71%) compare to the female adolescent (68%). Age, also significantly associated with stunting (χ2 = 31.509, p < 0.001), with younger age groups (12 to 14 years) having a higher percentage of normal stunting (70.0%) compared to older age groups (18 to below 20 years) at 54%.

Table 3: Nutritional status of the adolescent according to BMI category (kg/m^2) and Waterlow stunting classification

BMI category (kg/m^2)		Waterlow classification	
Weight category	**n (%)**	**Undernutrition categories**	**Stunting n (%)**
Underweight	76 (20.1%)	Normal	240 (63.6%)
Normal weight	263 (69.6%)	Mild	92 (24.2%)
Overweight	31 (8.2%)	Moderate	35 (9.3%)
Obese	8 (2.1%)	Severe	11 (2.9%)

*Here, Underweight (BMI <18.5); Normal (BMI, 18.5-24.9); Overweight (BMI, 25-29.9); Obesity (BMI, 30-34.9); Extreme Obesity (BMI, ≥35).[20]

Table 4: Correlations of stunting categories with the gender, age and family income of respondents

Categories			Stunting Category				Total	χ2 value	p-value
			Normal	**Mild**	**Moderate**	**Severe**			
Gender	Male	n	117	35	8	5	165	19.500	0.003
		%	70.9%	21.2%	4.8%	3.0%	100.0%		
	Female	n	144	55	8	6	213		
		%	67.6%	25.8%	3.8%	2.8%	100.0%		
Age (years)	12 to 14	n	118	25	17	8	168	31.509	<0.001
		%	70.2%	14.9%	10.1%	4.8%	100.0%		
	15 to 17	n	72	29	13	5	119		
		%	60.5%	24.4%	10.9%	4.2%	100.0%		
	18 to <20	n	49	27	9	6	91		
		%	53.9%	29.6%	9.9%	6.6%	100.0%		
Monthly family income (BDT)	5000 to 10000	n	6	7	10	5	28	36.724	<0.001
		%	21.4%	25.0%	35.7%	17.9%	100.0%		
	10000 to 15000	n	19	22	9	4	55		
		%	36.3%	40.0%	16.4%	7.3%	100.0%		
	15000 to 20000	n	74	39	14	6	133		
		%	55.6%	29.3%	10.5%	4.5%	100.0%		
	>20000	n	126	25	8	3	162		
		%	77.8%	15.4%	4.9%	1.8%	100.0%		

In addition, about 79% of the adolescent suffers from stunning, whose parent's maximum monthly income is 10,000 BDT; among them, 18% have severe stunting problems. With an increase

monthly income over 20,000 BDT, the stunting rate decreased to 22%. This means that lower family income significantly increases the likelihood of stunting among adolescents.

Table 5a: Correlations of BMI categories with gender and age of rural adolescents

Categories			Stunting Category				Total	χ2 value	p-value
			Under-weight	Normal	Over-weight	Obese			
Gender	Male	n	28	109	19	9	165	54.888	<0.001
		%	16.9%	66.1%	11.5%	5.5%	100.0%		
	Female	n	29	120	51	13	213		
		%	13.6%	56.3%	30.0%	6.1%	100.0%		
Age (Years)	12 to 14	n	29	84	47	7	168	2.187	0.171
		%	17.3%	50.6%	27.9%	4.2%	100.0%		
	15 to 17	n	11	85	17	6	119		
		%	9.2%	71.4%	14.3%	5.1%	100.0%		
	18 to <20	n	11	52	19	9	91		
		%	12.2%	57.2%	20.8%	9.8	100.0%		

Table 5b: Correlations between BMI categories and food habits of rural adolescents

Categories			BMI				Total	χ2 value	p-value
			Under-weight	Normal	Over-weight	Obese			
Fast foods consumption	Regularly	n	-	32	39	27	98	49.572	<0.001
		%	-	32.6%	39.8%	27.6%	100.0%		
	Sometimes	n	-	68	34	10	112		
		%	-	60.7%	30.4%	8.9%	100.0%		
	No	n	34	121	13	-	168		
		%	20.2%	72.0%	7.7%	-	100.0%		
Ready-to-eat or "instant" foods	Regularly	n	5	39	9	4	57	28.762	0.003
		%	8.8%	68.4%	15.8%	7.0%	100.0%		
	Sometimes	n	11	117	15	-	143		
		%	7.7%	81.8%	3.5%	-	100.0%		
	No	n	9	141	28	-	178		
		%	5.1%	79.2%	15.7%	-	100.0%		
Red meat consumption (in a day)	2 times	n	7	83	14	6	110	3.981	p = 0.57
		%	6.4%	75.5%	12.7%	5.4%	100.0%		
	1 time	n	25	130	22	10	187		
		%	13.4%	69.5%	11.8%	5.3%	100.0%		
	Do not eat	n	16	56	9	-	81		
		%	19.7%	69.1%	11.2%	-	100.0%		

Table 5 presents the association between BMI categories (underweight, normal, overweight, and obese) and several factors such as gender, age, fast food consumption, ready-to-eat food

consumption, and red meat consumption among school-going adolescents in rural Bangladesh. As shown in Table 5a, 66.1% of males (n = 165) had a normal BMI, whereas 16.9% were underweight, 11.5% were overweight, and 5.5% were obese. A lesser percentage (56.3%) of females (n = 213) had a normal BMI. A significant correlation was found between gender and BMI, wherein a higher percentage of females (30.0%) than males (11.5%) were overweight (χ^2 = 54.888, p < 0.001). In terms of ages, 50.6% of those between the ages of 12 and 14 (n = 168) had a normal BMI, 17.3% were underweight, 27.9% were overweight, and 4.2% were obese. Between the ages of 15 and 17 (n = 119), the majority (71.4%) had a normal BMI, 9.2% underweight, 14.3% overweight, and 5.1% obese; between the ages of 18 and <20 (n = 91), the distribution was as follows: 57.2% had a normal BMI, 12.2% were underweight, 20.8% were overweight, and 9.8% were obese. Age and BMI do not statistically significantly correlate, according to the χ^2 value (2.187).

In Table 5b, of the respondents who routinely eat fast food (n = 98), 32.6% had a normal BMI, 39.8% were overweight, and 27.6% were obese, whereas 30.4% were overweight and 8.9% were obese for those who consume sometimes. The proportion of participants with normal BMI (72.0%) was highest among non-fast-food consumers (n = 168), but 20.2% of them were underweight and 7.7% were overweight. None were obese. Fast-food consumption showed a strong association with BMI (χ^2 = 49.572, p < 0.001). A normal BMI was reported by 68.4% of those who frequently consumed ready-to-eat or "instant" foods (n = 57), while 15.8% were overweight and 7.0% were obese. Among consumers, adolescents (n = 143) occasionally had the highest percentage of normal BMI (81.8%) with only 3.5% overweight, while non-consumers (n = 178) had 79.2% normal BMI, 15.7% overweight, and none obese. A considerable correlation was also seen between ready-to-eat food intake and BMI (χ^2 = 28.762, p = 0.003). Adolescents who consume red meat two times a day (n = 110) had 75.5% in the normal BMI range, 12.7% overweight, and 5.4% obese. Those who consumed 1 time a day (n = 187) had 69.5% normal BMI, 11.8% overweight, and 5.3% obese. Non-consumers (n = 81) had 69.1% normal BMI, 11.2% overweight, and none were obese.

These findings suggest that gender and dietary patterns, particularly fast food and ready-to-eat food consumption, are critical factors influencing BMI among adolescents in this population.

Discussion

This study was conducted following a structured questionnaire-based survey among 378 adolescent school students in the rural areas of Bangladesh. The traditional diet in rural areas is often rich in carbohydrates (e.g., rice), but lacks diversity, especially in terms of protein and micronutrient-rich foods.[22] The summarised results show that the dietary patterns and health status of adolescents in rural areas of Bangladesh present a complex interplay of nutritional practices, socioeconomic factors, and health outcomes. All the participants, consumed carbohydrates such as rice, bread daily with limited consumption of fruits, vegetables, and quality protein sources like fish, whereas, one-fourth of them prefer to consume fast-food regularly. Several studies reported that, this variety of diet patterns heavily influenced by local food availability, cultural practices, advertisement in virtual media, choice of friends etc.[23-25] Furthermore, the study found that parental occupation and financial stress also play a role in restricting the options for foods. Adolescents from lower income homes are more likely to be underweight because of food insecurity, while adolescents from relatively well-off families might have easier access to meals high in calories fast foods, ready-to-eat foods, soft drink which raises their risk of obesity.[26, 27]

Stunting, a condition reflecting chronic undernutrition, is a critical public health issue, particularly in developing countries. In understanding the multifactorial nature of stunting, it is crucial to examine how various factors such as BMI, gender, and age correlate with stunting among adolescents in Bangladesh. Research indicates that the prevalence of stunting tends to decrease with increasing age during adolescence (Table 4). This age-related trend highlights the importance of early intervention in nutritional programmes to prevent stunting during crucial growth periods.[28]

This study found two-thirds of adolescents (70% and 63%) in rural areas were in the normal body weight (BMI) and height (stunting) range, respectively.

This is because most adolescents in rural areas consume plenty of vegetables, local fruits, and low-cost protein sources like local fish and chicken. 20% of adolescents were underweight, a total of 10% were overweight or obese, and 12% were in the stunting category. This means the underweight of rural adolescents is higher than the other under-nutritional problems like stunting, obesity. This could be attributed to several factors, including fast urbanization, lack of physical exercise like regular playing in the outdoor field, low-cost unhealthy food, and a lack of awareness regarding the risks associated with being BMI.[29,30] Underweight rate among males was higher, whereas obese tendency among females was higher in female adolescents. Similar trends were found in studies show that boys are more likely to be underweight, while girls tend to have a higher prevalence of being overweight or obese. This may be due to several socio-cultural norms, biological factors, less physical activities by girls compare to boys.[31-33]

Another finding of this work is the correlation between BMI and food habits of adolescents. Along with several studies, our findings reported that frequent consumption of fast foods and "ready-to-eat" foods because of their taste, ease of preparation, good advertisement, etc led to increased energy intake, resulting in overweight and obesity.[34-37] Beyond this, the evidence supporting a direct association between fast food consumption and overweight/obesity in children and adolescents is scare, and still more term- research evidence is needed. Several studies identified no association between consumption of red meat, milk, and dairy (cheese excluded) and overweight/obesity in adolescents 12–18 years of age.[38,39] These results contribute to our understanding of factors influencing stunting, overweight, and obesity of adolescents in the rural area of Bangladesh, which is crucial for targeted interventions and public health strategies.

Conclusion

This study provides valuable insights into the dietary patterns and health status of adolescents in rural areas of Bangladesh. The socio-demographic analysis revealed a diverse population, with variations in gender, age, parent's income, and occupation. The majority of adolescents followed a traditional three-meals-a-day routine, with a notable percentage indicating a tendency to skip a more meal. Most of the adolescents maintain a balanced diet with a normal BMI consuming adequate amounts of vegetables, fruits, and milk products. However, over one-third of adolescents prefer higher consumption of rice/bread and frequent fast-food intake read-to-eat foods which are associated with being overweight. The prevalence of stunting was observed, with 24% as mild, 9% as moderate, and around 3% as severe. Associations were explored, revealing significant links between stunting severity and BMI of adolescents with various demographic and physical characteristics such as age, gender, parents' income, etc. Moreover, gender and food habits demonstrate a strong association with BMI categories. These findings underscore the complexity of factors influencing the dietary patterns and health status of adolescents in rural areas of Bangladesh. Targeted interventions should address nutritional disparities and consider socio-demographic nuances to promote holistic adolescent health in the region.

Conflict of Interest
The authors declare no conflict of interest. All aspects of this research were conducted impartially and independently. No financial or personal relationships with other people or organisations have influenced this work.

Data Availability Statement
This statement does not apply to this article.

Ethics Statement
This study did not involve human participants, animal, subjects, and therefore, informed consent was not required. Beyond this, prior to data

collection for this study, oral consent was taken from every participant as well as their educational institute. Moreover, this study was approved by the Institutional Review Board of Daffodil International University (DIU), Faculty of Health and Life Sciences (FHLS) (Ref: FAHSREC/DIU/2023/SMIG-12).

Clinical Trial Registration
This research does not involve any clinical trials.

Author Contributions
- **Mahfuza Mubarak:** principal investor, conceptualised, designed the study and reviewed the manuscript
- **Md. Shahinul Islam:** designed the research, prepared the draft of the manuscript and reviewed the manuscript
- **Chandon Roy:** lead the questionnaires

preparation and data collection
- **Md. Mejbah Uddin Mithu:** lead the questionnaires preparation and data collection
- **Kifayat Sadman Ishadi:** lead the questionnaires preparation and data collection
- **Ebney Sunjida Abedin:** lead the questionnaires preparation and data collection
- **Md. Farhad Alam:** lead the questionnaires preparation and data collection
- **Arif Chowdhury Apou:** analysis data and assisted in drafting of the manuscript
- **Mohammad Shahinur Karim:** lead the analysed of data and interpretation. analysed the data.
- **ABM Alauddin Chowdhury:** assisted to revise the manuscript and interpretation of statistical data.

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