Nutritional Choices and Its Association with Behavioral Difficulties and Academic Performance among the High School Students in Bangladesh

Submitted By

Umme Habiba Tanny

(MPH, Nutrition)

Student ID: 222-41-1660

Department of Public Health

Daffodil International University

Supervised By

Mr. Md. Imdadul Haque

Assistant Professor

Department of Public Health

Daffodil International University

4th May, 2024

Thesis Outline

DECLARATION

By submitting this thesis entitled **"Nutritional Choices and its Association with Behavioral Difficulties and Academic Performance among the High School Students in Bangladesh"** I declare that the entirety of the work contained therein is my own, original work, and I am the sole author of it. It is also declared that it has not been submitted elsewhere for any conferment.

Signature

_____

(Umme Habiba Tanny)

Student, MPH (Nutrition),

DIU.

CERTIFICATION

This is to certify that **Umme Habiba Tanny** has completed his dissertation entitled **"Nutritional Choices and its Association with Behavioural Difficulties and Academic Performance among the High School Students in Bangladesh"**, for the purpose of partially meeting the prerequisites for the attainment of the Master of Public Health (MPH) degree, I have undertaken the task of overseeing the process. The available information suggests that no other academic institution has previously presented the findings in this thesis for the purpose of obtaining any academic degrees or diplomas.

Signature (Supervisor)

_____

(Mr. Md. Imdadul Haque)

Assistant Professor

Department of Public Health, DIU

Board of Examiners

Acknowledgements

I would like to thank all who has assisted and supported me in preparing thesis book. First and foremost, I'd like to thank Almighty Allah for giving me the strength and opportunity to complete the report within the timeframe allotted. I'd like to take this opportunity to thank everyone who has played a role in my life eventually. I owe my existence to my parents, without whom I would not exist. I 'm extremely grateful to my Supervisor, **Mr. Md. Imdadul Haque**, Assistant Professor, Dept. of Public Health, Daffodil International University for his unwavering guidance during my thesis work period. I would like to express my heartfelt gratitude and respect to **Professor Dr. Md. Bellal Hossain**, Dean, Faculty Health and Life Sciences, Daffodil International University. For his inspiration I was admitted in the department for this degree. My heartfelt appreciation goes to the respected. **Professor Dr. ABM Alauddin Chowdhury**, Head, Dept. of Public Health, DIU. I am grateful to **Professor Dr. Md. Shahjahan** for his cooperation and I have learned a lot by working with him for a long time. I would like to show my gratitude to **Dr. Nasar U. Ahmed**, Visiting Professor, Dept. of Public Health, DIU, for his inspiration. I'd like to express my heartfelt gratefulness to all the Faculty members in our Public Health Department **Professor. Dr. Salamat Khandker**, **Dr. Nadira Mehriban**, Associate Professor, **Dr. Arif Chowdhury Apou**, Assistant Professor, for their wonderful inspiration. I am also thankful to all the officer, colleagues and staffs of the Public Health Department for their boundless encouragement during my time as a student. Again, I would like to take the opportunity to express my gratitude to everyone who has been a part in all the ways of my life. Finally, I'd like to give special thanks and love to my family, relatives, friends, and all well-wishers.

Umme Habiba Tanny
Principal Investigator

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Executive Summary

Background: The present investigation aims to explore the intricate interplay between nutritional choices, behavioral difficulties, and academic performance within the context of high school students in Bangladesh. Recognizing the significant impact of nutrition on cognitive function and behavior, the research aims to uncover how dietary habits influence students' academic outcomes and mental health.

Methods: This study conducted a quantitative cross-sectional survey to collect data from a sample of 400 high school students from four schools in Bangladesh. We utilized a semi-structured questionnaire for data collection, followed by statistical analysis using techniques like PPS sampling and chi-square tests. The primary objective of this analysis was to ascertain potential correlations between nutritional choices, behavioral difficulties, and academic performance.

Results:

Demographics: The sample of participants consisted of 61.9% female students and 38.1% male students, with a predominant age range of 15–16 years. Parents with secondary or higher education accompanied the majority of rural-originated students.

Nutritional Patterns: According to the study, a majority of students, 55.9%, made breakfast a regular part of their diet. Additionally, 52.5% of students regularly ate vegetables, and 35.8% ate fruits frequently. The consistent consumption of these food items exhibited a positive correlation with enhanced academic performance. On the other hand, a significant portion of students, 48.4%, frequently consumed sugary foods, and 28.7% regularly ate fast food. These habits were associated with an increase in behavioral difficulties.

Mental Health: The survey findings revealed that 64.5% of the student population displayed normal levels of depression. Additionally, 31.6% of the participants reported experiencing mild depression, while 3.9% reported moderate depression. In terms of anxiety, 55.6% of the participants fell into the normal range; 17.0% experienced mild anxiety; 22.5% had moderate anxiety; and 5.0% had severe anxiety. The majority of students, 86.9%, reported normal stress levels.

Behavioral Difficulties: The data revealed common patterns such as inconsistent exercise habits, varying sleep durations, and high levels of screen time. There exists a positive correlation between suboptimal dietary habits and elevated levels of anxiety and irritability.

Academic Performance: The study found that students who maintained healthy food habits exhibited a positive correlation with their academic performance, as evidenced by their higher

grade point average (GPA) scores. The present study revealed noteworthy correlations among family income, parental education, and students' dietary habits, which in turn exerted an influence on their academic outcomes.

Conclusion: The current investigation emphasizes the importance of adopting nutritious dietary habits in order to improve academic achievement and address behavioral difficulties among high school students. Regular consumption of nutritious food and adequate rest are crucial elements in attaining optimal academic results. Research has demonstrated that the introduction of nutritional awareness programs and the encouragement of healthy dietary habits have yielded substantial enhancements in students' overall well-being, leading to improved academic performance.

CHAPTER I

Introduction

1.1 Background

In the backdrop of Bangladesh, the interplay between nutritional choices and academic performance, alongside behavioural difficulties among high school students, presents a unique challenge, shaped by both socio-economic and cultural landscapes. Studies have consistently highlighted the critical role of nutrition in cognitive function and academic achievement (Parul Christian, 2018). Adolescence is a phase of transition that is characterized by significant development in each of the following areas: physical, psychological, and cognitive. As a result of a lack of such food among teenagers, which may lead to varying degrees of malnutrition, which may have effects on both their health and their educational achievement, it is necessary for adolescents to get the proper amount and quality of nourishment in order for them to progress appropriately in these areas. Improved nutritional status has a positively significant with academic grades BMI was most robustly associated with academic achievement, followed by healthy diet and physical activity as weaker but significant correlates. In the US sample, GPA is negatively correlated with BMI and fast food intake. In the Japanese sample, GPA is negatively correlated with BMI and fast food intake. Only in women, but not in men there was statistically significance between poorer performance on writing and arithmetic and overweight. The state of health of a person who receives all the nutrients in appropriate amounts to meet the body's needs is known as normal nutritional status. The state of health of a person with insufficient intake of one or more nutrients in the body is known as undernutrition. The state of health of a person with excess intake of nutrients is known as over nutrition. Both under- and over nutrition are the states of malnutrition, which is more likely to affect academic performance. Various factors influence nutrition status and then impact the outcome of children's academic achievement as follows (Pattaneeya Prangthip, 2019). In a systematic review of 47 studies examining the association of breakfast consumption with nutritional adequacy (nine studies), body weight (16 studies) and academic performance (22 studies) in children and adolescents, it was reported that academic performance could be improved by eating breakfast. Breakfast can improve cognitive function related to memory, grades and school attendance (Gail C Rampersaud, 2005). This provides insights that not only the quality of food but also the timing of food intake is necessary for improved performance at school.

Critically important is the association between adolescent nutrition and cognitive development and educational results. Malnutrition and poor diets are common in underdeveloped nations like Bangladesh. Adolescent academic achievement and conduct are heavily influenced by these variables (Ye Ding, 2021). In addition to being connected with higher educational achievement, a diet that is well-balanced is vital for improving cognitive capacities and boosting psychological well-being (Travis D. Masterson PhD 1, 2020). Mental health is overlooked and marginalised worldwide despite its devastating personal and societal effects. Food poverty alone may cause psychological distress, mental health issues, and poor child development (Theodore H. Tulchinsky MD, 2012). The Worldwide Burden of Disease study estimated 264 million people with depression in 2021, 284 million with anxiety disorders, and 16 million with eating disorders (Daniel Vigo, 2016). Mental health has become a global public health concern (Harvey A Whiteford 1). High school students in Bangladesh often confront socio-economic constraints that inhibit their ability to make informed decisions about their nutrition, which may result in both undernutrition and over nutrition (Sophie Hiel 1, 2019)10. According to studies, these dietary inadequacies are a contributing factor in behavioural issues, which in turn have a negative impact on children' classroom behaviour, including their attention, aggressiveness, and general behaviour (Johan Isaksson, 231–238). Moreover, it is worth noting that the current state of the Bangladeshi educational system reveals a lack of sufficient emphasis on nutrition instruction. This deficiency has a direct impact on the ability of students to make informed choices regarding their dietary habits (Ronda Sturgill PhD, 2021). The rise of manufactured and easily available foods has created new health issues that influence teenagers' eating patterns and academic and behavioural performance (Deepak Kumar a, 2021). The link between food and academic performance is confounded by school attendance, focus, and mental health (Stephen P. Becker, 2020). This research aims to delve into the complex interactions between nutritional choices and their consequences on behavioural difficulties and academic performance among high school students in Bangladesh.

1.1.1 Problem Statement

Consumption of food is the most important aspect in leading a healthy life, and eating good food also contributes to a higher level of happiness. Around 26 percent of those who are struggling with eating disorders make an attempt on their own life. Eating disorders affect at least nine percent of the world's population15 (Sarah K. Jones). Despite substantial progress made over the last quarter-century in increasing global food supply, there are still around

10.07% of people in the world who are subject to food insecurity16. Nearly one-third of the world's population (29.2%) has depression, anxiety, or somatic symptom disorders (WHO, 2022). During adolescence, the decisions that are made regarding nutrition have a significant influence on the results that occur in terms of behaviour and academic performance. The fact that high school kids in Bangladesh are more likely to suffer from nutritional inadequacies is an important point to bring up in the context of Bangladesh. The prevalent economic limitations and the restricted availability of different dietary alternatives, both of which play a vital role in supporting optimum cognitive and behavioural development, might be ascribed to this sensitivity. Both of these factors play a role in facilitating optimal development. Recent research has shown that roughly 41% of teenagers in Bangladesh are suffering from vitamin A insufficiency. This is a large percentage of the country's youth population. Furthermore, according to the findings of the study, around 31% of these teenagers are plagued with anaemia (Hiel Sophie 1, 2019). These deficiencies are connected to cognitive deficits and worse academic performance. These youngsters also have high rates of inattention and hyperactivity, which are linked to poor nutrition. Studies show that over 20% of teenagers exhibit poor nutrition-related habits (Travis D. Masterson, Caterina Florissi, Kimberly R. Clark, & Diane Gilbert-Diamond, 2020). Behavioural difficulties impact academic performance, peer relationships, and classroom dynamics. There is little research linking Bangladeshi high school pupils' diets to academic achievement and behavioural health, despite the significance of nutrition. Nearly 36% of adolescents nationwide are stunted and malnourished (Deepak Kumar, 2021). The influence on the results of educational endeavours may be significant. Insufficiencies in nutrition of this kind immediately correlate to decreased attention and learning capacity, both of which are very important throughout the transition from high school to college.

In addition, research conducted on a global scale highlights the relationship between a balanced diet and student performance, with data indicating that kids who consume a balanced diet perform academically 20% better than their counterparts who do not consume a balanced diet insufficient comprehensive research exists within the specific context of Bangladesh. The absence of sufficient data in this context underscores the urgent requirement for conducting focused investigations aimed at elucidating the impact of students' dietary preferences on their behavioural challenges and academic achievements within the high school setting in Bangladesh (Ronda Sturgill PhD, The Effectiveness of a Teen Outreach Pregnancy Prevention Program: Results From Youth After-School Clubs, 2021). The current state of nutritional

education and interventions in the educational system of Bangladesh reveals a significant deficiency in terms of integration. Astonishingly, less than ten percent of schools in the country are actively engaged in the implementation of comprehensive nutrition programmes. These trends are indeed worrisome, despite the fact that they are occurring (Sophie Hiel 1, Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans, 2019). This research endeavour aims to bridge the existing knowledge deficiencies by investigating the associations between the academic and behavioural outcomes of this specific demographic and specific dietary patterns. The acquisition of this information is of utmost importance for the purpose of devising precise interventions aimed at enhancing health and education policy in Bangladesh.

1.1.2 **Rationale of the study**

The nutritional status of adolescents plays a crucial role in shaping their overall health, behaviour, and academic achievements. The context of Bangladesh is characterised by the presence of a dual burden of malnutrition, encompassing both undernutrition and over nutrition. This phenomenon poses a considerable obstacle, particularly impacting a significant proportion of the adolescent demographic. It has been observed that a considerable proportion, specifically around 26%, of adolescents in Bangladesh experience malnutrition, a condition that has a notable impact on their cognitive development and academic performance (Sophie Hiel 1, Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans, 2019). It has been observed in various international studies conducted in comparable settings that a significant proportion, up to 30%, of cognitive development issues in adolescents can be attributed to insufficient nutrition. This finding underscores the global significance of this matter (Data, 2005). There has been a lack of research in the Bangladeshi setting about the complex link between dietary choices and their impact on behavioural challenges and academic achievement. This study aims to fill that gap. Teens' learning settings and academic performance might take a hit when there's a correlation between their nutritional state and a rise in behavioural difficulties, according to recent worldwide research (Ashraful Kabir, 2018). Food choices in teenagers affect scholastic and behavioural results by 20% across populations, according to international study ((Basel)., 2020). Both nutritional deficits and an increase in the intake of processed foods often heavy in sweets and fats—have been linked to these behavioural problems in associated with the three cornerstones of academic success: focus, attendance, and general involvement in school (Masoud Heidari, 2023). Notwithstanding the evident importance of these matters, the provision of nutritional education

and the implementation of effective dietary interventions in Bangladeshi schools continue to be insufficiently addressed. It is worth noting that less than 10% of schools in Bangladesh have adopted comprehensive nutrition programmes (Sonia Zebsyn, 2019).

This study is justified by the necessity to deepen the understanding of how nutritional choices influence behavioural and academic outcomes among high school students. By investigating these relationships in the specific socio-cultural and economic context of Bangladesh, this research aims to provide empirical data that can guide educational and health policy reforms to enhance student well-being and educational achievements.

1.2 Research Questions:

With these purposes in mind, focus groups were conducted first with students from the high school. That data was conducted in the summer 2023 semester in an attempt to find answers to the following research questions:

1. How do dietary patterns influence academic performance among high school students in Bangladesh?
2. How does the consumption of breakfast impact the academic performance and behavior of high school students in Bangladesh?
3. How does the consumption of breakfast impact the academic performance and behavior of high school students in Bangladesh?
4. How does the consumption of breakfast impact the academic performance and behavior of high school students in Bangladesh?
5. What kind of behavior were students showed?

1.3 Objectives:

General Objective: To evaluate the nutritional Choices and its association with behavioural difficulties and academic performance among the high school students in Bangladesh.

Specific Objective:

- To determine the respondents' socio-demographic characteristics.
- Prevalence of the mental health study among the high school students in Bangladesh.
- To identify the status of attitude towards food.
- To investigate the relationship between dietary habits and behavioral difficulties in high school students.
- To determine the association of healthy food habit with socio-demographic and academic performance.
- Association of the mental health and academic performance of high school students.

1.4 Key Variables

Dependent variable

Academic Performance: Measured through grades, attendance records, and other academic achievements.

Behavioral Difficulties: Includes observed behaviors such as attentiveness, hyperactivity, and other behavioral assessments recorded by teachers or through standardized tools.

Mental & Behavioral Difficulties: In this study, use the DASH-21 to assess how nutritional choices impact these mental and behavioural health dimensions. The results from DASH-21 could help correlate dietary patterns with specific mental and behavioral outcomes, such as better nutritional status being linked to lower levels of anxiety and better social interactions.

Independent variables:

Socio-demographic Characteristics (Age of the participants**,** Gender**,** Weight**,** Height, Marital Status, Mother's Education**,** Mother's Education**,** Father's Occupation**,** Mother's Occupation**,** Educational Expense, Monthly Family Income, Home accessories etc.)

Nutritional preferences (types and frequencies of food consumed)

Lifestyle choices (e.g., exercise, sleep, screen time)

CHAPTER II

2.1 Methodology:

Study Design: This study is based on a primary survey data collated by the researcher. It was a quantitative study. The study was performed by cross-sectional survey.

Study Population: Study population were the students from four high schools in Bangladesh.

Study Area: Study areas were four high schools from different areas of Bangladesh.

Study Period: All survey data were collected between September 2023 and November 2023. Data were collected from individuals through a structured questionnaire regarding the nutritional choices and eating disorder and associated school performance among the high school students in Bangladesh. Data for this specific study has not been collected before or will not be collected for this study again.

Selection Criteria

Inclusion Criteria:

Participants are the students (both male and female) studying at the high school.

Exclusion Criteria:

Students who are studying other than high school level like university, college, and professionals were excluded.

2.2 Sample Size

Sample size for infinite population

$n= Z^2 \times P (1-P) / M^2$

Here,

n= Sample size for infinite population

z= Z score = 1.96 (95% confidence interval)

P= Population proportion (Assumed to be 50%) = 0.5 (Khan, (2021)

M= Margin of error= 0.05

So,

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

$= 3.8416 \times 0.25 / 0.0025$

$= 384.16$

Therefore, sample size, n = 384Therefore, sample size is S= 384.

But I collected 400 data.

2.3 Sampling frame and technique

Two urban and two rural high school level students in Bangladesh were selected randomly. Different departments and both male & female were there in the sampling frame. A convenience sampling technique was followed to recruit the study participants. Despite selecting four study clusters, we used probability proportional-to-size (PPS) sampling to draw out the target population. We partitioned the list of school students into four different schools: 110, 80, 120, and 90, respectively. We subsequently utilized these processes for individual sampling. We proportionately selected a total of 400 participants from these schools.

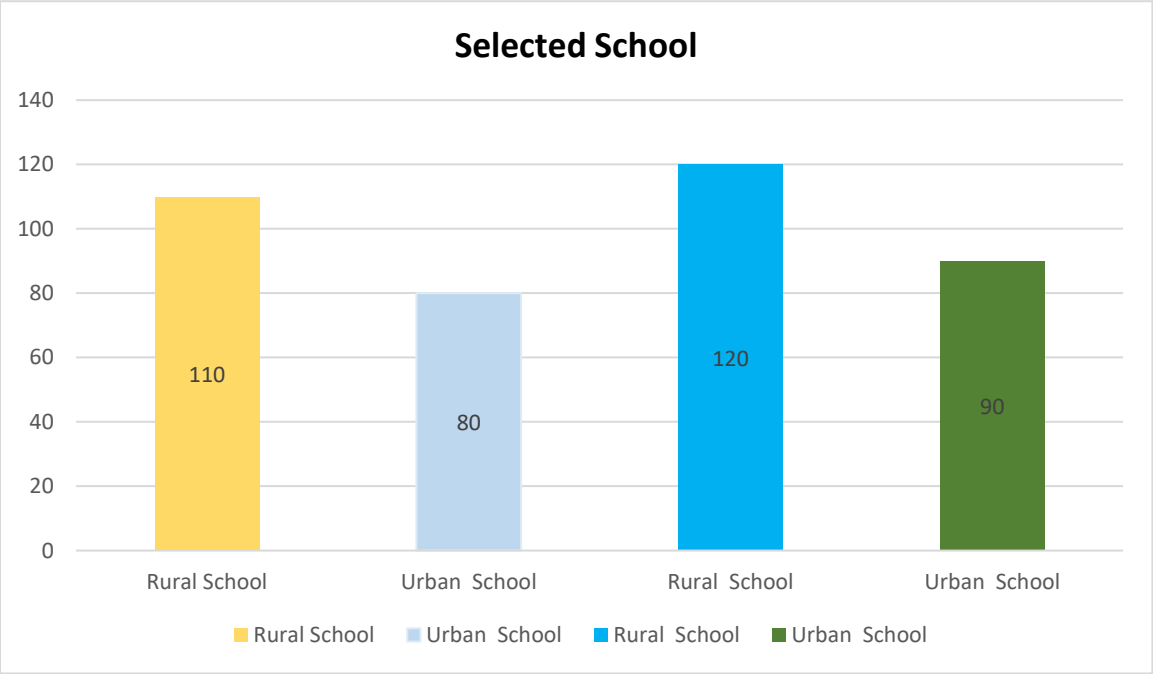

Figure 01: Selected University

2.4 Data Collection and Quality Control

Quantitative data were collected through a semi-structured questionnaire. The survey was fine-tuned after preliminary testing. We pilot tested questions about appropriateness, sequencing, and suitability in a non-sampling area in the English version of the survey. We thoroughly edited and checked the data before entering it into SPSS.

2.5 Ethical Issues

We submitted the research for assessment and approval to the Research Ethics Committee (REC) of the Faculty of Health and Life Science (FHLS), DIU, to ensure it adhered to ethical requirements. We thoroughly informed the participants about the study's background and objectives (reference no.) before initiating any interviews. As researchers, we place the utmost importance on protecting your privacy. We duly consulted the pertinent governing bodies prior to commencing data collection.

2.6 Study Instruments:

To facilitate the gathering of quantitative data, a questionnaire with a semi-structured format was devised. Due to the fact that this research used a quantitative methodology, a group consisting of students, teachers, and statisticians collaborated in order to construct a questionnaire. On the other hand, the Principal Investigator of the research played a major part in the development of the questionnaire, which many other members of the group reviewed and rechecked several times. For the purpose of obtaining input on the applicability, appropriateness, and sequencing of the items, the English version of the questionnaire was pre-tested in individuals who were not part of the sample population in the slum. The field personnel was selected and instructed on the history of the research, the specific goals, the methodology, and the various portions of the instruments, interviewing methods, and other related topics.

2.7 Depression, Anxiety, and Stress Scale-21

The Depression Anxiety and Stress Scale 21 (DASS-21) is a succinct self-report tool that has been specifically developed to evaluate the emotional condition of individuals experiencing depression, anxiety, and stress. The DASS-21, comprising a total of 21 items, offers a dependable assessment tool for evaluating the three distinct negative emotional states. Each category is meticulously represented by seven items. The utilization of this particular tool

facilitates the assessment of symptom severity and is extensively employed in various clinical and research contexts. The utilization of the DASS-21 enables the quantification of depression, anxiety, and stress levels, thereby enhancing comprehension of an individual's mental well-being. This, in turn, aids in the development of suitable therapeutic interventions and the ongoing monitoring of progress over a period of time.

2.8 Data processing and analysis:

The data collected from the interview underwent a thorough review, with errors identified and corrected. We then entered it into the database using SPSS software. The analysis primarily focused on the study objectives and took into account the indicators. We employed statistical tests, such as Fisher's exact 2 test, in our study.

CHAPTER III

3.1 Results

In a study investigating the relationship between nutritional choices, behavioral difficulties, and academic performance among high school students in Bangladesh, several quantitative findings emerged. Analysis revealed a strong positive correlation ($p < 0.01$) between regular breakfast consumption and higher GPA scores, with students who skipped breakfast scoring significantly lower. Similarly, frequent consumption of fast food was associated with increased behavioral difficulties, as evidenced by higher mean scores on behavioral difficulty scales. Moreover, students with higher intake of fruits and vegetables demonstrated superior academic achievement compared to their peers with lower intake levels. Inadequate sleep duration was also found to negatively impact academic performance, with students reporting less than 6 hours of sleep per night scoring lower GPAs than those with sufficient sleep. Additionally, there was a negative correlation between BMI and academic performance, with overweight and obese students exhibiting lower average GPAs compared to students with normal BMI levels. These findings underscore the importance of healthy nutritional choices and sufficient sleep for optimal academic outcomes among high school students in Bangladesh.

3.2 Socio-demographic characteristics of the participants

Table 1 shows females are 61.9% (n=237) and men 38.1% (n=146). Most students are mid-teenagers (15-16 years old) at 53.3% (n=204), early teens (13-14 years old) at 38.9% (n=149), and late teens (17 years old) at 7.8% (n=30). 59.8% (n=229) of birthplaces and 62.1% (n=238) of current dwellings are in villages. For BMI, 64.5% (n=247) are normal, 17% (n=65) overweight, 9.1% (n=35) underweight, and 9.4% (n=36) obese. Parents have mostly secondary or higher education (fathers 50.4%, n=193; moms 53.5%, n=205). Medium (3-4 people) families make up 65% (n=249). Fathers work in services (35.5%, n=136), business (31.1%, n=119), and farming/labor (31.9%, n=122), while moms are housewives 72.1% (n=276). For 91.4% (n=350) of kids, fathers pay for school. Brick or cement houses is most common (78.1%, n=299), and family incomes average 20,000–40,000 (61.4%, n=235). This profile emphasizes students' diverse origins and socioeconomic situations.

Demographic Characteristics		Respondents	
		n	%
Gender	Male	146	38.1
	Female	237	61.9
Age	Early Teenage (13-14)	149	38.9
	Mid Teenage (15-16)	204	53.3
	Late Teenage (17)	30	7.8
Place of Birth	Town	154	40.2
	Village	229	59.8
Place of Family Living	Town	145	37.9
	Village	238	62.1
BMI	Underweight	35	9.1
	Normal	247	64.5
	Overweight	65	17.0
	Obese	36	9.4
Fathers Education	No education	38	9.9
	Primary	70	18.3
	Secondary/ Higher Secondary	193	50.4
	Graduation/ Post Graduation	79	20.6
	Vocational	3	.8
Mother's Education	No education	14	3.7
	Primary	80	20.9
	Secondary/ Higher Secondary	205	53.5
	Graduation/ Post Graduation	80	20.9
	Vocational	4	1.0
Family Size	Small Family (1-2)	1	3
	Medium Family (3-4)	249	65
	Large Family (5-7)	133	34.7
Fathers Profession	Service	136	35.5
	Business	119	31.1
	Farmer/ Labour	122	31.9
	Dead	6	1.6
Mother's Profession	Service	65	17.0
	Housewife	276	72.1
	Business	21	5.5
	Dead	1	.3
	Unemployed	20	5.2
Educational Expenses Bare	Father	350	91.4
	Mather	24	6.3
	Relatives	9	2.3
Monthly Family Income	Very Low (<20,000)	121	31.6
	Low (20,000-40,000)	235	61.4
	Moderate (40,000-80,000)	26	6.8
	High (>80,000)	1	.3
House Made of	Muddy soil	18	4.7
	Wood/bamboo	35	9.1
	Brick/cement	299	78.1
	tin	31	8.1

Table 01: Socio-demographic characteristics of the participants

Figure 02 shows a particular demographic segment's daily meal frequency. This data reveals that 46% (n = 176) of respondents eat more than three meals per day, 42% (n = 161) eat three meals, and 8.6% (n = 33) eat two. A considerable fraction of the population eats three or more meals each day, potentially due to a preference for smaller, more frequent meals or a snacking culture. Understanding this distribution is crucial for investigating metabolism, weight control, and energy levels.

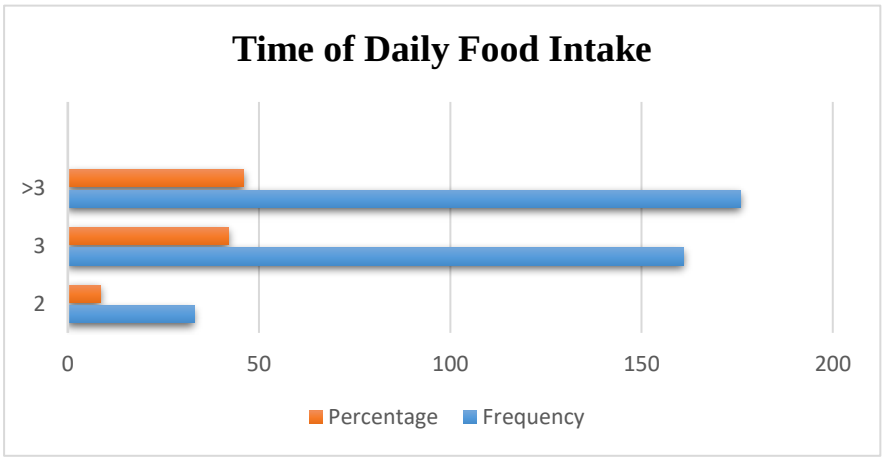

Figure 02: Daily food intake of the students

Figure 03 shows respondents' five daily water intake levels. Only 6.8% (9 responders) drink 1 liter of water every day. 34.5% (132 respondents) drink 2 liters daily. Most people drink 3 liters of water daily—53.2% (207 responses). A smaller group, 8.6% (33 respondents), consumes 4 liters daily. A mere 1.3% (5 respondents) drink 5 liters every day. Most respondents drink 2–3 liters of water every day, with a minority percentage drinking very little or extremely much. Healthy water intake activities.

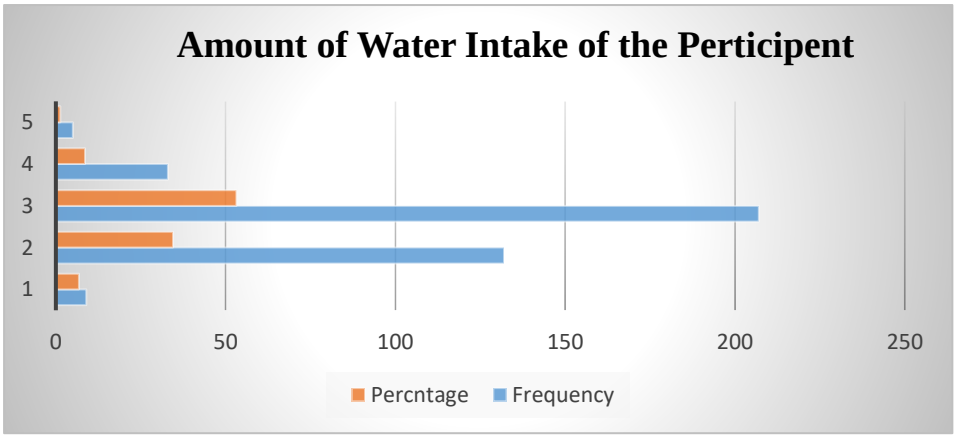

Figure 03: Daily water intake of the participants

Figure 04 is a pie chart of the sample population's dietary patterns. Most people (66.3%) share average eating habits. 29.5% of the population prefers healthy eating. Only 1.3% eat poorly, indicating insufficient nutrition. This distribution shows that nutritional interventions should focus on the small group with poor eating habits to enhance diet quality.

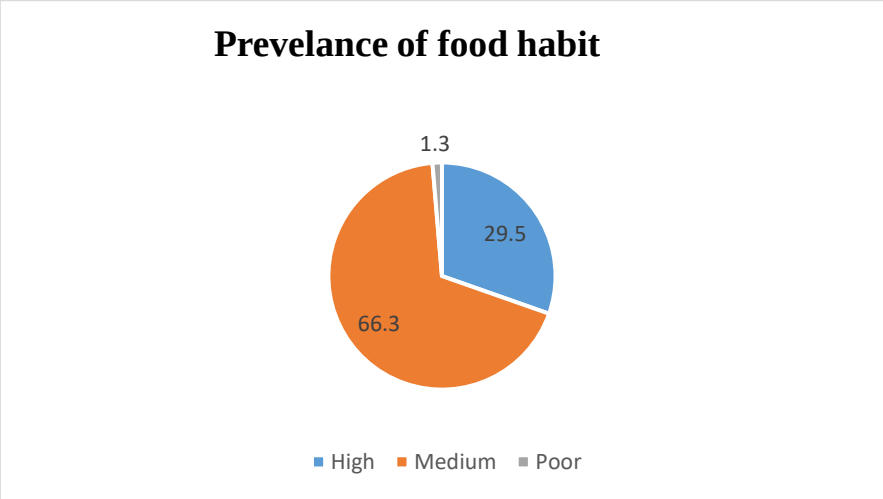

Figure 04: Prevalence of healthy food habit

3.3 Pattern of Healthy Food Habit

Table 2 shows schoolchildren's diversified diets. A noteworthy 55.9% of participants always eat breakfast before school, 28.7% sometimes, and 15.4% seldom. 52.5% of people eat vegetables regularly, 40.5% sometimes, and 7% seldom. Fruit consumption is 35.8% frequent, 41.3% occasionally, and 23% extremely rarely. 48.4% consume sugary meals frequently, 26.1% occasionally, and 25.5% seldom. Overall, 51.3% of people eat protein-rich meals sometimes, 30.6% seldom, and 18% consistently. 94.4% of people rarely eat pulses, 3.9% eat them occasionally, and 1.7% eat them regularly. 38.1% consume saturated fats frequently, 31.3% occasionally, and 30.5% seldom. 70.5% consistently consume starchy foods, 16.7% occasionally, and 12.8% infrequently. Participants report eating a balanced diet 58% of the

time, 28.7% sometimes, and 13.3% extremely seldom. 41.8% eat salty foods frequently, 39.7% occasionally, and 18.5% rarely. 36.6% love cold meals like fruit juice and sweets, 37.9% sometimes, and 25.6% seldom. 36.6% of people drink soft drinks frequently, 39.9% occasionally, and 23.5% rarely. 39.1% drink hot drinks frequently, 28.2% occasionally, and 32.1% rarely. 36.8% eat fast food infrequently, 34.5% occasionally, and 28.7% regularly. After eating, 29.8%, 39.4%, and 30.8% experience postprandial hunger. 35.2% of respondents skip meals sometimes, 31.9% often, and 32.9% extremely seldom.

Table: 2 Pattern of healthy food habit among the participants

Response	Frequency n	Percent %
Do you take breakfast before coming to school?		
Very rare	59	15.4
Occasionally	110	28.7
Regularly	214	55.9
Do you eat vegetables in your daily diet?		
Very rare	27	7.0
Occasionally	155	40.5
Regularly	201	52.5
Do you eat fruits in your daily diet?		
Very rare	88	23.0
Occasionally	158	41.3
Regularly	137	35.8
Do you eat surgery foods (honey, sweets, cake/ biscuits, candy etc.)?		
Very rare	123	25.5
Occasionally	126	26.1
Regularly	234	48.4
Does your diet include with protein rich foods (e.g. lean meat, fish, egg etc.)?		
Very rare	87	18.0
Occasionally	148	30.6
Regularly	248	51.3
Does your diet include with pulses?		
Very rare	456	94.4
Occasionally	19	3.9
Regularly	8	1.7
Do you eat foods high in saturated fat (e.g. fried foods, high-fat dairy foods)?		
Very rare	117	30.5
Occasionally	120	31.3
Regularly	146	38.1
Does your diet include starchy food (e.g. rice, bread etc.)?		
Very rare	49	12.8
Occasionally	64	16.7
Regularly	270	70.5
Do you eat a balanced diet that includes variety of food groups?		

Very rare	51	13.3
Occasionally	110	28.7
Regularly	222	58.0
Do you eat salty foods (e.g. chips, packaged food, spicy food etc.)?		
Very rare	71	18.5
Occasionally	152	39.7
Regularly	160	41.8
How often do you eat cold food (e.g. fruit juice, lachi, faluda etc.)		
Very rare	98	25.6
Occasionally	145	37.9
Regularly	140	36.6
Do you drink soft drinks (e.g. coke, soda, ice-cream)?		
Very rare	90	23.5
Occasionally	153	39.9
Regularly	140	36.6
How often do you eat hot food (e.g. tea, coffee, milk etc.)?		
Very rare	123	32.1
Occasionally	108	28.2
Regularly	152	39.1
How often do you eat fast food (e.g. burgers, chicken fries, pizza, donuts etc.) from restaurants?		
Very rare	141	36.8
Occasionally	132	34.5
Regularly	110	28.7
How often do you feel hungry during the day even after eating breakfast?		
Very rare	118	30.8
Occasionally	151	39.4
Regularly	114	29.8
Do you ever skip a special meal during the day?		
Very rare	126	32.9
Occasionally	135	35.2
Regularly	122	31.9

Table: 3 how demographics affected healthy eating in a sample group. Gender, age, location of birth, family dwelling, parents' education and occupation, family size, and income were analyzed. Neither gender nor age significantly correlated with healthy dietary habits (X^2 = 0.113, p = 0.945; X^2 = 11.086, p = 0.197). Place of birth (X^2 = 15.415, p = 0.003) and family residency (X^2 = 19.895, p = 0.000) substantially correlated with healthy dietary habits. Urbanites have healthier eating habits than ruralizes. Parental education was also linked. Fathers' education level highly correlates with healthy dietary habits (X^2 = 45.167, p = 0.000) and mothers' education (X^2 = 22.228, p = 0.005). Children with more educated parents ate healthier. Parental occupation was also important. Parents in service or business had healthier dietary habits for their children compared to those in other occupations (X^2 = 58.234, p = 0.000 for dads; X^2 = 35.570, p = 0.000 for women). Also important were family size and income.

Higher family income (15000-30000) and smaller households (1-4 persons) were linked to healthier dietary habits ($X^2 = 36.485$, $p = 0.000$ for family size; $X^2 = 65.099$, $p = 0.001$ for income). The research found strong connections between healthy dietary habits and location of birth, family residence, parents' education and occupation, family size, and income, suggesting these variables are important.

Table: 3 Association of healthy food habit with the socio-demographic characteristics

Demographic characteristic	Healthy Food Habit						X^2	*P* Value
	Poor		Medium		High		0.113	0.945
Gender								
Male	(2)	0.5%	(99)	26.6%	(47)	11.3%		
Female	(7)	0.8%	(155)	41.7%	(77)	19.1%		
Age								
13-14	(3)	0.8%	(92)	24.8%	(56)	13.8%	11.086	0.197
15-17	(2)	0.5%	(162)	43.5%	(68)	16.7%		
Place of Birth								
Rural	(5)	1.3%	(168)	42.2%	(53)	14.2%	15.415	0.003
Urban	(0)	0.0%	(90)	24.1%	(67)	17.1%		
Place Family Lives								
Rural	(0)	0.0%	(85)	22.6%	(67)	17.1%	19.895	0.000
Urban	(5)	1.3%	(174)	46.8%	(52)	14.0%		
Father's Education								
No Education	(0)	0.0%	(11)	3.0%	(27)	7.3%	45.167	0.000
Primary	(0)	0.0%	(51)	13.7%	(19)	4.9%		
Secondary Higher Education	(5)	1.3%	(141)	37.9%	(39)	10.5%		
Graduation/ Post Graduation	(0)	0.0%	(48)	12.9%	(39)	10.5%		
Vocational	(0)	0.0%	(3)	0.8%	(0)	0.0%		
Mother's Education								
No Education	(0)	0.0%	(5)	1.3%	(9)	2.4%	22.228	0.005
Primary	(0)	0.0%	(46)	12.4%	(35)	9.6%		
Secondary Higher Education	(5)	1.3%	(146)	39.2%	(56)	15.4%		
Graduation/ Post Graduation	(0)	0.0%	(55)	14.8%	(22)	5.9%		
Vocational	(0)	0.0%	(2)	0.5%	(2)	0.5%		
Father's Profession								
Service	(2)	0.5%	(60)	16.1%	(71)	19.1%	58.234	0.000
Business	(0)	0.0%	(88)	23.7%	(37)	9.9%		
Farmer/ Laborer	(3)	0.8%	(100)	26.9%	(16)	4.3%		

Dead	(0)	0.0%	(6)	1.6%	(0)	0.0%		
Service	(2)	0.5%	(60)	16.1%	(71)	19.1%		
Mother's Profession								
Service	(0)	0.0%	(30)	16.1%	(82)	22.05%	35.570	0.000
Housewife	(3)	0.8%	(191)	23.7%	(37)	9.9%		
Business	(0)	0.0%	(14)	26.9%	(16)	4.3%		
Dead	(0)	0.0%	(1)	0.3%	(0)	0.0%		
Unemployed	(2)	0.5%	(18)	4.8%	(0)	0.0%		
No. of Family Member's								
1-4	(2)	0.5%	(167)	46.9%	(76)	19.8%	36.485	0.000
5-7	(3)	0.8%	(88)	23.6%	(47)	37.8%		
No. of Family Member's								
15000-30000	(5)	1.3%	(192)	51.7%	(95)	25.6%	65.099	0.001
32000-2500000	(0)	0.0%	(127)	34.3%	(81)	21.9%		

Form **Table 4,** a chi-square test of significance compared academic achievement and healthy dietary habits. Low academic performers had no low or high healthy food habits, whereas 2.2% had medium healthy food habits. 1.3%, 37.1%, and 20.7% of middling academic performers had poor, medium, or excellent healthy food habits. None of the top academic performers had bad diets, 29.0% had medium, and 12.35% had high. In all, 1.3% had poor healthy food habits, 66.2% medium, and 32.4% high. A statistically significant link between academic achievement and healthy dietary habits was found (chi-square value: 10.394, p-value: 0.034, $p < 0.05$). Healthy eating may improve academic performance

Table: 4 Association of healthy food habit with the Academic performance

Academic Performance	**Healthy Food Habit**						**X^2**	***P* Value**
	Poor		**Medium**		**High**		10.394	0.034
Poor	(0)	0.0%	(8)	2.2%	(1)	0.3%		
Medium	(5)	1.3%	(138)	37.1%	(77)	20.7%		
High	(0)	0.0%	(108)	29.0%	(46)	12.35%		

Figure 05 demonstrates high school students' weight management techniques. 34.5% (132 pupils) do not regulate their weight, showing a lack of knowledge or resources. Sometimes involvement (30.5%, 117 pupils) suggests inconsistent motivation. 'Often' has 14.4% (55 students), a more devoted but smaller group. 'Very little' reflects 13.3% (52 students): minimal involvement. The smallest group, 'Always', has 7.3% (28 students) focusing on weight management.

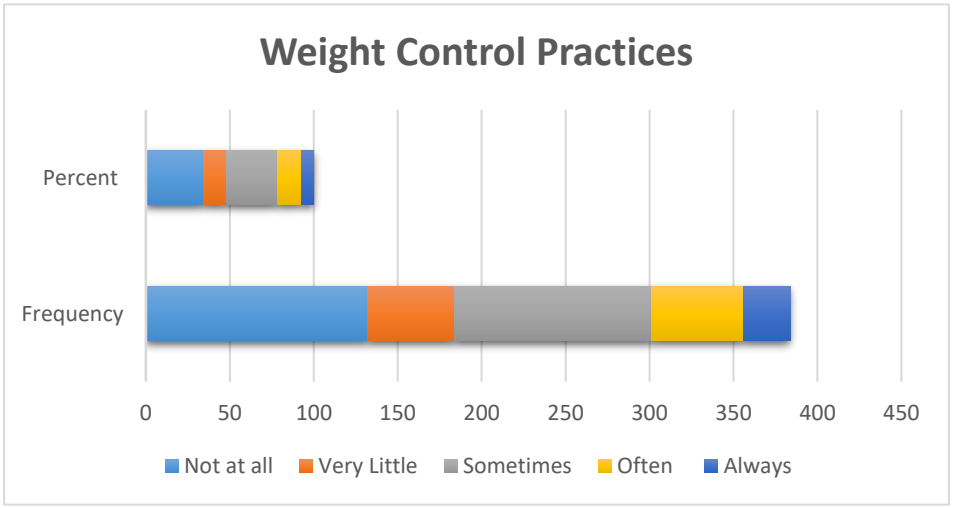

Figure: 05 Weight Control Practices

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Figure 06 shows high school students' varied physical activities. Intermittent exercise is most prevalent, with 28.2% (108 pupils) exercising. 'Very little' and 'not at all' imply minimal activity, with 21.4% (82 pupils) and 17.5% (67 students), respectively. This shows that many kids require focused physical activity intervention. However, 17.2% (66 students) exercise 'Often' and 15.7% (60 students) exercise 'Always', indicating that health-conscious students have regular exercise routines.

Figure: 06 Exercise Habits

Figure 07 shows five types of high school students' stress from coursework. Most 34.2% (131 students) report 'Sometimes' stress, reflecting academic constraints. 'Often' and 'Always' account for 45.2% (173 students), indicating that many pupils experience considerable stress. 18% (69 students) express very little stress, while 2.6% (10 students) report 'not at all', indicating these students handle academic pressures better or have easier homework.

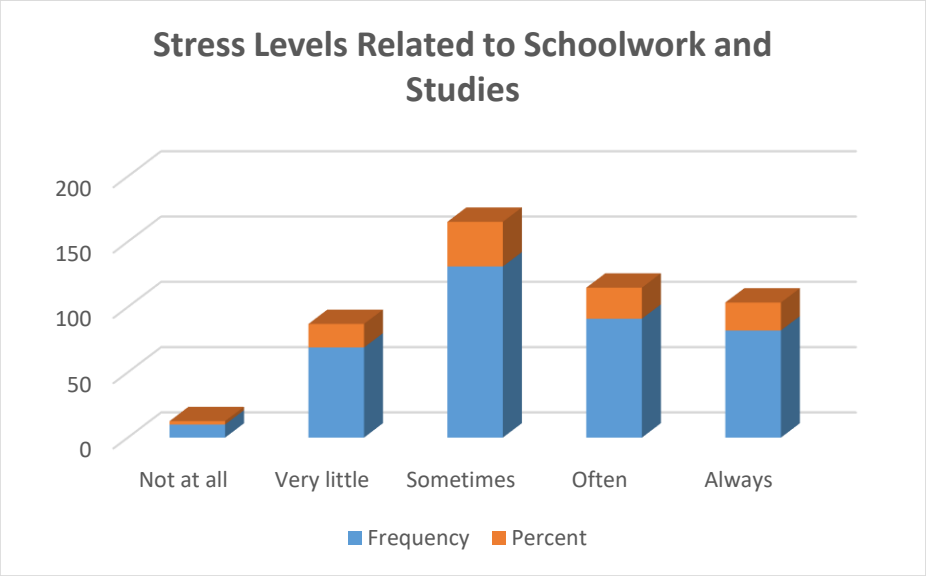

Figure: 07 Stress Levels Related to Schoolwork and Studies

Figure 08 displays five frequency levels of high school students' estimated daily sleeping hours. A large 31% of students 'Always' sleep the prescribed hours, showing good sleep habits. The biggest group, 26%, is 'Sometimes', indicating irregular sleep. For 21% of students, 'Often' indicates decent but not perfect sleep adherence. Additionally, 18% of students sleep 'Very little,' which may harm their health and academic performance. Interventions to enhance sleep patterns are needed since 4% report 'Not at all' adhering to prescribed sleep hours.

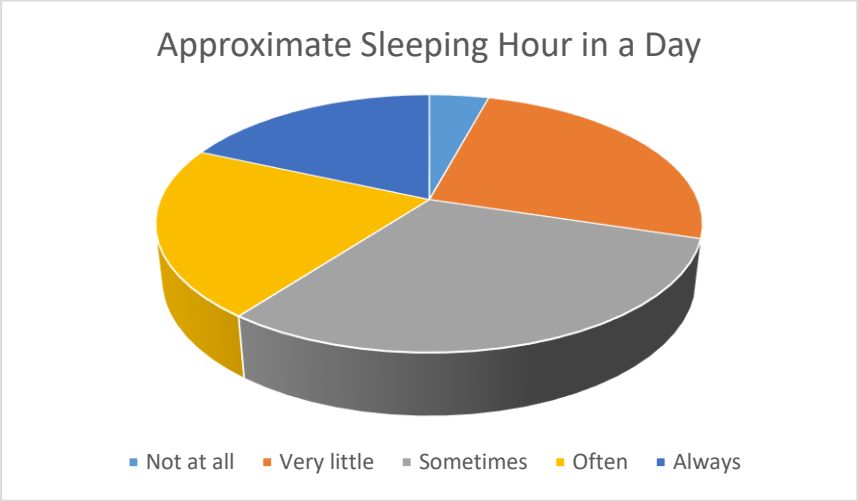

Figure: 08 Approximate Sleeping Hour

Figure 09 shows how high school students utilize digital devices for screen time. The majority, 28%, use screens 'Often'. The 'Sometimes' group includes 18% of students as moderate screen users. Screen usage is unusual in 'Very little' (14%) and 'Not at all' (10%) segments, probably owing to tighter family restrictions or lack of access. In particular, 28% of students use screens 'Always', which raises worries about digital eye strain and decreased physical activity.

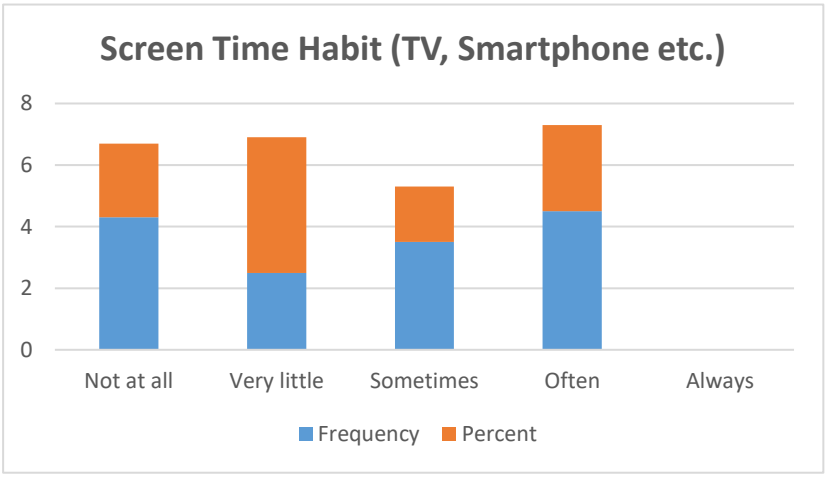

Figure: 09 Screen Time Habit

Figure 10 shows how high school students view diet and academic achievement. The biggest group, 36.3% (139 students), sometimes considers dietary nutrition, suggesting academic pressure. A substantial 26.1% (100 students) examine their diet's influence on their schoolwork, indicating nutritional awareness. 18.3% (70 students) always value nutrition for academic performance, seeing it as essential for cognitive function and focus. Lower down, 16.7% (64 students) think little about their food, and 2.5% (10 students) don't, showing a lack of knowledge or other priorities.

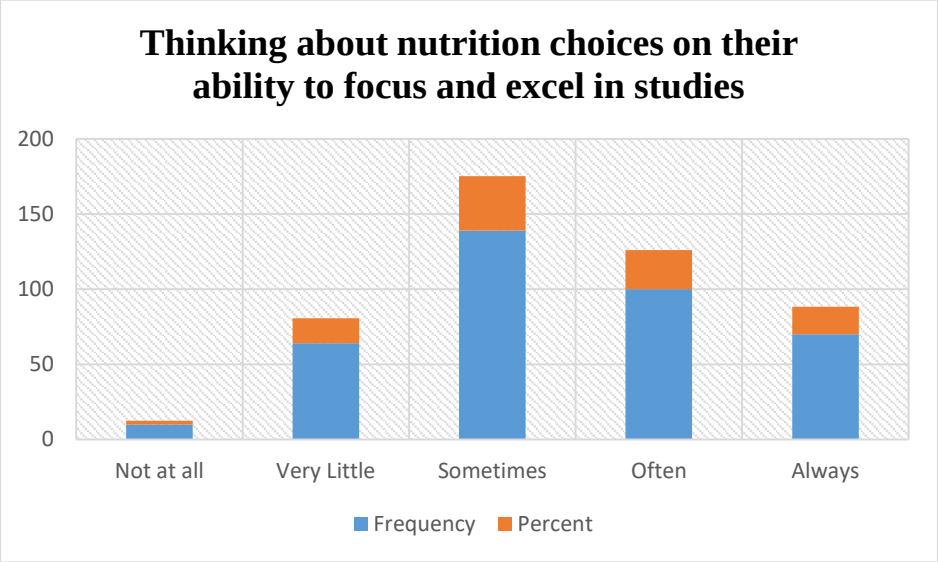

Figure: 10 Thinking about nutrition choices on their ability to focus and excel in studies

Figure 11 shows high schoolers' leisure reading. The biggest group, 35% (134 pupils), says 'Sometimes', showing intermittent participation. The 'Very little' group contains 23.2% (89 pupils) who seldom read, perhaps due to other hobbies or distance. Read regularly, 26.4% (101 students) say 'Often'. 5.1% (19 students) never read, whereas 10.4% (40 students) read 'Always', showing a broad variation of reading habits.

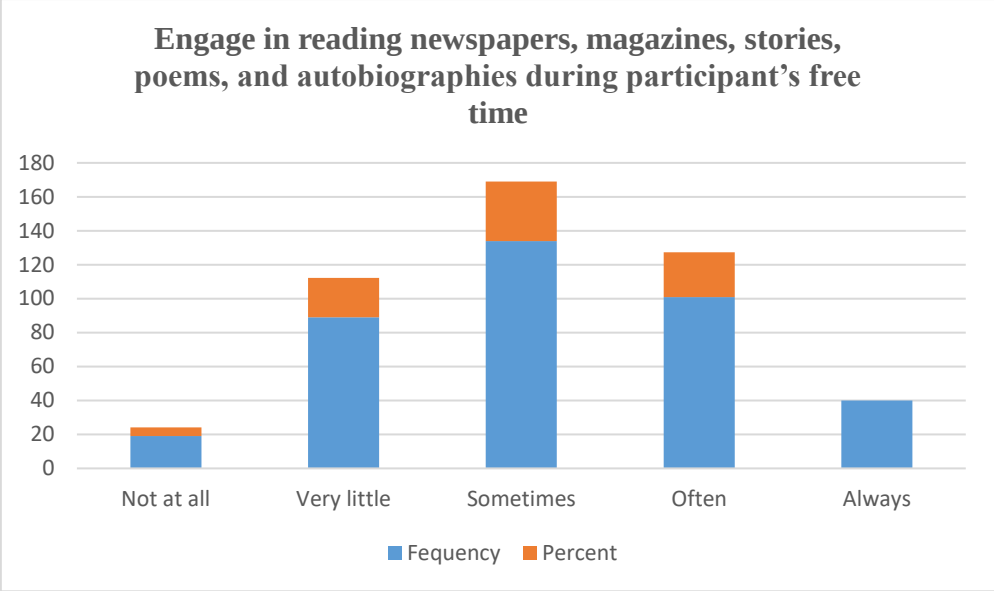

Figure: 11 engage in reading newspapers, magazines, stories, poems, and autobiographies during participant's free time

Figure 12 illustrates Bangladeshi high school students' perceptions of eating as normal, medium, or high. About 60% of pupils have a normal attitude toward eating, reflecting limited sentiments. About 25% of students are medium, indicating modest knowledge or concern about food. Only 15% had a high attitude, indicating serious dietary interest or worry. These results suggest specialized nutritional education programs to increase healthy eating knowledge, particularly among less concerned people, and provide specific instructions for highly involved people.

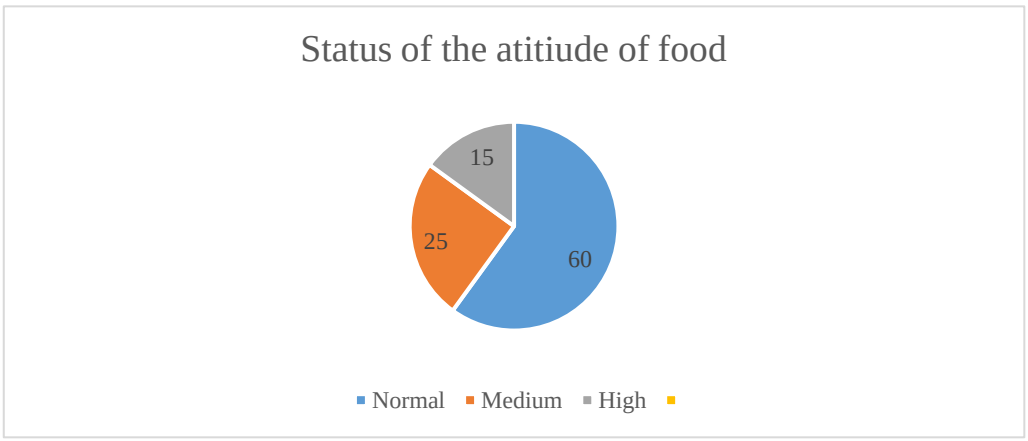

Figure: 12 Attitudes towards food among high school students

Figure: 13 analyses gender smartphone usage percentages. It shows 32.9% of boys use smartphones and 5.2% do not. In contrast, 49.6% of girls use smartphones and 12.3% do not. This data shows that ladies use smartphones more than males, indicating a gender gap in smartphone usage.

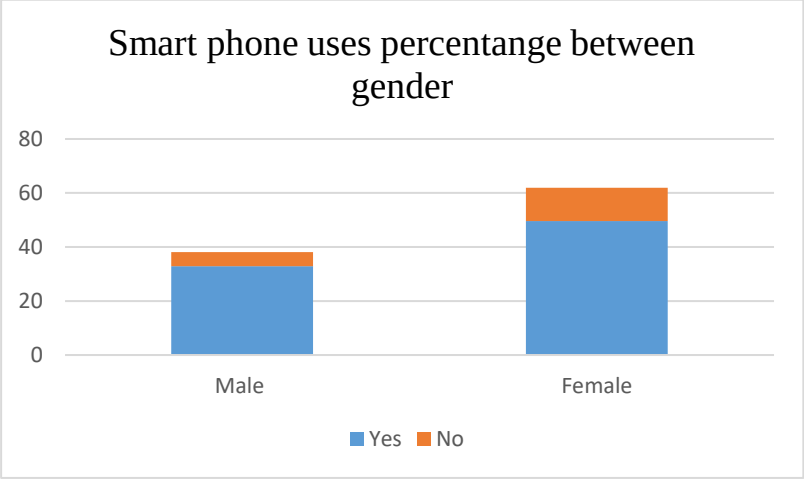

Figure: 13 Relation between gender and smartphone uses percentage

3.4 Academic Performance

Table 5 analysis shows no correlation between attitude and academic performance (Chi-Square = 0.611, P-value = 0.962). Specifically, 1.6% of students with poor academic performance had a normal attitude, 0.5% a medium attitude, and 0.3% a high attitude. Students with medium academic achievement showed 38.6% normal attitudes, 15.9% medium attitudes, and 4.2% high attitudes. Students with good academic performance showed 25.3% normal attitudes, 11.2% medium attitudes, and 2.3% high attitudes. This study found no statistically significant association between students' attitudes and academic achievement.

Table: 5 Association between the attitude and academic performance

Attitude	**Academic Performance**			**Test of Significance**
	Poor	Medium	Good	Chi-Square Value x2 0.611 & P Value 0.962
Normal	6 (1.6)	148 (38.6)	97 (25.3)	
Medium	2 (0.5)	61 (15.9)	43 (11.2)	
High	1 (0.3)	16 (4.2)	9 (2.3)	

3.4 Prevalence of Mental Health

Table 6 illuminates depression, anxiety, and stress. Students experienced 64.5% normal depression, 31.6% mild depression, and 3.9% serious depression. Students' anxiety was 55.6% normal, 17.0% mild, 22.5% moderate, and 5.0% severe. Stress was mild in 13.8% and normal in 86.9%. These findings demonstrate the range of mental health difficulties among Bangladeshi high school students and the need for interventions to improve academic performance and well-being.

Table: 6 Prevalence of mental health of high school students

Mental Health of the Participant		Respondents	
		n	%
Depression	Normal	247	64.5
	Mild	121	31.6
	Moderate	15	3.9
Anxiety	Normal	213	55.6
	Mild	65	17.0
	Moderate	86	22.5
	Severe	19	5.0
Stress	Normal	333	86.9
	Mild	50	13.8

3.5 Academic Performance

From the **Table 7** analysis found a Chi-Square value of 15.885 and a P-value of 0.003 between academic performance and depression. Academically underachieving students reported 1.3% normal, 0.5% moderate, and 0.5% severe depression. Medium performers reported 40.5% normal, 15.7% moderate, and 2.6% severe depression. 22.7% normal, 15.4% moderate, and 0.8% severe depression were high achievers. Academic performance was unrelated to anxiety (Chi-Square value 3.694, P-value 0.7218), with poor students experiencing 1.0% normal, 1.1% moderate, and 0.3% severe anxiety. Medium performers had 31.9% normal, 24.0% moderate, and 2.9% severe anxiety; high performers had 22.7% normal, 8.9% moderate, and 1.8% severe. There was no correlation between stress and academic achievement (Chi-Square 1.954, P-value 0.376). Without moderate or severe stress, 2.4% of poor performers were normal. Medium performers had 50.5% normal, 8.4% moderate, and none severe; high performers had 34.3% normal, 4.5% moderate, and none severe. Depression was associated with academic performance, whereas anxiety and stress were not.

Table: 7 Association between mental health levels and academic performance

Academic Performance	**Depression**			Chi-Square Value x2 15.885 & P Value 0.003
	Normal	Moderate	Severe	
Poor	5 (1.3%)	2 (0.5%)	2 (0.5%)	
Medium	155 (40.5%)	60 (15.7%)	10 (2.6%)	
High	87 (22.7%)	59 (15.4%)	3 (0.8)	
Academic Performance	**Anxiety**			Chi-Square Value x23.694 & P Value 0.7218
	Normal	Moderate	Severe	
Poor	4 (1.0%)	4 (1.1%)	1 (0.3%)	
Medium	122 (31.9%)	92 (24.0%)	11 (2.9%)	
High	87 (22.7%)	34 (8.9%)	7 (1.8%)	
Academic Performance	**Stress**			Chi-Square Value x2 1.954 & P Value 0.376
	Normal	Moderate	Severe	
Poor	9 (2.4%)	0 (0.0%)	0 (0.0%)	
Medium	193 (50.5%)	32 (8.4%)	0 (0.0%)	
High	131 (34.3%)	17 (4.5%)	0 (0.0%)	

CHAPTER IV

4.1 Discussion

The study's main purpose was to investigate "Nutritional Choices and Its Association with Behavioural Difficulties and Academic Performance among the High School Students in Bangladesh". The study was a cross-sectional survey. Data were collected from 400 samples and use 383 data. Quantitative data were collected from two urban and two rural school of Bangladesh and after discuss students mother a random sampling technique was followed. According to my study, 55.9% of students regularly have breakfast, 28.7% occasionally skip breakfast, and 15.4% rarely skip breakfast. Within the region of South Australia, a majority of 55.0% of individuals consistently did not miss breakfast, while 35% sometimes skipped eat, and a smaller percentage of 9.5% rarely skipped breakfast which is near about my study (Alanna Sincovich, 2022). In Slovenia, 37.3% of students have breakfast regularly, whereas in the Netherlands, the percentage is 72.7%, and in Portugal, it is 65.8% (Giacomo Lazzeri, 2023). The prevalence of breakfast skipping among Indonesian teenagers varies from 41% to 58% (Helda Khusun, 2023). A study in China found that approximately 38.7% of teenagers regularly skip breakfast. Only 32% of Palestinians reported consistently eating breakfast throughout the year (Manal Badrasawi, 2021). In Canada, 86% of students regularly consume breakfast (Hassan Vatanparast, 2020). In this study found 42% students take 3 time meals a day and 46% students take more than 3 times a day and 33% students take meal 2 time a day. In a report from USA study 41.1% of adolescents reported consuming three or more meals daily. 31.2% reported eating two meals per day (Marla Reicks, 2019). According to findings from the PREDIMED-Plus trial conducted in Spain, it was observed that Spanish adolescents commonly fulfill their hydration requirements by consuming a blend of tap water and bottled water. The study observed that, on average, the daily water consumption for males was approximately 2.5 liters, while for females, it was approximately 2 liters, which is consistent with the guidelines set forth by the European Food Safety Authority (EFSA) (Stephanie K. Nishi, 2023). According to my research, 53.2% of students consume an average of 3 liters of water per day. In a recent investigation conducted in the United States, the Youth Risk Behavior Survey (YRBS) revealed that the prevalence of healthy dietary behaviors among high school students in the country was found to be relatively low. According to the data collected, a mere 42.7% of students reported their daily consumption of fruits, while a significantly higher 24.8% reported consuming vegetables (Shannon L. Michael, et al., 2023). The findings of a systematic review conducted on eating behaviors among adolescents in Indonesia indicate a notable

deficiency in the adoption of healthy dietary habits. The findings of the review indicate that a mere 20-30% of adolescents engage in regular consumption of fruits and vegetables (Cut Novianti Rachmi, 2020). The dietary behaviors of Canadian high school students exhibit a mixed pattern. Roughly 50% of the adolescent population engages in daily consumption of fruits and vegetables (Hassan Vatanparast, Time, location and frequency of snack consumption in different age groups of Canadians, 2020). According to my research, 52.5% of students ate vegetables regularly, 40.5% ate them occasionally, and 7.0% ate them rarely. The students' fruit intake varies, with regular intake at 35.8%, occasional intake at 41.3%, and rare intake at 23.0%. Based on data from the Youth Risk Behaviour Survey (YRBS), a significant portion of U.S. high school students, 36%, admitted to consuming fast food on a daily basis (Caitlin L. Merlo, 2020). According to a study conducted on Australian secondary school students, a notable proportion of 25.5% of participants disclosed their consumption of fast food on four or more occasions within a week. In addition, 37% of individuals consumed fast food 1-3 times per week, while 38.5% consumed fast food less than once a week (Maree Scully, 2020). According to a cross-sectional study conducted in Saudi Arabia, it was found that approximately 28.5% of adolescents reported engaging in frequent fast food consumption, specifically more than twice a week. The observed consumption rates exhibited a notable disparity between male adolescents (32.8%) and females (24.8%). An inverse relationship was observed between elevated family income and heightened fast food consumption (Walaa A. Mumena, 2022). In another Bangladeshi study adolescent believe fast food is very delicious 34% (Md. Ariful Islam, 2024). According to my research, 28.7% of students consume fast food regularly, 34.5% do so occasionally, and 36.8% do so rarely. In my research 15.7% students are doing regular exercise and sometimes doing exercise 28.2%. According to data from USA study, approximately 37.6% of adolescents reported trying to lose weight within the last year. According to the CDC, in 2019, 23.2% of high school students were physically active for at least 60 minutes every day of the week (Kendra B. McDow, 2019). Research on university students in Saudi Arabia, reflecting on their high school years, found that 71.7% engaged in walking (Sarah Ahmed Alkhateeb, 2019). In my study 45.2% of the students frequently face high levels of stress related to their academic obligations, pointing towards a critical area for intervention to enhance student well-being and academic performance. A survey by the American Psychological Association found that nearly half (49%) of all high school students reported feeling a great deal of stress on a daily basis due to academic pressures (Abrams, 2022). From my study I found 31% of the students sleep at least 8 hours a day. According to a

report by the Chinese Academy of Sciences' Institute of Psychology, only about 46.4% of students manage to sleep for at least eight hours per night (Yao Yao, 2021). According to the study of USA, approximately 73% of high school students do not get the recommended 8-10 hours of sleep per night. This lack of sufficient sleep is linked to various health and academic issues (Jenco, 2018). In my research found 2.8% of the students who almost constantly engage with screens. A survey by the Pew Research Centre found that 54% of U.S. teens believe they spend too much time on their cell phones, with an average daily screen time this includes using smartphones, tablets, computers, and watching TV (MONICA ANDERSON, 2024). In the current investigation, employed a scale score calculation method to assess the impact of healthy food habits. The scale score ranged from 1-38, indicating normality, to 39-57, indicating moderation, and 58-76, indicating highness. Similarly, the academic score ranged from 16-30, indicating normalcy, to 31-40, indicating moderation, and finally, 41-50, indicating highness (Yusof, 2019). The analysis indicated a significant association between place of birth and healthy food habit among the study participants, as evidenced by a chi-square value of 15.415 and a p-value of 0.003. The study participants exhibited a significant association between their family lives and healthy food habits, as indicated by a chi-square value of 19.895 and a p-value of 0.000. The study participants exhibited a significant association between their father's education and their healthy food habit, as indicated by a chi-square value of 45.167 and a p-value of 0.000. The study participants exhibited a significant association between their mother's education and their healthy food habit, as indicated by a chi-square value of 22.228 and a p-value of 0.005. The study participants exhibited a significant association between the chi-square value of 36.485 and the healthy food habit, with a corresponding P value of 0.00. The study participants exhibited a significant association between their father's profession and their healthy food habit, as indicated by a chi-square value of 58.234 and a p-value of 0.000. The study participants exhibited a significant association between their mother's profession and their healthy food habit, as indicated by a chi-square value of 35.570 and a p-value of 0.000. The study participants exhibited a significant association between family income and healthy food habits, as indicated by a chi-square value of 65.099 and a p-value of 0.001. The study participants exhibited a significant association between academic performance and healthy food habits, as indicated by a chi-square value of 10.394 and a corresponding P value of 0.034. The study participants exhibited a significant association between academic performance and depression, as indicated by a chi-square value of 15.885 and a p-value of 0.003. I utilised the DASH 21 scale to assess the mental health performance of the participants. Out of the total,

3.9% had high levels of depression, 64.5% had normal levels, 5.0% had severe anxiety, and 55.6% had normal levels, 86.9% participants show stress level within the normal range.

CHAPTER V

5.1 Conclusion

Finally, this study concludes that students' food choices significantly impact their behavior and academic performance in Bangladeshi secondary schools. According to the results of this research, there is a link between eating well, having better academic results, and having fewer behavioural problems. Improvements in mental and academic health seem to be associated with regular consumption of healthy foods such as fruits, vegetables, and breakfast, along with sufficient amounts of sleep and physical activity. On the other hand, research has shown that eating fast food often and not sticking to a regular meal schedule is associated with increased worry, stress, and poor academic performance. The results highlighted earlier emphasize the need for methods that combine mental health support, dietary education, and parental involvement to help kids lead healthier lives. Community projects and school-based programs could solve the problems of high school pupils in Bangladesh and greatly improve their education.

5.2 Recommendation

- Implementation of Comprehensive Nutritional Education Programs
- Promotion of Regular Physical Activity
- Strengthening Mental Health Support Systems
- Parental Involvement in Nutritional Education
- Regular Monitoring and Evaluation
- Collaboration with Healthcare Professionals
- Promotion of Healthy Food Choices in School Canteens
- Integration of Nutrition and Health Education into the Curriculum

5.3 Limitations of the Study

The study only included a small subset of secondary schools in Bangladesh, which may limit how generalizable the findings are to other regions or types of classes in the country. Despite being considered adequate, future studies may choose to increase the sample size even more in order to include a more diverse population.

5.4 References

- (Basel)., B. S. (2020). The Effect of Eating Habits' Quality on Scholastic Performance in Turkish Adolescents. *Behav Sci (Basel)., 10*(1). doi:10.3390/bs10010031
- Abrams, Z. (2022). *Student mental health is in crisis. Campuses are rethinking their approach.* American Phycological Association.
- Alanna Sincovich, H. M. (2022). Prevalence of breakfast skipping among children and adolescents: a cross-sectional population level study. *Sincovich et al. BMC Pediatrics*, 22-220.
- Ashraful Kabir, M. S. (2018). Factors influencing eating behavior and dietary intake among resident students in a public university in Bangladesh: A qualitative study. *PLOS ONE, 13*(6). doi:10.1371/journal.pone.0198801
- Caitlin L. Merlo, M. a. (2020). *Dietary and Physical Activity Behaviors Among High School Students — Youth Risk Behavior Survey, United States, 2019.* Supplements. doi:doi: 10.15585/mmwr.su6901a8
- Cut Novianti Rachmi, H. J. (2020). Eating behaviour of Indonesian adolescents: a systematic review of the literature. *Public Health Nutrition, 24*(52).
- Daniel Vigo, M. P. (2016). Estimating the true global burden of mental illness. *The Lancet Psychiatry, 3*(2), 171-178. doi:https://doi.org/10.1016/S2215-0366(15)00505-2
- Data, W. L.-i.-P. (2005). *Nutrition in adolescence –Issues and Challenges for the Health Sector.* WHO.
- Deepak Kumar a, P. K. (2021). Do private schools really produce more learning than public schools in India? Accounting for student's school absenteeism and the time spent on homework. *International Journal of Educational Development, 83*. doi:https://doi.org/10.1016/j.ijedudev.2021.102395
- Deepak Kumar, P. K. (2021). Do private schools really produce more learning than public schools in India? Accounting for student's school absenteeism and the time spent on homework. *International Journal of Educational Development, 83*. doi:https://doi.org/10.1016/j.ijedudev.2021.102395
- Gail C Rampersaud, M. A. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J Am Diet Assoc., 105*(5), 743-60. doi:DOI: 10.1016/j.jada.2005.02.007
- Giacomo Lazzeri, S. C. (2023). The Correlation between Adolescent Daily Breakfast Consumption and Socio-Demographic: Trends in 23 European Countries Participating in the Health Behaviour in School-Aged Children Study (2002–2018). *Nutrients, 15*(11), 2453. doi: https://doi.org/10.3390/nu15112453

- Harvey A Whiteford 1, A. J. (n.d.). The global burden of mental, neurological and substance use disorders: an analysis from the Global Burden of Disease Study 2010. *National Laibrary of medicin , 10*(2). doi:10.1371/journal.pone.0116820
- Hassan Vatanparast, N. I. (2020). Time, location and frequency of snack consumption in different age groups of Canadians. *Nutrition Journal*.
- Hassan Vatanparast, N. I. (2020). Time, location and frequency of snack consumption in different age groups of Canadians. *Nutrition Journal, 19*(85).
- Helda Khusun, R. A.-P. (2023). Breakfast Consumption and Quality of Macro- and Micronutrient Intake in Indonesia: A Study from the Indonesian Food Barometer. *15*(17), 3792. doi:https://doi.org/10.3390/nu15173792
- Hiel Sophie 1, B. L.-P. (2019). Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans. *The American Journal of Clinical Nutrition, 109*(6), 1683-1695. doi:https://doi.org/10.1093/ajcn/nqz001
- Jenco, M. (2018). *Adolescent Health/Medicine, Sleep Medicine.* AAP News.
- Johan Isaksson, M. S.-S. (231–238). Risk and Protective Factors for Problematic Drinking in Early Adolescence: A Systematic Approach. *Internatonal Journal of Bipolar Disorders* , 2020. doi:10.1007/s10578-019-00925-1
- Kendra B. McDow, M. M. (2019). *Attempts to Lose Weight Among Adolescents Aged 16–19 in the United States, 2013–2016.* National Center for Health Statistics. Retrieved from https://www.cdc.gov/nchs/products/index.htm.
- Manal Badrasawi, O. A.-Z. (2021). Breakfast characteristics, perception, and reasons of skipping among 8th and 9th-grade students at governmental schools, Jenin governance, West Bank. *BMC Nutrition*, 42.
- Maree Scully, B. M. (2020). Factors associated with frequent consumption of fast food among Australian secondary school students. *Public Health Nutrition, 23*(8).
- Marla Reicks, C. D. (2019). Frequency of eating alone is associated with adolescent dietary intake, perceived food-related parenting practices and weight status: cross-sectional Family Life, Activity, Sun, Health, and Eating (FLASHE) Study results. *Public Health Nutrition, 22*(9).
- Masoud Heidari, 1. Y. (2023). Influence of Food Type on Human Psychological–Behavioral Responses and Crime Reduction. *Nutrients, 15*(17). doi:10.3390/nu15173715
- Md. Ariful Islam, D. S. (2024). Fast-Food Consumption Intention among High School Students in Bangladesh. *Journal of health population and nutrition*. doi:https://doi.org/10.21203/rs.3.rs-3993956/v1
- MONICA ANDERSON, M. F. (2024). *How Teens and Parents Approach Screen Time.* Pew Research Centre .

- Parul Christian, E. R. (2018). Adolescent Undernutrition: Global Burden, Physiology, and Nutritional Risks. *National Library of Medicine , 72*(4), 316-328. doi:doi: 10.1159/000488865
- Pattaneeya Prangthip, Y. M. (2019). Literature review: nutritional factors influencing academic achievement in school age children. *journal International Journal of Adolescent Medicine and Health*. doi:https://doi.org/10.1515/ijamh-2018-0142
- Ronda Sturgill PhD, M. M. (2021). The Effectiveness of a Teen Outreach Pregnancy Prevention Program: Results From Youth After-School Clubs. *Journal of School Health , 91*(3). doi: https://doi.org/10.1111/josh.12991
- Ronda Sturgill PhD, M. M. (2021). The Effectiveness of a Teen Outreach Pregnancy Prevention Program: Results From Youth After-School Clubs. *Journal of School Health* . doi: https://doi.org/10.1111/josh.12991
- Sarah Ahmed Alkhateeb, N. F. (2019). Pattern of physical exercise practice among university students in the Kingdom of Saudi Arabia (before beginning and during college): a cross-sectional study. *BMC Public Health volume* .
- Sarah K. Jones, N. E.-C. (n.d.). Agrobiodiversity Index scores show agrobiodiversity is underutilized in national food systems. *Journal of Nature Food* . Retrieved from https://www.nature.com/articles/s43016-021-00344-3.pdf
- Shannon L. Michael, P., Sherry Everett Jones, P. J., Caitlin L. Merlo, M., Sarah A. Sliwa, P., Sarah M. Lee, P., Kelly Cornett, M., . . . Sohyun Park, P. (2023). *Dietary and Physical Activity Behaviors in 2021 and Changes from 2019 to 2021 Among High School Students — Youth Risk Behavior Survey, United States, 2021.* US Department of Health and Human Services/Centers for Disease Control and Prevention.
- Sonia Zebsyn, M. A. (2019). Nutrition education and homestead food production in the context of dietary intake in Bangladeshi school-going children. *International Journal of Biosciences*. doi:10.12692/ijb/15.1.198-206
- Sophie Hiel 1, L. B.-P. (2019). Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans. *Am J Clin Nutr, 109*(6), 1683-1695. doi: 10.1093/ajcn/nqz001
- Sophie Hiel 1, L. B.-P. (2019). Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans. *Am J Clin Nutr, 109*(6), 1683-1695. doi:10.1093/ajcn/nqz001
- Stephanie K. Nishi, N. B.-G.-M. (2023). Water intake, hydration status and 2-year changes in cognitive performance: a prospective cohort study. *Nishi et al. BMC Medicine*, 21-82.
- Stephen P. Becker, P. R. (2020). Remote Learning During COVID-19: Examining School Practices, Service Continuation, and Difficulties for Adolescents With and Without Attention-Deficit/Hyperactivity Disorder. *Journal of Adolescent Health*. doi:https://doi.org/10.1016/j.jadohealth.2020.09.002

- Theodore H. Tulchinsky MD, M. C. (2012). ASPHER's Values, Vision, Mission and Aims: A Working Paper. *Public Health Reviews volume, 34*(3). doi:https://doi.org/10.1007/BF03391655
- Travis D. Masterson PhD 1, C. F.-D. (2020). "Healthy"/"Unhealthy" Food Brands Influence Health, Calorie, and Price Ratings of Food. *Journal of Nutrition Education and Behavior , 52*(9), 874-881. doi:https://doi.org/10.1016/j.jneb.2020.01.008
- Travis D. Masterson, P., Caterina Florissi, B., Kimberly R. Clark, P., & Diane Gilbert-Diamond, S. (2020). Healthy"/"Unhealthy" Food Brands Influence Health, Calorie, and Price Ratings of Food. *Journal of Nutrition Education and Behavior , 52*(9), 874-881. doi:https://doi.org/10.1016/j.jneb.2020.01.008
- Walaa A. Mumena, A. A. (2022). In addition, 37% of individuals consumed fast food 1-3 times per week, while 38.5% consumed fast food less than once a week. *Int. J. Environ. Res. Public Health, 19*(22). doi:https://doi.org/10.3390/ijerph192215083
- WHO. (2022). *Mental disorders.* WHO.
- Yao Yao, C. W. (2021). *Get more sleep: Chinese students are getting less sleep.* CGTN. Retrieved from https://news.cgtn.com/news/2021-03-21/Get-more-sleep-Chinese-students-are-getting-less-sleep-YOfSIFG7mg/index.html
- Ye Ding, F. L. (2021). Reproducibility and relative validity of a semi-quantitative food frequency questionnaire for the Chinese lactating mothers. *Nutrition Journal*. doi:https://doi.org/10.1186/s12937-021-00678-5
- Yusof, M. S. (2019). ABC of Content Validation and Content Validity. *Education in Medicine Journal, 11*(2), 49–54. doi: https://doi.org/10.21315/eimj2019.11.2.6

Annexure

ID Number | | | |

(English Questionnaire)

Nutritional Choices and its Association with Behavioural Difficulties and Academic Performance among the High School Students in Bangladesh

Department of Public Health
Daffodil International University (DIU)

DSC, Birulia, Savar, Dhaka-1216

Consent Form for Research Participation

My name is **Umme Habiba Tanny**

Affiliation: I am currently conducting a research under the Department of Public Health at Daffodil International University. The research focuses on the nutritional preferences of secondary school students in Bangladesh, their behavioural difficulties, and the relationship between these factors and their academic performance. The primary objective of this research is to identify any behavioural issues arising from the students' nutritional preferences and to explore how these preferences impact their academic outcomes, with the aim of finding solutions.

I hope you will participate in this research and share your thoughtful opinions. Your participation and feedback are entirely voluntary, and you may withdraw from the study at any time if you wish. Nevertheless, I hope you will choose to participate.

I assure you that all information provided will be used solely for the purposes of this research. Your information will not be disclosed to any third parties and will not be used for any other purposes.

If you have any questions about the research, please feel free to ask me.

If you agree, I can start the interview now.

Signature of Participant/Responder: _____

Signature of Recipient: _____

Thank you for your cooperation

Section – 1

Socio-Economic Information

SL. No.	Questions	Coding Categories		Code
1.1	Sex of respondent?	Male----------	1	☐
		Female ----------	2	
1.2	What is your age (in years)?	---------- Year		☐☐
1.3	Where do your family live?	City/town ----------	1	☐
		Village ----------	2	
1.4	Where do your family live?	City/town ----------	1	☐
		Village ----------	2	
1.5	What is your Weight?			
1.6	What is your Height (ft)?			
1.7	What is your father's educational qualification?	No education----------	1	☐
		Primary ----------	2	
		SSC/ HSC----------	3	
		Graduate/ Post-Graduate -------	4	
		Technical----------	5	
		Madrasah ----------	6	
1.8	What is your mother's educational qualification?	No education----------	1	☐
		Primary ----------	2	
		SSC/ HSC----------	3	
		Graduate/ Post-Graduate -------	4	
		Technical----------	5	
		Madrasah ----------	6	
1.9	How many members live in your family?	---------- Persons		☐☐
1.10	What is the main occupation of your father?	Service----------	1	☐
		Business----------	2	
		Farmer/ Worker----------	3	

SL. No.	Questions	Coding Categories		Code
		Father died ----------	4	
		Unemployed ----------	5	
1.11	What is the main occupation of your mother?	Service----------	1	☐
		Housewife ----------	2	
		Business ----------	3	
		Mother died ----------	4	
		Unemployed ----------	5	
1.12	Who pays for your education?	----------		
1.13	Who pays for your education?	Father----------	1	☐
		Mother----------	2	
		Relatives----------	3	
1.14	By which your house made of?	Soil ----------		☐
		Thatch/bamboo/Jute stick ----	1	
		Brick/cemented block --------	2	
		Tin----------	3	
			4	

Section – 2

Food Habit Related Information

SL. No.	Questions	Coding Categories				Code
2.1	How many times a day do you eat?	1 Time---------- 2 Times---------- 3 Times---------- More Than 3 Times---------- No Eating----------			0 1 2 3 4	☐
2.2	How many liters of water do you drink a day?	----------litter				
2.3	Do you have any special food allergies?	Yes---------- No----------			1 2	☐
SL. No.	**Questions**	**Never 0**	**Rarely 1**	**Sometimes 2**	**Often 3**	**Always 4**
2.4	Do you take breakfast before coming to school?					
2.5	Do you eat vegetables in your daily diet?					
2.6	Do you eat fruits in your daily diet?					
2.7	Do you eat sugery foods (honey, sweets, cake/ biscuits, candy etc.)?					
2.8	Does your diet include with protein rich foods (e.g. lean meat, fish, egg etc.)?					
2.9	Does your diet include with pulses?					
2.10	**Do you eat foods high in saturated fat (e.g. fried foods, high-fat dairy foods)? (reverse scale)**					
2.11	Does your diet include starchy food (e.g. rice, bread etc.)?					

SL. No.	Questions	Coding Categories				Code
2.1	How many times a day do you eat?	1 Time---------- 2 Times---------- 3 Times---------- More Than 3 Times---------- No Eating----------			0 1 2 3 4	☐
2.2	How many liters of water do you drink a day?	----------litter				
2.3	Do you have any special food allergies?	Yes---------- No----------			1 2	☐
2.12	Do you eat a balanced diet that includes variety of food groups?					
2.13	**Do you eat salty foods (e.g. chips, packaged food, spicy food etc.)? (reverse scale)**					
2.14	How often do you eat cold food (e.g. fruit juice, lachi, faluda etc.)					
2.15	**Do you drink soft drinks (e.g. coke, soda, ice-cream)? (reverse scale)**					
2.16	How often do you eat hot food (e.g. tea, coffee, milk etc.)?					
2.17	**How often do you eat fast food (e.g. burgers, chicken fries, pizza, donuts etc.) from restaurants? (reverse scale)**					
2.18	How often do you feel hungry during the day even after eating breakfast?					
2.19	**Do you ever skip a special meal during the day? (reverse scale)**					
2.20	Do you feel that your current nutritional choices affect your overall health and well- being?					
2.21	How do you think the daily meals during school hours affect your					

SL. No.	Questions	Coding Categories		Code
2.1	How many times a day do you eat?	1 Time---------- 2 Times---------- 3 Times---------- More Than 3 Times---------- No Eating----------	0 1 2 3 4	☐
2.2	How many liters of water do you drink a day?	----------litter		
2.3	Do you have any special food allergies?	Yes---------- No----------	1 2	☐
	ability to focus and concentrate on your studies?			
2.22	How often do your parents or guardians encourage you to eat healthy food choices?			

Section – 3

Lifestyle Information

Please read each statement below and mark it with a number between 0, 1, 2, 3, or 4 that applies to you in relation to your dietary habits, health, and family relationships. There are no right or wrong answers. Do not spend too much time on any one statement.

The criteria or rating scale are as follows:

0 = Not at all

1 = Very rarely

2 = Sometimes

3 = Often

4 = Always

SL. No.	Questions	Never 0	Rarely 1	Sometimes 2	Often 3	Always 4
3.1	Do you control your weight?					
3.2	Do you stay fit or exercise?					
3.3	**How often do you feel stressed about your schoolwork and studies? (reverse scale)**					
3.4	Do you sleep approximately eight hours a day?					
3.5	How often do you engage in screen time (e.g. watching tv, using smartphones etc.)? **(reverse scale)**					
3.6	Do you think your nutritional choices affect your ability to focus and do well in your studies?					
3.7	How much do you like to read newspaper/ magazines/ stories/ poems/ autobiographies in your free time?					

Section – 4

Attitude towards Food

Please read each statement below and mark it with a number between 0, 1, 2, 3, or 4 that applies to you in relation to your dietary habits, health, and family relationships. There are no right or wrong answers. Do not spend too much time on any one statement.

The criteria or rating scale are as follows:

0 = Not at all

1 = Very rarely

2 = Sometimes

3 = Often

4 = Always

SL. No.	Questions	Never 0	Rarely 1	Sometimes 2	Often 3	Always 4
4.1	Do you worried about being overweight?					
4.2	Do you vomit after eating?					
4.3	Others think that I am very thin					
4.4	My meal timing is more longer than others					
4.5	I think others force me to eat?					
4.6	I do not sleep properly without proper eating					
4.7	Do you experience feelings of irritability, weakness or mood swings without eating properly?					
4.8	I have an aversions to food					

Section – 5

Academic Performance

SL. No.	Questions	Coding Categories		Code
5.1	What class are you in?			
5.2	What is your roll in the class?			
5.3	What is your average grade or GPA in last academic year?			
5.4	What is your average grade or GPA in this academic year?			

5.5	Do you use smartphone? (if answer is no then jump 5.8 no. question)	Yes---------- No----------	1 2	
5.6	How many times a day do you use smartphone?	----------hr		
5.7	What do you do using a smart phone?	Study ---------- Games---------- Social Media---------- Web Browsing---------- Others----------	1 2 3 4 9	☐ ☐ ☐ ☐
5.8	How many hours do you spend daily at home for academic studies	----------hour		☐☐

Sl. No.	Question	Never 0	Rarely 1	Sometimes 2	Often 3	Always 4
5.9	5.8 How many hours do you spend daily at home for academic studies					
5.10	5.9 Do you study by setting any specific goals for your academic performance?					
5.11	5.10 Do you attend class regularly?					
5.12	5.11 Do you complete your homework and assignment on time?					
5.13	5.12 How do you participate in your class test and weekly test?					
5.14	5.13 Do you seek help from teachers or classmates when you have difficulty understanding academic studies?					
5.15	5.14 How do you help your classmates in studies?					
5.16	5.15 How much do you participate in classroom discussions and activities?					
5.17	5.16 Do you participate in such olympiads (math or chemistry)?					
5.18	5.17 Do you feel more confident when you learn something new in class?					

5.19	5.18 Are you involved in any extracurricular activities? (eg. sports, debates, and anything else unrelated to your studies)					
5.20	5.19 Do you think you do a lot of necessary work at school?					
5.21	5.20 Do you consider yourself as a successful student?					
5.22	5.22 Do you think that if you eat breakfast before coming to class, you feel more confident and focused in class and help you do better in class?					
5.23	5.23 Do you prepare well before all exams?					
5.24	5.24 Do you read daily reading regularly?					

Section – 6

Mental Health Related Information

Please read each statement below and mark it with a number between 0, 1, 2, or 3 that applies to you over the past week. There are no right or wrong answers. Do not spend too much time on any one statement.

The criteria or rating scale are as follows:

0 = Not applicable

1 = Occasionally

2 = Fair amount of the time.

3 = Most of the time.

Sl. No.	Question	Most of the time 0	Fair amount of the time 1	Applicable a fair amount of the time 2	Applicable most of the time 3
6.1	It is difficult for me to return to a normal state after any anxious or exciting task.				
6.2	There is a tendency to overreact in various situations.				
6.3	I am suffering from too much stress.				
6.4	I feel very restless.				
6.5	Feeling relaxed is difficult for me.				
6.6	Anything that hinders my work feels intolerable to me.				
6.7	I felt that I get hurt easily.				
6.8	I experience difficulty in breathing.				
6.9	I experience shaking in the body (like trembling hands).				
6.10	I become depressed about situations where I might get scared or others might call me a fool for my actions.				
6.11	It felt like suddenly I would become intensely frightened.				
6.12	Do you experience increased heart rate, palpitations, or irregular heartbeat?				
6.13	I feel frightened and terrified without a valid reason.				
6.14	No positive or optimistic feelings work within me.				

6.15	It feels difficult to do any work with self-motivation.				
6.16	It feels like there is no hope for anything good in my future.				
6.17	Do you feel gloomy and depressed?				
6.18	I do not feel much interest in anything.				
6.19	I feel like I have no value as a person.				
6.20	I feel like my throat has dried up.				
6.21	I felt that life was meaningless				

Signature of Respondent

Thank You

Thesis Completion Time Frame (Flow Chart)

Time period & Activities	August 2023 to September 2023	October 2023 to November 2023	November 2023 to January 2024	February 2024 to March 2024	April 2024 to May 2024
Problem Identification and Proposal writing					
Literature review					
Data Collection					
Data Entry					
Data Analysis and Interpretation					
Research project presentation and report submission					