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International
University

TRIGGERING FACTORS BEHIND CHILDHOOD OBESITY

A PROJECT REPORT

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment
of B.Sc. in Nutrition and Food Engineering

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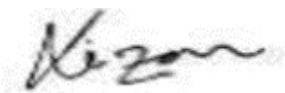
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APPROVAL

This project titled “**Triggering Factors Behind Childhood**”, submitted by **Sadia Hossain Somaiya** to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

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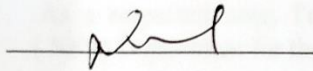


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DECLARATION

We hereby declare that this project has been done by me under the supervision of **Md. Nawal Sarwer**, Lecturer (Senior Scale), Department of NFE, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

Due to unhealthy eating habits and lack of physical exercise, today's youth are overweight. Contributing factors might include hormones and genes. The obesity pandemic impacts everyone. Many mental and social health issues, including sleep apnea, abnormalities of the skeleton and joints, low self-esteem, and social stigma, are associated with childhood obesity. Consumption, rest, and physical activity are all affected by one's weight. Health is affected by medication, social situations, and heredity. Overconsumption of calories relative to energy expenditure is the root cause of obesity. However, other factors such as metabolism, hormones, and generosity all play a role. Fat accumulates in response to calorically dense diets. Kids become fat for a few reasons: bad eating habits, lack of exercise, and genetics. Society suffers due to childhood obesity. Sedentary lifestyles worsen adolescent obesity and fat storage. Sports and other forms of extracurricular physical activity encourage kids to stay active. Greater accessibility to television and video games is a result of technological advancements. A lot of sugar and fat are in fast food. Alcohol is bad since it contains a lot of calories. Sugar and fat content in restaurants could be higher than at home. Issues with food intake. The effect of fast food on obese children is the focus of this research. The poll included Khilgaon Girls, South Point, and National Ideal students in the sixth to twelfth grades. Regular exercise of 60 minutes is necessary to maintain weight reduction. No more than two hours of screen usage each day is recommended. Be kind to young people and eat when you're thirsty. Using food as a reward or punishment is unethical. Talk to your doctor, a dietitian, and a support group in your area about losing weight. It is crucial to maintain a balanced diet and watch calorie intake. Get 150–300 minutes of exercise per week, whether that's running, swimming, tennis, or walking. Like exercises that last 2.5 to 5 hours. To make healthy drinks and food, you need protein, good fats, whole grains, and vegetables. Cut down on processed red meat, refined carbs, sugar, potatoes, and sugary drinks; prioritize healthy food and exercise. Disconnect all electronic devices immediately.

Keywords: Psychological And Social Disorders, Obesity, Restaurants, Fast Food, Calorie Control, Protein, Healthy Fats.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Childhood obesity, once considered a challenge limited to affluent societies, has transcended socio-economic boundaries to become a pervasive global concern. This phenomenon is not isolated to developed nations but is increasingly prevalent in low- and middle-income countries, with Bangladesh as a poignant example. The escalating rates of childhood obesity in Bangladesh mirror a broader trend across South Asia, reflecting a shift in health dynamics from infectious diseases to non-communicable diseases (NCDs). (Wang, 2012).

1.2 Historical Context

Bangladesh, historically grappling with malnutrition and infectious diseases, has undergone a notable transformation in its health landscape. While infectious diseases and undernutrition continue to pose significant challenges, the rise of childhood obesity marks a shift toward a dual burden of malnutrition—a juxtaposition of undernutrition and overnutrition. This shift is emblematic of the nation's rapid urbanization, changing dietary patterns, and evolving socio-economic structures. (Islam, 2014).

1.3 The Dual Burden of Malnutrition

The dual burden of malnutrition, characterized by the coexistence of undernutrition and overnutrition within populations or even households, encapsulates the complex health challenges facing countries like Bangladesh. While the pockets of the population continue to experience undernutrition and its associated health ramifications, a growing number of children are grappling with the detrimental effects of excess calorie intake and sedentary lifestyles. (Rahman, 2014).

1.4 Significance of the Global Perspective

Understanding childhood obesity in Bangladesh necessitates placing it within the broader global context. Lessons learned from successful interventions and strategies in other parts of the world can inform tailored approaches for Bangladesh. Additionally, recognizing commonalities and differences in triggering factors, health consequences, and socio-cultural dynamics provides a nuanced foundation for crafting effective and contextually relevant solutions. (Biswas, 2020).

1.5 Research Objectives

This thesis is designed to explore the factors are contributing to childhood obesity in Bangladesh. The objectives are multifaceted, aiming to provide a holistic understanding of the issue and offer practical recommendations for policymakers, healthcare professionals, and communities. Each objective contributes to building a comprehensive framework for addressing childhood obesity:

- **Addressing the factors are contributing to childhood obesity:** Understanding the factors behind childhood obesity is crucial for developing effective prevention and intervention strategies. By identifying and addressing these factors, we can make targeted improvements in public health policies, community support systems, and family practices.
- **Understand Socio-Cultural Dynamics:** Investigate how socio-cultural factors shape attitudes and behaviors related to childhood nutrition and physical activity, with a focus on understanding the cultural norms that may contribute to the obesity epidemic.
- **Evaluate Policy Interventions:** Assess the effectiveness of existing policies and interventions aimed at mitigating childhood obesity in Bangladesh, identifying gaps and opportunities for improvement.
- **Propose Recommendations:** Based on the findings, propose evidence-based recommendations for interventions and policies that could effectively address childhood obesity in the Bangladeshi context, considering the unique challenges and opportunities in the country.

1.6 Rationale for the Study

This research is motivated by the imperative to understand and address the intricate web of factors contributing to childhood obesity in Bangladesh. While global literature provides valuable insights, the unique socio-economic and cultural context of Bangladesh necessitates a focused investigation. By identifying the specific triggers of childhood obesity in this setting, the research aims to contribute nuanced insights that can inform targeted interventions, ensuring they are not only effective but also culturally sensitive and contextually relevant. In the subsequent chapters, this thesis unfolds, delving into the literature surrounding childhood obesity, outlining the methodologies employed in the study, providing a demographic and health profile of Bangladesh, and systematically exploring the triggering factors, health consequences, socio-cultural dynamics, and policy

landscape related to childhood obesity in this dynamic South Asian nation.
(Kamruzzaman, 2022).

CHAPTER 2

LITERATURE REVIEW

2.1 Childhood Obesity

Obesity is a chronic condition characterized by an excessive and abnormal accumulation of body fat. It has become a global epidemic, affecting individuals of all ages. In children, obesity is particularly concerning due to its immediate and long-term health consequences. Childhood obesity is defined as having a body mass index (BMI) at or above the 95th percentile for a child's age and sex. The prevalence of childhood obesity has increased significantly over the past few decades, making it a major public health challenge.

2.2 Factors Contributing to Childhood Obesity

A multitude of factors contribute to childhood obesity, and research in this area has identified several key domains:

- **Dietary Factors:** Poor dietary habits are a major contributor to childhood obesity. Consuming energy-dense, low-nutrient foods and sugary beverages can lead to excessive calorie intake (Daniels et al., 2005).
- **Physical Activity:** Insufficient physical activity is closely linked to childhood obesity. Sedentary behaviors, such as excessive screen time, can reduce opportunities for physical activity (Wang & Lobstein, 2006).
- **Genetic and Biological Factors:** Genetic predisposition can influence a child's susceptibility to obesity. Certain genetic variations may affect metabolism and fat storage (Frayling et al., 2007).
- **Socioeconomic Factors:** Socioeconomic status plays a crucial role in childhood obesity. Children from lower-income families often face limited access to healthy foods and recreational opportunities (Ludwig & Kabakus, 2007).
- **Psychosocial Factors:** Psychological stress, emotional eating, and family dynamics can impact a child's weight status (Tsiros et al., 2008).
- **Environmental Factors:** Environmental factors, including food marketing and neighborhood design, can shape children's eating and physical activity behaviors (Story & French, 2004).

2.3 Related Works

Several influential studies have investigated the factors contributing to childhood obesity. Sahoo et al. (2015) conducted a comprehensive review of existing research to provide a public health overview of key issues related to the prevention of obesity and chronic diseases in children (Sahoo et al., 2015). They adopted a life-course perspective, focusing on the interplay of nutrition and child growth. The authors examined multiple factors contributing to childhood obesity, including genetics, environmental influences, behavioral factors, mental health aspects, dietary patterns (specifically sugary drinks and snacks), family characteristics, parenting styles, and the ecological model, which encompasses dietary intake, physical activity, sedentary behavior, and environmental factors. Their aim was to offer a holistic understanding of the complex causes and consequences of childhood obesity.

In their 2023 paper, Shenoy and Nayak address childhood obesity as a significant global public health concern, attributing its rise to factors such as rapid urbanization and reduced physical activity. The paper delves into the pathophysiology of childhood obesity and emphasizes the need for early screening and recognition. The authors advocate for the development of cost-effective strategies involving collaboration between school authorities, parents, and healthcare professionals. They propose that community-level intervention, particularly through educating parents about healthy food choices, can play a crucial role in tackling childhood obesity. The use of Body Mass Index (BMI) as a widely employed screening tool is discussed as part of preventive measures. Importantly, the authors highlight that childhood obesity is a complex issue influenced by a combination of genetic-environmental factors and biological-developmental factors. They shed light on the contributions of epigenetics, gut microbiota, and intrauterine and intergenerational causes to the onset of obesity. Overall, the paper provides a comprehensive understanding of the multifaceted nature of childhood obesity and advocates for a holistic approach involving various stakeholders to address this pressing public health challenge.

In their study, Prasad (2023) conducted an exhaustive review addressing the multifaceted factors contributing to childhood and adolescent obesity, with a specific focus on biological, cultural, and environmental influences on eating habits. The comprehensive review delves into various dietary factors implicated in the development of childhood obesity. Notable contributors identified include the consumption of sweetened beverages, larger portion sizes of energy-dense foods, eating in front of the television, eating without

hunger or emotional factors, frequent eating out, and binge eating. The authors underscore the significance of adopting comprehensive approaches to prevent and address childhood obesity. These approaches encompass primary prevention strategies aimed at educating children and their families, promoting healthy diets, and fostering lifestyle habits conducive to weight management. Additionally, the study advocates for secondary prevention efforts designed to reduce childhood obesity and prevent the onset of unhealthy eating habits. The emphasis on both primary and secondary prevention strategies underscores the authors' commitment to a holistic and multi-faceted approach in addressing the complex issue of childhood obesity.

In their study, Abdelhak et al. (2022) explored the multifaceted aspects of childhood obesity, elucidating its implications for health both in childhood and across the lifespan. The findings underscore the acute medical problems associated with childhood obesity, including asthma, chronic inflammation, orthopedic abnormalities, liver disease, diabetes mellitus, and dyslipidemia. Additionally, the study emphasizes the long-term consequences, revealing connections to cardiovascular risk factors, obesity persistence, and premature mortality in adulthood. The authors further investigated the psychological ramifications of childhood obesity, revealing its association with low self-esteem, depression, disruptions in educational achievements, and challenges in social relationships. In terms of prevention, Abdelhak et al. advocates comprehensive measures at the family and community levels. These preventive strategies involve promoting a healthy diet, encouraging physical activity, ensuring adequate sleep, and limiting screen time through well-structured programs.

Regarding treatment, the study discusses the limited role of pharmacological interventions in managing childhood obesity, with medications such as orlistat, the phentermine/topiramate combination, and liraglutide considered as last-resort options after non-pharmacological interventions have been exhausted. Bariatric surgery emerges as a viable and effective option for extreme cases of obesity with comorbidities, albeit with the caveat of necessitating long-term monitoring and support post-surgery. The comprehensive exploration of risk factors, clinical consequences, prevention, and treatment strategies in childhood obesity provided by Abdelhak and colleagues contributes valuable insights to the multifaceted understanding of this critical public health issue.

Amanda Levere's (2022) study examines childhood obesity among Indigenous children in Canada, highlighting significant health challenges such as higher rates of infant mortality, sudden infant death syndrome, tuberculosis, asthma, bronchitis, childhood obesity, and diabetes compared to non-Indigenous counterparts. Approximately 33% of Indigenous children in Canada are classified as obese, emphasizing the urgent need to address this public health issue.

Levere's research advocates for a holistic approach to understanding and preventing childhood obesity in Indigenous children. Beyond traditional methods focusing on diet and exercise, the study emphasizes the importance of incorporating cultural, familial, and community elements. Establishing and enhancing the connection between Indigenous children and their cultural heritage is identified as crucial for promoting their health and overall well-being. Levere stresses the significance of integrating Indigenous children's viewpoints in developing effective programs to address food insecurity and prevent obesity within their communities. Active participation in research is positioned as a transformative mechanism fostering self-esteem, empathy, responsibility, and community involvement among Indigenous children.

In their study, Faircloth et al. (2019) conducted a survey to explore parent preferences in discussions about their child's weight. The authors investigated various aspects, including weight-based terminology, the most motivating terms, preferred settings for such conversations, and whether awareness of their child's weight status influenced these preferences. The findings revealed that the term "unhealthy weight" was both preferred and deemed motivating, while "obese" emerged as the most motivating term. The authors recommend that healthcare providers use terms preferred by parents when addressing excess weight, irrespective of the parent's perception of their child's weight status. Additionally, they emphasize the importance of considering the motivational value of the chosen terminology. The study highlights the delicate balance required when discussing weight with parents of children with overweight or obese, emphasizing the need to choose terms that are both least offensive and most motivating.

CHAPTER 3

MATERIALS AND METHODS

3.1 Research Design

The project employs a quantitative research approach to find out the factors that trigger or cause childhood obesity. Quantitative approaches provide very specific answers from participants, and it will help me to find out the purpose of this work most.

3.2 Study Setting and Participants

The study was carried out at certain schools in Khilgaon, Dhaka, Bangladesh. Also, the reason behind selecting this area is that here the maximum restaurants, food courts, and super shops are available. The participants were deliberately chosen from the school's population, with the help of the teachers and parents. The population was divided into two categories. Half of the students were selected from schools that have a playground, and the other half of the students were selected from schools that have no playground.

3.3 Data Sampling

The study was conducted at selected schools located in the Khilgaon area of Dhaka. The data was collected using an approach that focused on gathering quantitative information. Every interested student was required to provide consent beforehand. Subsequently, the primary interview commenced using the Key Informant Interview (KII) data collecting strategy. A total of 100 survey responses were compiled.

School Name	Playground	Number of Participants	Number of Male Participants	Number of Female Participants	Class Range
Shahid Babul Academy	Yes	20	10	10	Class One to Class Five
South Point School	No	25	10	15	Class One to Class Seven
National Ideal School	No	25	15	10	Class One to Class Seven
Khilgaon Girls School	Yes	30	15	15	Class One to Class Seven

3.4 Data Collection

The data was collected through the utilization of Key Informant Interviews (KIIs) from a single participant. Close-ended questions enable respondents to choose from a limited and specific set of predetermined answers regarding the current subject. Respondents are more likely to answer questions that are easy to understand, which provides a friendly atmosphere.

3.5 Data Analysis

Analysis of data required the use of Microsoft Excel 2016. The information was methodically categorized and coded into subdivisions and topics according to recurring patterns and fundamental concepts associated with the project's main target.

3.6 Ethical Considerations

Priority was given to ethical issues throughout the study. Throughout data collection, analysis, and reporting, confidentiality and anonymity were maintained, and informed consent was sought from everybody who participated. The study adheres to ethical protocols and secures the required authorizations from pertinent regulatory bodies.

3.7 Validity and Dependability of Research

To instill confidence in the findings of research, triangulation of data sources (interviews) is employed. Participant verifications were performed to validate the credibility and accuracy of the results. Comprehensive records of the procedure for the study will be upheld to augment the dependability and truthfulness of the study's results.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Demography of Respondent

The survey participants exhibited a relatively equal distribution across different age groups, spanning from 6 to 12 years old. This balanced representation ensures that insights gathered from the study are not skewed toward a specific age bracket but rather encompass a diverse range of childhood stages. The inclusion of respondents across various ages enhances the comprehensiveness of the data, enabling a more holistic understanding of the research topic. This even distribution contributes to the robustness of the findings, allowing for insights that are applicable across different developmental stages within the childhood demographic.

The gender distribution was relatively balanced, with both males and females participating in the survey. This inclusive representation across age and gender allows for a comprehensive examination of perspectives and experiences related to the research topic. The diverse demographic composition enhances the validity and applicability of the survey findings, capturing a nuanced understanding of the subject matter across different age groups and genders.

4.2 Distribution of Body Mass Index (BMI)

The survey provided the Body Mass Index (BMI) values for the participants, reflecting a range of values across the sample. The BMI values are numerical representations of the participants' body composition, calculated by dividing their weight in kilograms by the square of their height in meters. The recorded BMI values span from approximately 17.65 to 32.20, indicating variability in the participants' body mass and providing insight into the distribution of weight within the surveyed group. This data is instrumental in assessing the overall health and nutritional status of the participants, forming a crucial component in understanding the relationship between BMI and other variables within the scope of the research.

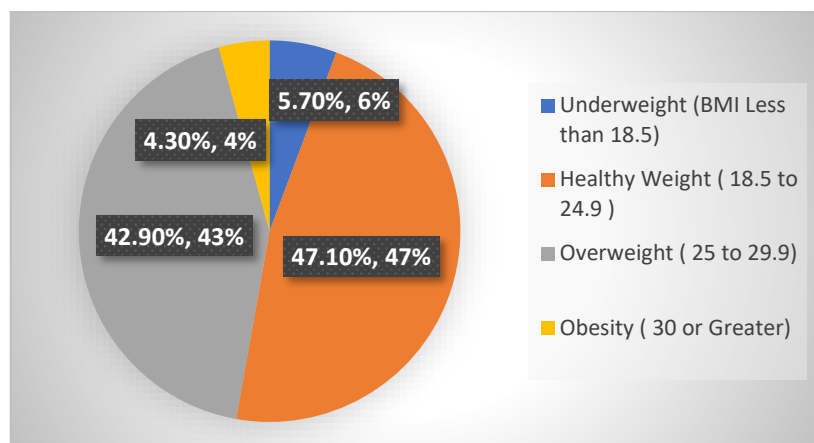


Figure1: Distribution of BMI of the participants.

From figure 1, it becomes particularly noteworthy that a significant proportion of the BMI values fall within the range of 25 to 27. This range, indicating overweight status, raises specific concerns regarding the health and well-being of the children surveyed. Understanding the prevalence of overweight conditions in this age group is crucial for developing targeted interventions and health promotion strategies. The data underscores the importance of addressing childhood obesity and its potential consequences.

4.3 Tendency of Exercising

The participants' responses regarding their frequency of engaging in physical activities or sports that induce sweating and increased breathing are varied. Most respondents reported participating in such activities 2 to 4 days a week, indicating a consistent involvement in physical exercise.

Table 1: Distribution of BMI categories based on their tendency of exercising

BMI	0 to 1 days	2 to 4 days	5 to 7 days
Overall	40%	47.1%	12.9%
< 25	5.1%	71.8%	23.1%
≥ 25	83.9%	16.1%	0%

Overall, 40% of participants who reported engaging in physical activities 0 to 1 day a week had a BMI greater than or equal to 25, indicating overweight or obesity. In contrast, the majority (71.8%) of those who engaged in physical activities 2 to 4 days a week had a BMI below 25, suggesting a healthier weight status. Among respondents who reported engaging in physical activities 5 to 7 days a week, only 12.9% had a BMI greater than or

equal to 25, indicating a lower prevalence of overweight or obesity within this group. These findings underscore the potential association between increased physical activity levels and a lower likelihood of being overweight or obese, emphasizing the importance of regular exercise in maintaining a healthy weight.

4.4 Preference for Sedentary Activities

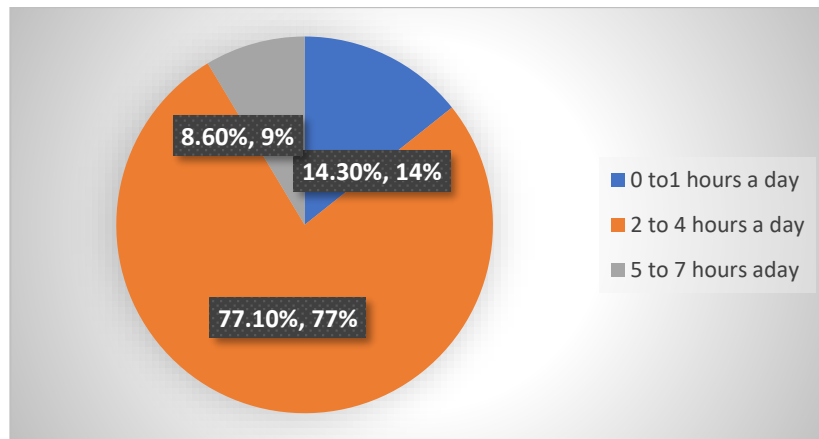


Figure 2: Preference for Sedentary Activities

Participants were asked to rate their preference for sedentary activities, such as watching TV, playing video games, or using a computer. The responses indicated a diverse range of preferences, with a majority of 77% reporting engaged in sedentary activities for 2 to 4 hours a day.

Table 2: Distribution of BMI categories based on their preference for sedentary activities.

BMI	0 to 1 hour a day	2 to 4 hours a day	5 to 7 hours a day
< 25	23.1%	76.9%	0%
≥ 25	3.2%	77.4%	19.4%

Among participants with a BMI below 25, the majority (76.9%) reported spending 2 to 4 hours a day on sedentary activities, while a smaller proportion (23.1%) indicated spending 0 to 1 hour a day on such activities. Conversely, for participants with a BMI of 25 or greater, the majority (77.4%) also reported spending 2 to 4 hours a day on sedentary activities, with a smaller proportion (3.2%) spending 0 to 1 hour a day. Additionally, a notable percentage (19.4%) of participants with a BMI of 25 or greater reported spending 5 to 7 hours a day on sedentary activities. These findings suggest a potential association between prolonged engagement in sedentary behaviors and a higher likelihood of being

overweight or obese, highlighting the importance of promoting physical activity and reducing sedentary time for weight management and overall health.

4.5 Consumption of Fast Food

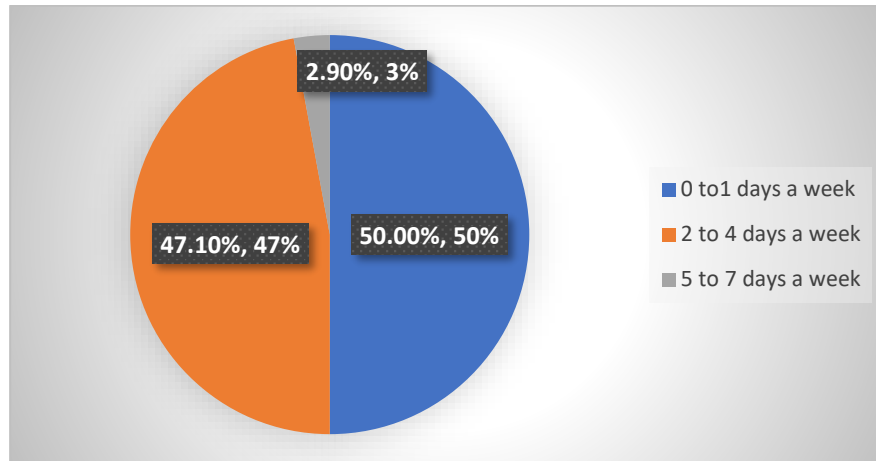


Figure 3: Consumption of Fast Food

Respondents were asked to rate their consumption of fast food or takeout meals. The results show a varied pattern in dietary habits within the surveyed group. Overall, over 47% reported consuming fast food or take-out meals 2 to 4 days a week. Conversely, 50% of the participants indicated a lower consumption rate, with 0 to 1 day a week being the preferred frequency. Notably, some respondents reported higher consumption, with a few indicating a frequency of 5 to 7 days a week. These findings provide valuable insights into the nutritional choices of the surveyed population, highlighting potential areas for targeted interventions to promote healthier eating habits within this demographic.

Table 3: Distribution Of BMI based on their consumption of fast food.

BMI	0 to 1 days	2 to 4 days	5 to 7 days
< 25	23.1%	76.9%	0%
≥ 25	16.1%	77.4%	6.5%

Among individuals with a BMI below 25, the majority (76.9%) reported consuming fast food 2 to 4 days a week, while a smaller proportion (23.1%) reported consuming it 0 to 1 day a week. Conversely, among participants with a BMI of 25 or greater, the majority (77.4%) also reported consuming fast food 2 to 4 days a week, with a smaller percentage (16.1%) indicating consumption 0 to 1 days a week. Additionally, a notable percentage (6.5%) of participants with a BMI of 25 or greater reported consuming fast food 5 to 7

days a week. These findings suggest a correlation between increased frequency of fast-food consumption and a higher likelihood of being overweight or obese, underscoring the importance of promoting healthier dietary habits for weight management and overall well-being.

4.6 Consumption of Sugary Snacks

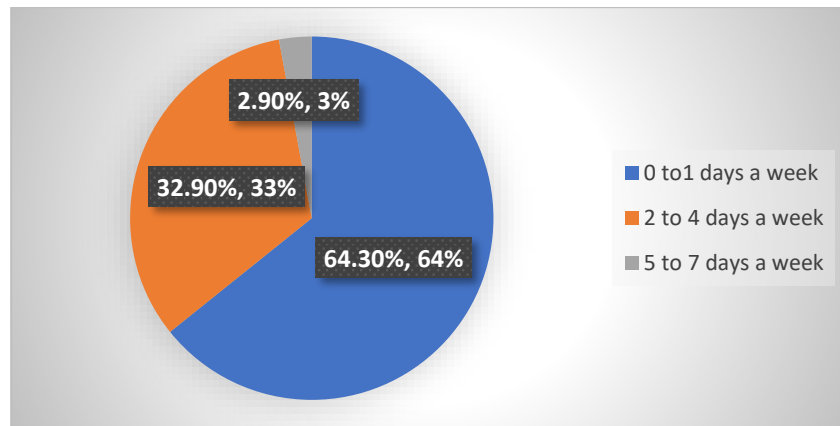


Figure 4: Consumption of Sugary Snacks

Obese children are more likely to develop cardiovascular disease at a younger age due to a combination of risk factors such as high blood pressure, abnormal lipid profiles, insulin resistance, and glucose intolerance. One of these risk factors is an elevated chance of getting heart disease. A rise in the prevalence of obesity, a decrease in dietary quality, and an increase in calorie consumption are all linked to sugar consumption. The presence of these three elements is connected. One of the factors that leads to the incidence of childhood obesity is having a sugar-rich diet. She cautions that youngsters shouldn't consume more than 45 grams of sugar per day, even in seemingly healthful items like fruit juice and yogurt. In my opinion, it's roughly the same as fifteen sugar cubes.

Table 4: Distribution of BMI based on their consumption of sugary snacks.

BMI	0 to 1 days	2 to 4 days	5 to 7 days
< 25	79.5%	17.9%	2.6%
≥ 25	45.2%	51.6%	3.2%

Among individuals with a BMI below 25, the majority (79.5%) reported consuming sugary snacks 0 to 1 days a week, while a smaller proportion (17.9%) reported consuming them 2 to 4 days a week. Only a minimal percentage (2.6%) indicated consuming sugary snacks 5 to 7 days a week. Conversely, among participants with a BMI of 25 or greater, a

percentage of 45.2% reported consuming sugary snacks 0 to 1 day a week, while the majority (51.6%) reported consuming them 2 to 4 days a week. 3.2% of participants with a BMI of 25 or greater reported consuming sugary snacks 5 to 7 days a week. These findings suggest a potential association between increased frequency of sugary snack consumption and a higher likelihood of being overweight or obese, emphasizing the importance of promoting healthier dietary habits for weight management and overall health.

4.7 Information about Eating when Not Physically Hungry Due to Emotion or Boredom

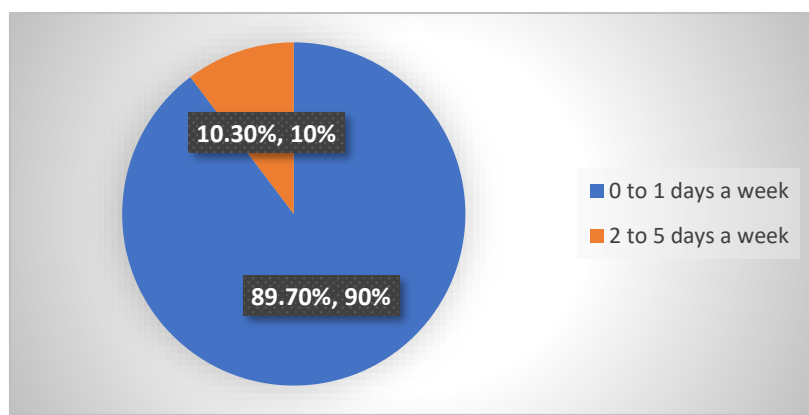


Figure 5: Information about Eating when Not Physically Hungry Due to Emotion or Boredom

Stress, despair, loneliness, irritability, anxiety, and fury are just a few examples of feelings that may lead to cravings. Other emotions that can create cravings include anger, worry, and frustration. Boredom and procrastination are the two categories of feelings that are known to be the most common causes for people to consume food when they are not hungry. This is even though these two categories of feelings are not always considered to be emotions. When you are feeling stressed, one of the easiest ways to discharge the increased energy that comes along with it is to consume and consume food. Another issue that needs to be taken into consideration is the emotional awareness of individuals. It is less probable that those who are more aware of the fact that their hunger is a sensation would have feelings of hunger that manifest themselves as emotions.

Table 5: Distribution of BMI based on eating habits due to emotional reasons or boredom.

BMI	0 to 1 days	2 to 4 days
< 25	89.7%	10.3%
≥ 25	90.3%	9.7%

Among individuals with a BMI below 25, the vast majority (89.7%) reported eating for emotional or boredom reasons 0 to 1 day a week, while a small proportion (10.3%) reported doing so 2 to 4 days a week. Similarly, among participants with a BMI of 25 or greater, a comparable majority (90.3%) reported eating for emotional or boredom reasons 0 to 1 days a week, with a slightly smaller percentage (9.7%) reporting doing so 2 to 4 days a week. These findings suggest a high prevalence of emotional or boredom eating across both BMI groups, indicating a potential area for intervention to promote healthier eating behaviors and manage weight effectively.

4.8 Concern about Body Image and Weight

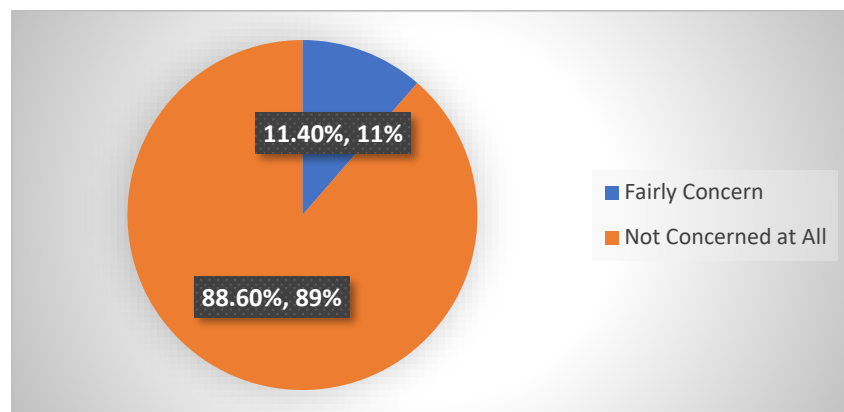


Figure 6: Concern about Body Image and Weight

The internal psychological and emotional process of body dissatisfaction may be influenced by a variety of external factors, such as the pressure to adhere to an unattainable ideal of beauty. Body dissatisfaction may lead to unhealthy ways of managing weight, such as disordered eating. One major factor in the intolerance of body diversity in our culture is the prejudice against those who are different in terms of their size and form. Nowadays, attractiveness, discipline, success, and popularity are all correlated with a slender, toned, and strong physique. If you're overweight, others will look down on you and assume you lack strength, drive, and beauty. People who have a negative self-image

are more likely to engage in disordered eating practices like dieting and are also more likely to acquire eating disorders. Having a positive perception of one's body is associated with leading a healthy lifestyle, which includes eating properly and exercising regularly. This, in turn, boosts confidence, acceptance, and general happiness. As girls approach puberty, the impact of peer pressure to conform to idealized body types becomes more noticeable. Peer pressure to conform might lead to this. Among the young people polled, 40% (or 37% of men and 42% of females) said they felt insecure about their looks because of what their peers thought of them.

Table 6: Distribution Of BMI based on their concern about body image.

BMI	Not concerned at all	Fairly concern
< 25	97.4%	2.6%
≥ 25	77.4%	22.6%

Among individuals with a BMI below 25, the vast majority (97.4%) reported not being concerned about their body image at all, while a small proportion (2.6%) reported being fairly concerned. Conversely, among participants with a BMI of 25 or greater, a lower percentage (77.4%) reported not being concerned about their body image at all, with a notably higher proportion (22.6%) reporting being fairly concerned. These findings suggest a potential difference in body image concerns between the two BMI groups, with individuals in the higher BMI category demonstrating a higher level of concern. Understanding these perceptions is essential for developing interventions aimed at promoting positive body image and psychological well-being across diverse demographic groups.

4.9 Knowledge of Long-Term Health Consequences of Childhood Obesity

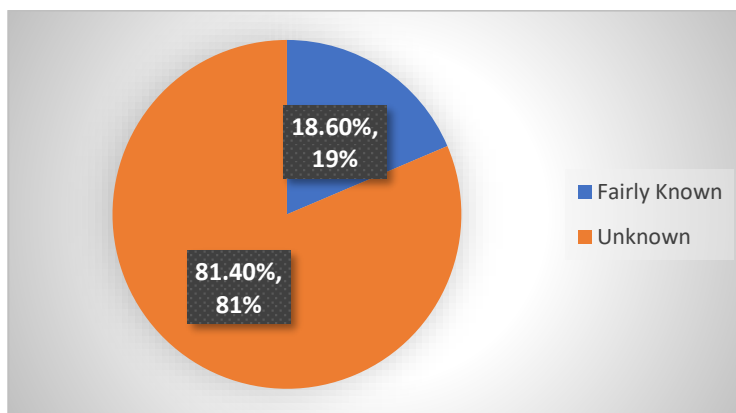


Figure 7: Knowledge of Long-Term Health Consequences of Childhood Obesity

Obesity in children is associated with an elevated susceptibility to a range of health complications, both now and in the long term. For instance, diabetes type 2, hypertension, cardiovascular disease, and hepatic steatosis are all instances of these ailments. Juvenile obesity may arise from a combination of factors, including familial eating patterns, insufficient engagement in physical activity, and suboptimal nutritional choices. The alarming increase in the incidence of childhood obesity is a matter of concern, given its potential health implications and societal ramifications. Individuals who are obese, regardless of their age, have an elevated susceptibility to certain health complications compared to those who are not obese. Both hypertension and dyslipidemia are recognized as significant risk factors for the development of cardiovascular disease. Diabetes mellitus type 2. Respiratory challenges include several medical disorders, such as asthma and sleep apnea, among others. Individuals who are overweight or obese expose themselves to significant health risks. The condition of being overweight is linked to several health implications, with cardiovascular disease (including heart disease and stroke), type 2 diabetes, musculoskeletal disorders (such as osteoarthritis), and malignancies (including endometrial, breast, and colon cancers) being the most prominent.

Table 7: Distribution of BMI based on their knowledge about long term consequences of childhood obesity.

BMI	Unknown	Fairly known
< 25	87.2%	12.8%
≥ 25	74.2%	25.8%

Among individuals with a BMI below 25, the majority (87.2%) reported being unknown about the long-term health consequences, while a smaller proportion (12.8%) reported having a known understanding. Conversely, among participants with a BMI of 25 or greater, a slightly lower percentage (74.2%) reported being unknown about the long-term health consequences, with a notably higher proportion (25.8%) reporting having a known understanding. These findings suggest a potential disparity in awareness regarding the long-term health consequences of childhood obesity between the two BMI groups, with individuals in the higher BMI category demonstrating a higher level of knowledge. Addressing this gap in knowledge is crucial for implementing effective prevention and intervention strategies to mitigate the long-term health impacts of childhood obesity.

4.10 Preference for Water or Other Healthy Beverages Over Sugary Drinks

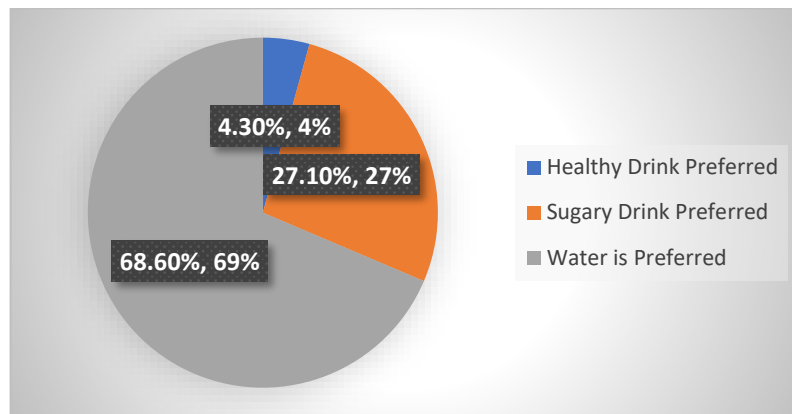


Figure 8: Preference for Water or Other Healthy Beverages Over Sugary Drinks

A child's use of sugary drinks is associated with an increased risk of developing a weight problem such as obesity or being overweight. Substituting nutritious drinks, such as safe-to-drink water, for sugary ones might help reduce the possibility that this could occur. Beverages comprise 47% of the total sugars eaten nationwide, which is more than half of the added sugars swallowed, according to the American Dietary Guidelines. Liquid calories do not have the same effect on the body as solid calories do; this is because the body does not "register" them as fully as they do in solid meals. To put it simply, the body does not "register" the calories in liquids the same way it does with solid meals. People who have drunk calorically rich drinks seldom experience a persistent hunger pang long after they've finished eating. There is mounting evidence linking the intake of sugar-sweetened beverages to a higher risk of juvenile obesity. The study findings corroborate this assertion. So, cutting down on sugary beverages would also reduce the chances of childhood obesity right now. Therefore, it is highly recommended that young people consume more water and less soda to promote their healthy lifestyle choices. One advantage of water over soda is that it's much more pleasant to drink. Water, which has no calories, may aid with weight control and calorie restriction when substituted with calorically high liquids like sweet tea or regular soda. Water is essential to your health for several reasons: Keep the temperature at a somewhat steady level. Joints should be greased and cushioned.

Table 8: Distribution of BMI based on their preference of water or other healthy drinks over sugary drinks.

BMI	Water is preferred	Healthy drink is preferred	Sugary drink is preferred
< 25	92.3%	2.6%	5.1%
≥ 25	38.7%	6.5%	54.8%

Among individuals with a BMI below 25, the majority (92.3%) expressed a preference for water, while only a small percentage (2.6%) favored other healthy beverages. In contrast, a significantly smaller proportion (5.1%) preferred sugary drinks. Conversely, among participants with a BMI of 25 or greater, a notably lower percentage (38.7%) preferred water, with a similarly small percentage (6.5%) favoring other healthy beverages. However, a substantial majority (54.8%) indicated a preference for sugary drinks. These findings suggest a significant discrepancy in beverage preferences between the two BMI groups, with individuals in the higher BMI category demonstrating a higher inclination towards sugary drinks. Addressing this preference for sugary beverages is crucial in promoting healthier dietary choices and combating obesity-related health risks.

4.11 Consumption of High-Fat Foods

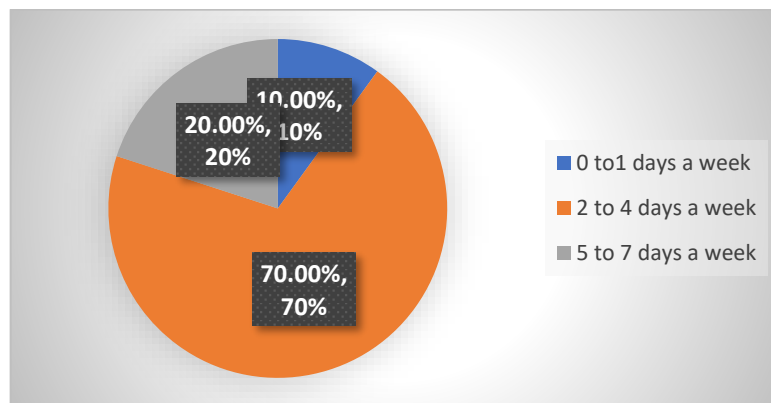


Figure 9: Consumption of High-Fat Foods

Childhood obesity and adiposity have been associated with rising rates of calorie-dense and fat-laden food intake [86,87,88,89]. The issue of childhood obesity is exacerbated by poor dietary practices, such as not getting enough fruit, vegetables, and milk and eating too many calorie-heavy snacks. The impact of a high-fat diet (HFD) on obesity and its associated comorbidities is due to more than just consuming too many calories. A higher body mass index, poorer success maintaining weight reduction, and weight increase are all linked to fast food consumption. However, there is also a correlation between fast food consumption and weight growth. For young people, eating fast food lowers dietary

standards and provides unhealthy options, which raises the risk that they may gain weight. Particularly for those who eat fast food, this is the case. Consumption of bad foods, lack of physical exercise, and family eating habits are some of the many factors that lead to childhood obesity. Concerningly, the prevalence of overweight children and adolescents is on the rise, which poses serious health risks and may eventually impact society at large.

Table 9: Distribution of BMI based on their consumption of fried or high fat foods.

BMI	0 to 1 days	2 to 4 days	5 to 7 days
< 25	15.4%	84.6%	0%
≥ 25	3.2%	51.6%	45.2%

Among respondents with a BMI below 25, a small percentage (15.4%) reported consuming fried or high-fat foods 0 to 1 day a week, while the majority (84.6%) reported doing so 2 to 4 days a week. None of the respondents in this BMI category reported consuming fried or high-fat foods 5 to 7 days a week. Conversely, among participants with a BMI of 25 or greater, a significantly lower percentage (3.2%) reported consuming fried or high-fat foods 0 to 1 day a week. However, a substantial proportion (51.6%) reported doing so 2 to 4 days a week, and a notable percentage (45.2%) reported consuming these foods 5 to 7 days a week. These findings suggest a potential association between increased frequency of consuming fried or high-fat foods and a higher likelihood of having a BMI of 25 or greater, emphasizing the importance of promoting healthier dietary habits for weight management and overall health.

4.12 Support of Family to Engage in Physical Activities

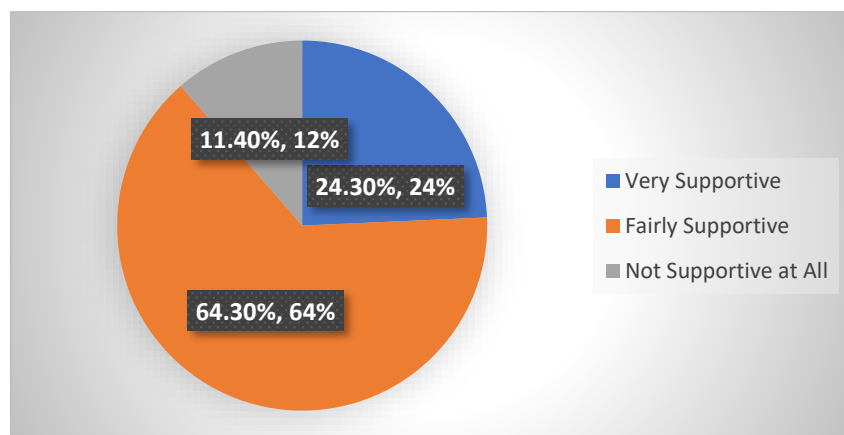


Figure 10: Support of Family to Engage in Physical Activities

Helping kids achieve and maintain a healthy weight is one advantage of establishing healthy eating practices as a family. This is especially true when it comes to overweight children. By adhering to dietary guidelines and consuming a variety of fruits and vegetables, whole grains, lean meats, and low-fat or fat-free dairy products, you may ensure the best possible health for your family. Parents have a significant impact on their children's healthy lifestyle patterns, which include their dietary habits, level of physical activity, quantity of sleep they receive, and screen time. The establishment of these behaviors is greatly influenced by parents. You should prioritize providing a diverse range of nutrient-dense foods and making family mealtimes a top priority whenever possible. It is important to remind children that they should have a balanced diet that includes plenty of fruit and vegetables, limit their intake of sugary drinks like soda, juice, and sports drinks, and eat breakfast every day. Every morning, you should have breakfast. You must make sure that they are getting enough sleep.

Table 10: Distribution Of BMI based on their family support in physical activity.

BMI	Very supportive	Fairly supportive	Not supportive at all
< 25	30.8%	59%	10.2%
≥ 25	16.1%	71%	12.9%

Among individuals with a BMI below 25, approximately 30.8% reported receiving very supportive encouragement from their family, while a larger majority (59%) indicated receiving fairly supportive support. Conversely, only a small proportion (10.2%) reported receiving no support at all. In contrast, among participants with a BMI of 25 or greater, a lower percentage (16.1%) reported receiving very supportive encouragement from their family, with a slightly higher majority (71%) reporting supportive support. Similarly, a small proportion (12.9%) indicated receiving no support at all. These findings suggest that while overall support for physical activity from family members is prevalent in both BMI groups, individuals with a higher BMI may perceive slightly lower levels of very supportive encouragement from their families. Addressing this perception gap could potentially enhance efforts to promote physical activity and combat obesity-related health risks within familial settings.

4.13 Information about Playgrounds of School's

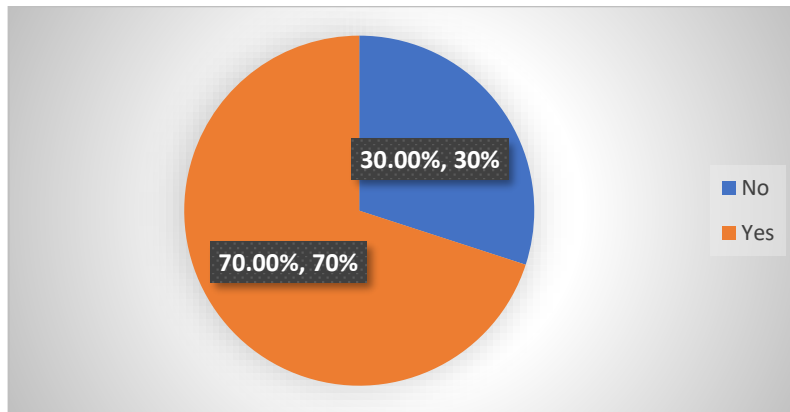


Figure 11: Information of Playgrounds of School's

Most of today's educators had ill-prepared asphalt playgrounds when they were students. Most playgrounds in the modern era are rather distinct. An outdoor classroom, climbing areas, various kinds of functional surfaces, and play areas with the right equipment are modern playground necessities that would be severely missing in today's playgrounds. As they take part in playground activities, kids may hone abilities that will benefit them throughout their lives. Possessing these abilities means you can work well with others, make good decisions, be a leader, keep your focus even when things are tough, and come up with original ideas. Children should have the opportunity to play in a safe and publicly accessible public area. Keep kids from staring at screens for more than an hour or two each day. Included in this category are televisions, video games, and personal computers. The typical American kid spends close to twenty-four hours a week in front of the tube. An increase in physical activity levels may result from a decrease in sedentary behavior.

Table 11: Distribution Of BMI based on playground present in their schools or not.

BMI	Yes	No
< 25	74.4%	25.6%
≥ 25	64.5%	35.5%

Among individuals with a BMI below 25, the majority (74.4%) reported that their schools do have a playground, while a smaller proportion (25.6%) indicated that their schools do not. In contrast, among participants with a BMI of 25 or greater, a slightly lower percentage (64.5%) reported having a playground in their schools, with a higher proportion (35.5%) indicating the absence of a playground. These findings suggest that

while a substantial majority of schools have playgrounds regardless of BMI, a higher proportion of individuals with a BMI of 25 or greater reported the absence of playgrounds in their schools. The availability of playgrounds in schools is essential for promoting physical activity among students, and efforts to ensure equitable access to such facilities may contribute to overall health and well-being, particularly among individuals at risk of being overweight or obese.

4.14 Information of how they go to School.

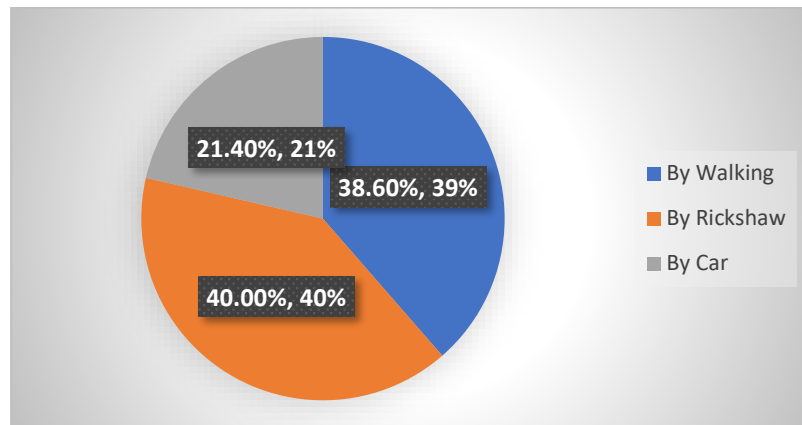


Figure 12: Information of how they go to School

A little less than 19% of children and adolescents met the criteria for being overweight, which is equivalent to roughly 14.7 million individuals. In the age range of 2–5, the prevalence of obesity was 12.7%, while in the age range of 6–11, it was 20.7%, and in the age range of 12–19, it was 22.2%. In the past, type 2 diabetes was only diagnosed in adults; now, it is now being seen more often in children as a potential health issue for children who are overweight. There are instances of disturbed eating habits, such as binge eating or bulimia. Those conditions that are associated with the anatomy of the foot are referred to as orthopedic illnesses. It was shown that children and adolescents who were overweight had a higher likelihood of experiencing feelings of anxiety and depression. A significant correlation of 43% was found between girls who were overweight and experiencing anxiety and melancholy ($p < 0.0001$). It was shown that the risk for males who were overweight was also rather significant ($p < 0.0001$). Even though there is a connection between the weight of the parents and the weight of their children, this does not necessarily imply that every child who is born to parents who are overweight will also grow up to be overweight. In addition to the genetic make-up of the parents, the parenting practices of the parents also pass on some of their characteristics to their children.

Table 12: Distribution Of BMI based on how they go to school.

BMI	By walking	By rickshaw	By car
< 25	48.8%	33.3%	17.3%
≥ 25	25.8%	48.4%	25.8%

Among individuals with a BMI below 25, approximately 48.8% reported walking as their mode of transportation, while 33.3% mentioned using a rickshaw, and 17.3% indicated traveling by car. In contrast, among participants with a BMI of 25 or greater, a notably lower percentage (25.8%) reported walking to school, with a higher proportion (48.4%) using a rickshaw. Additionally, a similar percentage (25.8%) mentioned traveling by car. These findings suggest differences in transportation patterns between the two BMI groups, with individuals in the higher BMI category more likely to use motorized transportation options such as rickshaws or cars compared to walking. Promoting active modes of transportation, such as walking or cycling, may contribute to increasing physical activity levels among students, thereby supporting efforts to prevent and manage obesity.

4.15 Information about Food Preference for Tiffin

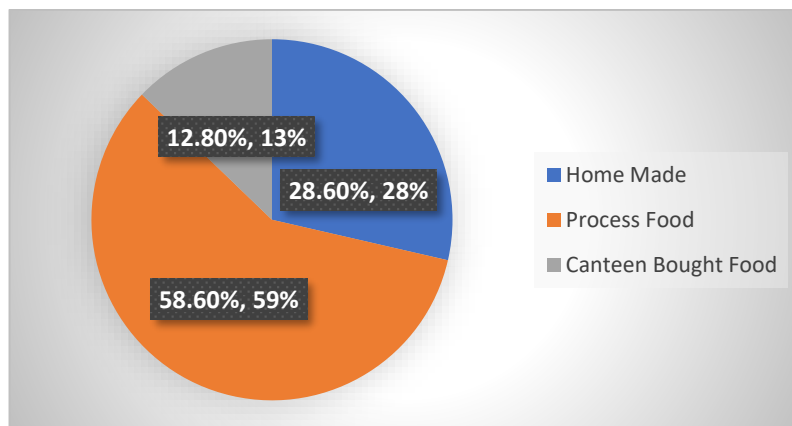


Figure 13: Information about Food Preference for Tiffin

The study's authors found that both obese men and women had a pronounced preference for fatty and sweet flavors. Obese individuals had a greater preference for salt and fat compared to their slimmer counterparts. Individuals who were overweight had a greater preference for sugary and fatty meals compared to those who were underweight. The desire had an inverse correlation with BMI. Individuals who exhibit excess weight or obesity may have distinct neural responses to food consumption contingent upon their level of satiety. This is since individuals who are overweight or obese may have a more

pronounced reward response in comparison to those who have a normal weight. This may increase their propensity to consume food on occasions when they are not hungry. It is recommended to include nutritious protein sources such as fish, chicken, and beans, as well as minimally processed whole foods like vegetables, fruits, nuts, and whole grains, into one's dietary regimen. The exclusion of sugary drinks, refined carbohydrates, potatoes, red and processed meats, and other processed foods, along with fast food, is recommended for dietary modification. Reduce the use of heavily processed foods by opting for more natural alternatives such as fresh vegetables, nuts, seeds, and whole grains. Instead of sugary beverages, it is recommended to provide fortified non-dairy drinks, water, or low-fat or fat-free milk options. When healthy foods and drinks are stored in a conveniently accessible position, they are more likely to be quickly obtained when necessary.

Table 13: Distribution of BMI based on Their preference of food for tiffin.

BMI	Homemade food	Canteen bought food	Process food
< 25	38.5%	7.7%	53.8%
≥ 25	16.1%	19.4%	64.5%

Among individuals with a BMI below 25, the majority (38.5%) expressed a preference for homemade food for tiffin, while a smaller proportion (7.7%) preferred canteen-bought food. The highest percentage (53.8%) indicated a preference for processed food. Conversely, among participants with a BMI of 25 or greater, a notably lower percentage (16.1%) favored homemade food for tiffin. A slightly higher proportion (19.4%) preferred canteen-bought food, while the majority (64.5%) expressed a preference for processed food. These findings suggest that individuals with a higher BMI are more inclined towards processed food options for tiffin compared to those with a lower BMI, highlighting the importance of promoting healthier dietary choices to mitigate the risk of obesity and related health issues.

4.16 Information about Carrying School Bag

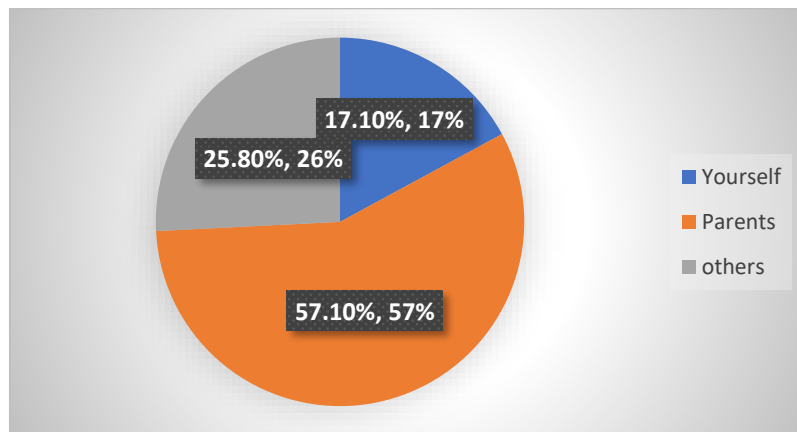


Figure 14: Information about Carrying School Bag

The possible effect of children's hefty school backpacks on developing their core strength and stamina. A child's core strength may be improved by the weight of their school backpacks. Children may develop stronger core muscles and more stamina if they routinely wear backpacks that support up to a quarter of their body weight. Increased fatigue, back and muscle pain, poor posture, lumbar pain, shoulder and neck pain, and an abnormal curvature of the spine are among the many common problems that today's youth face. When traveling, it is not uncommon for children to slouch since they are so used to carrying heavy bags on one shoulder. The most common use for a school bag on the way to and from school is to hold books, notebooks, and other school materials. The bag will keep the elements (rain, snow, and dirt) at bay. The health risks associated with routinely carrying heavy bags, including those used for school or laptops, are many. You can feel pain in your shoulders, neck, and back from the strain it puts on your ligaments, muscles, and tendons. The accumulation of poor posture and musculoskeletal problems may be a long-term consequence of this tension.

Table 14: Distribution of BMI based on information on carrying bag.

BMI	Yourself	Parents	Others
< 25	28.3%	53.8%	17.9%
≥ 25	3.2%	61.3%	35.5%

Among individuals with a BMI below 25, approximately 28.3% reported carrying their school bags themselves, while a majority (53.8%) indicated that their parents carry it for them. A smaller proportion (17.9%) mentioned others, such as siblings or friends, carrying their school bags. Conversely, among participants with a BMI of 25 or greater, a notably lower percentage (3.2%) reported carrying their school bags themselves. A higher majority

(61.3%) stated that their parents carry the school bags, and a significant proportion (35.5%) mentioned others carrying their bags. These findings suggest differences in the responsibility for carrying school bags between the two BMI groups, with individuals in the higher BMI category more likely to have their parents or others carry their school bags compared to those with a lower BMI. Addressing factors contributing to this disparity may offer insights into promoting independence and physical activity among students, regardless of their BMI status.

4.17 Information about Sleeping Well at Night

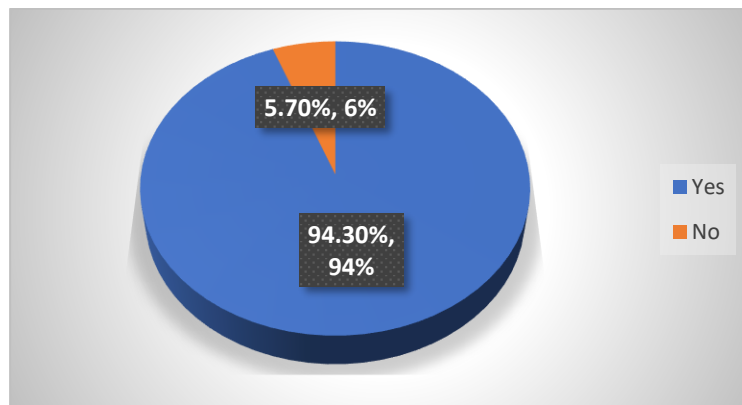


Figure 15: Information about Sleeping Well at Night

Sleep deprivation increases the risk for young individuals. Gain more insight into the etiology of obesity by examining the primary source. Insufficient sleep-in young individuals may lead to adverse hormonal changes, which are known to contribute to weight growth in adulthood. Another potential factor is an increase in diurnal fatigue, leading to a decrease in physical activity levels. Sleep disturbances resulting from obesity are a contributing factor to weight gain due to reduced energy levels and the physiological adaptation that leads to excessive production of stress hormones in the body. One especially exasperating feature of this cyclical pattern is that, in some instances, insufficient sleep might potentially save the lives of those who are fat. Individuals with neck pain may perhaps get relief by sleeping in a lateral position. For example, pregnant women, those who experience snoring during sleep, people who are overweight or obese, and the elderly may all get advantages from sleeping on their sides.

Table 15: Distribution of BMI based on their sleeping pattern.

BMI	Yes	No
< 25	100%	0%
≥ 25	87.1%	12.9%

Among individuals with a BMI below 25, all respondents (100%) indicated that they sleep well at night, with none reporting otherwise. In contrast, among participants with a BMI of 25 or greater, the majority (87.1%) reported sleeping well at night, while a small proportion (12.9%) reported not sleeping well. These findings suggest a high prevalence of good sleep quality among individuals with a BMI below 25, while a slightly lower percentage of individuals with a BMI of 25 or greater experience good sleep quality. Addressing factors contributing to sleep disturbances among individuals with higher BMI levels may be important for promoting overall health and well-being.

4.18 Information about Eating a Day

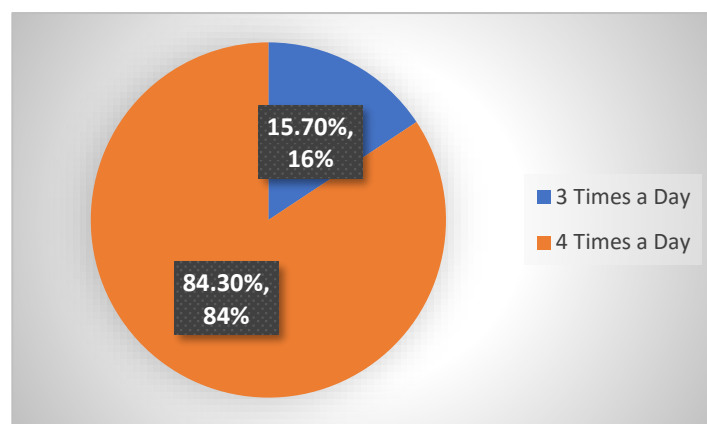


Figure 16: Information about Eating a Day

The healthy body mass index (BMI) range for kids and teens varies with their chronological age, so keep that in mind: Assuming a BMI between the fifth and eighty-five percentiles, a person is said to be within the healthy weight range. Body mass index (BMI) values between the 85th and 95th percentiles indicate that a person is overweight. To be classified as obese, a person's body mass index (BMI) must be more than or equal to the 95th percentile. Here are a few of the more prevalent ones, ranked by frequency: devoting a considerable portion of one's diet to processed or fast food, which is notoriously heavy in sugar and fat. Consuming an excessive amount of alcohol is not recommended due to the high calorie content. Dine-out, as restaurant cuisine could have more sugar and fat than home-cooked dinner. For children who are overweight or obese, it may be beneficial to consume nutrient-dense meals and exercise often. To avoid health issues related to obesity and to establish good habits that may be sustained throughout life, childhood is a crucial time that should not be missed. Your kid may learn to eat healthily and stay at a healthy weight with the help of a doctor or nutritionist.

Table 16: Distribution of BMI based on their daily eating routine.

BMI	3 times a day	4 to 5 times a day
< 25	28.2%	71.8%
≥ 25	0%	100%

Among individuals with a BMI below 25, approximately 28.2% reported eating three times a day, while a larger majority (71.8%) indicated consuming meals four to five times a day. Conversely, among participants with a BMI of 25 or greater, none reported eating three times a day, with all respondents (100%) indicating that they consume meals four to five times a day. These findings suggest differences in meal frequency between the two BMI groups, with individuals in the higher BMI category more likely to consume meals four to five times a day compared to those with a lower BMI. Addressing factors influencing meal frequency and promoting balanced eating habits may contribute to overall health and weight management across different BMI categories.

4.19 Analysis of the Consumption of Different Food Groups

Table 17: Analysis of the consumption of different food groups

Type of food	Yes (Overall)	No (Overall)	Yes (BMI>25)	No (BMI>25)	Yes (BMI<25)	No (BMI<25)
Cereals	100%	0%	100%	0%	100%	0%
White Roots and Tubers	65.7%	34.3%	48.4%	51.6%	79.5%	20.5%
Vitamin A Rich Vegetables and Tubers	58.6%	41.4%	58.1%	41.9%	59.0%	41.0%
Dark Green Leafy Vegetables	38.6%	61.4%	25.8%	74.2%	48.7%	51.3%
Other Vegetables	55.7%	44.3%	29.0%	71.0%	76.9%	23.1%
Vitamin A Rich Fruits	71.4%	28.6%	87.1%	12.9%	59.0%	41.0%
Other Fruits	64.3%	35.7%	48.4%	51.6%	76.9%	23.1%
Organ Meat	48.6%	51.4%	45.2%	54.8%	51.3%	48.7%
Flesh Meats	98.6%	1.4%	100.0%	0.0%	97.4%	2.6%

Eggs	77.1%	22.9%	51.6%	48.4%	97.4%	2.6%
Fish and Seafood	88.6%	11.4%	77.4%	22.6%	97.4%	2.6%
Legumes, Nuts, and Seeds	58.6%	41.4%	48.4%	51.6%	66.7%	33.3%
Milk and Milk Products	100%	0%	100.0%	0.0%	100.0%	0.0%
Oils and Fats	60%	40%	51.6%	48.4%	66.7%	33.3%
Sweets	74.3%	25.7%	100.0%	0.0%	53.8%	46.2%
Spices, Condiments, Beverages	50%	50%	45.2%	54.8%	53.8%	46.2%
Outside food (Household level)	47.1%	52.9%	64.5%	35.5%	33.3%	66.7%
Outside food (Individual level)	47.1%	52.9%	64.5%	35.5%	33.3%	66.7%

The table presents the consumption of various food groups among respondents, categorized by overall responses and Body Mass Index (BMI) groups.

Cereals: 100% of respondents reported cereal consuming, regardless of their BMI status.

White Roots and Tubers: While 65.7% of respondents reported consuming white roots and tubers overall, a higher percentage (79.5%) of individuals with a BMI below 25 reported consuming these foods compared to those with a BMI of 25 or greater (48.4%).

Vitamin A Rich Vegetables and Tubers: Approximately 58.6% of respondents reported consuming vitamin A rich vegetables and tubers overall, with similar percentages across different BMI groups.

Dark Green Leafy Vegetables: A smaller proportion (38.6%) of respondents reported consuming dark green leafy vegetables overall. Interestingly, a higher percentage (48.7%) of individuals with a BMI below 25 reported consuming these vegetables compared to those with a BMI of 25 or greater (25.8%).

Other Vegetables: Around 55.7% of respondents reported consuming other vegetables overall, with a higher percentage (76.9%) of individuals with a BMI below 25 consuming these compared to those with a BMI of 25 or greater (29.0%).

Vitamin A Rich Fruits: A majority (71.4%) of respondents reported consuming vitamin A rich fruits overall, with a higher percentage (87.1%) among individuals with a BMI of 25 or greater compared to those with a BMI below 25 (59.0%).

Other Fruits: Approximately 64.3% of respondents reported consuming other fruits overall, with a higher percentage (76.9%) among individuals with a BMI below 25 compared to those with a BMI of 25 or greater (48.4%).

Organ Meat, Flesh Meats, Eggs, Fish and Seafood, Legumes, Nuts, and Seeds, Milk and Milk Products, Oils and Fats: These food groups were consumed by nearly all respondents, with minimal variations observed across different BMI groups.

Sweets: Approximately 74.3% of respondents reported consuming sweets overall, with a higher percentage (100%) among individuals with a BMI of 25 or greater compared to those with a BMI below 25 (53.8%).

Spices, Condiments, Beverages: Around 50% of respondents reported consuming spices, condiments, and beverages overall, with minimal variations observed across different BMI groups.

Outside Food (Household Level) and Outside Food (Individual Level): Approximately 47.1% of respondents reported consuming outside food at the household level and individual level overall, with a higher percentage among individuals with a BMI of 25 or greater compared to those with a BMI below 25.

The data offers valuable insights into the dietary habits of children and their potential associations with BMI, shedding light on factors contributing to childhood obesity.

4.20 Discussion

1. High Consumption of Energy-Dense Foods: The consumption of foods such as white roots and tubers, sweets, and outside food (both at household and individual levels) appears to be prevalent among all respondents, regardless of their BMI status. This high consumption of energy-dense foods, especially sweets and outside food, may contribute to excessive calorie intake, thereby increasing the risk of obesity, particularly among children with a BMI of 25 or greater. This is my finding.

In their 2018 paper, titled “**Snacking Energy-dense Food Related to Childhood Obesity**”, Aulia Jauharun Nisak, Qonita Rachmah, Trias Mahmudiono* and Calista

Segalita also finds out the same reason of obesity. They find that the consumption pattern of energy-dense food and snacking were both associated with childhood obesity based on BMI/ age, but not for food access. Several energy-dense foods that need to be reduced to lower obesity risk are flavored drinks, biscuits, syrup, chocolate, and sweetened condensed milk. Moreover, the prevalence of obesity in the study was found to be higher (50.0%).

Recommendations: I feel if we can do the things given below there can be a solution for this.

They are:

- Promote Healthy Eating Habits through Education
- Increase Accessibility to Healthier Food Options
- Regulate and Limit Marketing of Unhealthy Foods

2. Differences in Vegetable and Fruit Consumption: There are notable differences in the consumption of vegetables and fruits between different BMI groups. While the consumption of vitamin A-rich vegetables and tubers and dark green leafy vegetables seems relatively consistent across BMI categories, individuals with a BMI below 25 show a higher consumption of other vegetables and fruits compared to those with a BMI of 25 or greater. This suggests that children with a lower BMI may have healthier dietary patterns with a higher intake of nutrient-rich fruits and vegetables, which could contribute to maintaining a healthier weight.

In their 2013 paper, titled “**Fruit and vegetable consumption and BMI change in primary school-age children: a cohort study**”, Bayer, I Nehring, G Bolte & R von Kries find in their study that the tendency for BMI gain to be lower in children with increasing fruit consumption compared to those with decreasing fruit consumption is interesting, though the result is nonsignificant. Increasing fruit intake may be associated with healthier dietary patterns, as fruits are typically nutrient-dense, lower in calories, and high in fiber, which could help with weight management. However, the lack of statistical significance suggests that this effect may not be strong enough in this sample or study design to draw firm conclusions. Vegetables are typically low in calories, but they could have other factors influencing weight (e.g., preparation methods, dietary patterns overall).

Recommendations:

- Parents should Promote Increased Fruit and Vegetable Consumption
- Encourage Balanced, Nutrient-Dense Meals
- Monitor and Support Long-Term Dietary Patterns

3. Variations in Protein Sources: The consumption of rich protein foods such as organ meat, flesh meats, eggs, fish and seafood, and legumes, nuts, and seeds appear to be widespread among all respondents, with minimal variations across different BMI groups. While these foods are important sources of essential nutrients, their consumption alone may not significantly impact BMI status.

Recommendations:

- Emphasize Balanced Macronutrient Intake, Not Just Protein
- Focus on Portion Control and Caloric Balance
- Promote Healthy Lifestyle Practices

4. Preference for Homemade Food: A higher percentage of individuals with a BMI below 25 reported a preference for homemade food compared to those with a BMI of 25 or greater. This preference may indicate a healthier dietary choice, as homemade meals are often associated with better portion control and the use of fresher ingredients, which can contribute to weight management.

5. Lower Engagement In physical activity: The data indicates that a higher percentage of individuals with BMI below 25 have more engagement in physical activity compared to those with BMI of 25 or greater. This may indicate that they are maintaining a healthy lifestyle. By doing physical activity they can use their extra calories stored in their body.

In their 2006 paper, titled “**Relationship between physical activity and obesity in children and adolescents**”, S. GUERRA 1, A. TEIXEIRA-PINTO 2, J. C. RIBEIRO 1, A. ASCENSÃO 1, J. MAGALHÃES 1, L. B. ANDERSEN 3, J. A. DUARTE 1, J. MOTA 1 have in their study that differences in physical activity (PA) levels have been observed between boys and girls, it is crucial to analyze these genders separately due to the distinct patterns of PA and obesity they may exhibit. Logistic regression analyses of obesity for males (Table II) and females (Table III) revealed significant findings for males but not for females.

For males, those in the 1st quartile of PA (representing lower levels of physical activity) had an odds ratio of 2.1 for obesity compared to those in the 4th PA quartile (higher PA levels). This suggests that males with lower levels of physical activity were more than twice as likely to be obese compared to their more active counterparts.

6. Screen Time: The data indicates that a higher percentage of individuals with BMI below 25 have less screen time than those with BMI of 25 or upper. There is a demonstrated propensity for individuals to eat more food overall during screen viewing compared to when they are not viewing screen entertainment. I think higher weekly TV viewing was associated with a less healthy diet and consumption of more sugary products.

In their 2015 paper, titled **“Childhood Obesity: Reason behind this health crisis”**, Abhinav Sawhney*, Nidha Amir, Mohd Mazhar, Sumeet Gullaiya, Satyendra K Rajput also find the same reason behind childhood obesity that I find. In their paper they find that environmental factors play a more important role in childhood obesity than genetical factors. The common factors we find are the family’s economic status, meal pattern of the child, having fast food more than 3 times a week, the area they belong to, physical exercise level, way of food their parents are choose for them, way of cooking food mostly related to childhood obesity. They also find some other reasons behind childhood obesity like duration of exclusive breast feeding and breast feeding, role of leptin and ghrelin, genetic factors.

In 2023, Yale School of Public Health published one of the papers of the thesis named, **“Missing the Forest for The Trees: The Causes of The Obesity Epidemic”**. In their paper they find some reason behind childhood obesity and the common reasons are consumption of processed food, ready to eat meals, sugary drinks, does not have enough place to play or physical activity, screen time, and the uncommon reasons are gut microbiome (when germ free mice are given a fecal microbiota transplant from an obese donor, they become obese), Stress is involved in food intake regulation also energy expenditure, and most important factor they find is marketing. There is a line like children who watched TV with commercial advertisements were more prone to obesity than children who watched television without advertisement.

Overall, the observational analysis suggests that while there are variations in dietary patterns between different BMI groups, certain dietary behaviors, such as high consumption of energy-dense foods and sweets, may contribute to childhood obesity.

Encouraging healthier dietary choices, such as increasing the intake of fruits and vegetables and reducing the consumption of sweets and energy-dense foods, could be important strategies in the prevention and management of childhood obesity. Additionally, promoting homemade meals and educating families about balanced nutrition may help foster healthier eating habits from an early age.

Limitations of the Study

This study on childhood obesity in Bangladesh has certain limitations that should be acknowledged. The sampling process, while carefully designed for diversity, might not fully represent the entire population, impacting the generalizability of findings. The cross-sectional nature of the study provides a snapshot, potentially overlooking the dynamic evolution of childhood obesity over time, and the reliance on self-reported data introduces the possibility of bias, particularly in responses related to cultural and dietary aspects. Furthermore, the evaluation of existing policies faces challenges as policies may change during the study, and external factors beyond the study's scope could influence childhood obesity rates. Ethical considerations regarding the sensitivity of health-related information may also impact the depth of participant disclosure. Despite these limitations, this study contributes valuable insights into the triggering factors behind childhood obesity in Bangladesh. While acknowledging these constraints, the findings aim to provide a foundation for further research and contribute to the ongoing discourse on addressing childhood obesity in the region. (BMD, 2006).

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1 Conclusion

Poor dietary habits and lack of physical activity are the primary causes of juvenile obesity. Hormonal and genetic variables, however, may play a role. People of all ages are susceptible to illness known as obesity. Overweight children and adolescents are at increased risk for a variety of health issues, including sleep apnea, abnormalities in bones and joints, low self-esteem, stigma and other social and psychological difficulties. Overweight people often have irregular eating habits, low levels of physical exercise, and trouble sleeping. Health is also impacted by factors such as genetics, socioeconomic status, and the usage of medications. Obesity is still defined as eating more calories than the body burns through regular, active living, even though many factors may influence a person's weight, including genes, behavior, metabolism, and hormones. When you eat more calories than your body needs, some of those extra calories will end up stored as fat. Some of the factors that contribute to the epidemic of childhood obesity include families' eating habits, a lack of physical exercise, and unhealthy food consumption. Both the health of individuals and the very foundation of our society are at risk from the alarming trend of increasing rates of childhood obesity. The risk of childhood obesity rises in tandem with the rate of excess fat storage in children, and this rate is correlated with their level of inactivity. Participating in after-school sports or playing sports outdoors are two ways that children may get active. With the advent of the digital age came a proliferation of popular, easily available media such as television series and video games. Consuming a diet heavy in sugar and fat via frequent consumption of processed and fast meals. Alcohol is high in calories, thus it's not a good idea to drink too much of it. eating out on a regular basis – compared to home cooking, restaurant food could have more sugar and fat. Consuming an excess of calories above one's daily requirements. The fast-food industry is the target of this research, but the root causes of childhood obesity will be considered. Students from four different schools—Khilgaon Girls, National Ideal, South Point, and Shahid Babul Academy—with ages ranging from six to twelve were also included in this study.

5.2 Recommendations

- Engaging in activities that last longer than sixty minutes may aid weight loss and make it easier to maintain the desired weight.

- One should not spend more than an hour or two a day in front of any kind of electronic screen, including phones, computers, and televisions.
- Remind kids and teens to eat slowly and thoughtfully and only eat when they're hungry. Under no circumstances is it acceptable to use food as a reward or a substitute for food.
- If your primary care physician or another healthcare provider specialized in weight loss management has recommended joining a weight loss group in your area, you should also do so.
- Pay attention to the number of calories a child eats and eat a balanced diet.
- It is advised that you engage your child in vigorous physical exercise for 150 to 300 minutes weekly, like running, swimming, tennis, or brisk walking.
- A wide selection of nutritious drinks and foods are at your disposal, including those rich in protein, healthy fats, fruits and vegetables, and whole grains. Sugary drink consumption accompanied increased physical activity and a reduction in the consumption of harmful meals and drinks including potatoes, red meat, processed meat, refined cereals, and sweets.
- Time spent "sit timewise., in front of a screen, including television, computers, and other electronic devices—should be reduced.
- Should stop using fast foods for tiffin and should not give fast foods more than one time in a week.
- Every school should have a playground in their school and should go to school by walking.
- Parents should use more vegetables and fruits in a child's daily food.

REFERENCES

- Daniels, S. R., Arnett, D. K., Eckel, R. H., et al. (2005). Overweight in children and adolescents: Pathophysiology, consequences, prevention, and treatment. *Circulation*, 111(15), 1999-2012.
- Wang, Y., & Lobstein, T. (2006). Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity*, 1(1), 11-25.
- Frayling, T. M., Timpson, N. J., Weedon, M. N., et al. (2007). A common variant in the FTO gene is associated with body mass index and predisposes to childhood and adult obesity. *Science*, 316(5826), 889-894.
- Ludwig, D. S., & Kabakus, N. (2007). The economic burden of childhood obesity. *Pediatrics*, 119(1), 237-248.
- Tsiros, M. D., Olds, T., Buckley, J. D., et al. (2008). Health-related quality of life in obese children and adolescents. *International Journal of Obesity*, 32(3), 377-384.
- Story, M., & French, S. (2004). Food advertising and marketing is directed at children and adolescents in the US. *International Journal of Behavioral Nutrition and Physical Activity*, 1(1), 1-17.
- Shenoy, M., & Nayak, V. R. (2023). Childhood obesity: Impact, outcome and preventive strategies.
- Prasad, Y. (2023). Dietary factors and childhood obesity: A comprehensive review.
- Abdelhak, M., Mohamed, S., Aboukhatwa, M., Saifullah, A., Syahmi, M., Mosaad, M., Elrggal, M., Dehele, I., & Elnaem, M. (2022). Risk Factors, Clinical Consequences, Prevention, and Treatment of Childhood Obesity.
- Levere, A. (2022). An Exploration of Childhood Obesity, Ecological Contributing Factors, and the New Sociology of Indigenous Children in Canada.
- Faircloth, R., Brooks, D., Vogt, K., & Emerick, J. (2019). Talking About Childhood Obesity: A Survey of What Parents Want.
- Hossain, M., Luies, S., & Biswas, T. (2020b). Prevalence and factors associated with overweight and obesity among primary school children (9–14 years) in a selected area of Dhaka, Bangladesh: A cross-sectional study. *Indian Journal of Community Medicine*, 45(4), 429. https://doi.org/10.4103/ijcm.ijcm_466_19

Islam, M. T., Khan, M., Sultana, T., Shahriar, A., Shamsul, C., Kibria, H., Hassan, M., & Kawser, C. A. (n.d.). *Prevalence of Overweight and Obesity among the School-Going Children (6-12 Years) of Urban and Rural Areas in Bangladesh*. <https://doi.org/10.3329/jawmc.v12i1.75254>

The pillars of trustworthiness in qualitative research - ScienceDirect. (n.d.).

CHAPTER 6

APPENDIX 1

6.1 Questionnaire Knowledgeable Consent

Questionnaire Knowledgeable Consent

Title of Study: Triggering Factors Behind Childhood Obesity

Dear Participant,

Assalamualaikum

This letter serves as an invitation to think about taking part in a study that we are running on to represent the Department of Nutrition & Food Engineering under Faculty of Allied Health Science (FAHS), Daffodil International University's (DIU).

Aim: The aim of the study is to identify or investigate the Triggering factors behind childhood obesity.

Benefits and Risks: As a participant in this study, you are not expected to face any risks. The benefit of the study is that you will be assisting us in our investigation of the "Triggering Factors Behind Childhood Obesity". I have high hopes that the outcome of our research will be beneficial, not only to the organizations that were directly involved in the study but also to the research community at large.

Confidentiality & Anonymity: All the data you deliver is strictly confidential. Your name will not appear in any thesis or report resulting from this study; however, anonymous statements may be used with your permission. Only researchers affiliated with this project will have access to the data collected.

Time: It will take you about 15 to 20 minutes to complete this questionnaire.

Your Rights as People Who Take Part in Research: It is optional to take part in this study. You have the option to discontinue participating altogether or at any point during the study. If you'd prefer, you can choose not to respond to any of the conducted.

Payment & Compensation: You will incur no costs because of taking part in this study. You will receive no financial reward for your participation in this study.

Concerning The Study: Feel free to ask me about this study's questionnaire or for more information to help you decide to participate.

Use Of the Information: We guarantee that the data from this study will only be utilized for research purposes.

Participant's Consent: My concerns and questions about this study have all been solved. I voluntarily decided to take part in this research project. By signing below, I voluntarily agree to all the terms and conditions set forth in this Agreement.

Signature

6.2 Questionnaire

Triggering Factors Behind Childhood Obesity

Case study no: _____ Date: _____

Name: _____

School Name: _____

Address: _____

Age: _____ years

Sex: Male/ Female

Height: _____ Weight: _____ BMI: _____

Father's Occupation: _____ Mother's Occupation: _____

Tick the appropriate answer:

1. How often do you engage in physical activities or sports that you make sweat and breathe harder?	3: 5 to 7 days a week 2: 2 to 4 days a week 1: 0 to 1 days a week
2. Rate your preference for sedentary activities (such as watching TV, playing video games, or using a computer).	3: 5 to 7 hours a day 2: 2 to 4 hours a day 1: 0 to 1 hours a day
3. Rate your consumption of fast food or takeout meals.	3: 5 to 7 days a week 2: 2 to 4 days a week 1: 0 to 1 days a week
4. Rate your consumption of sugary snacks (like cookies, cakes, or candy).	3: 5 to 7 days a week 2: 2 to 4 days a week 1: 0 to 1 days a week
5. How often do you eat when you are not physically hungry but due to emotions or boredom?	3: 5 to 7 days a week 2: 2 to 4 days a week 1: 0 to 1 days a week
6. Rate your concern about your body image or weight.	3: Extremely concerned 2: Fairly concern 1: Not concerned at all
7. Rate your knowledge about the long-term health consequences of childhood obesity.	3: Very well known 2: Fairly known 1: Unknown
8. Rate your preference for water or other healthy beverages over sugary drinks.	3: Healthy drink is preferred 2: Water is preferred 1: Sugary drink preferred
9. How frequently do you consume fried or high-fat foods?	3: 5 to 7 days a week 2: 2 to 4 days a week 1: 0 to 1 days a week

10. Rate the support you receive from your family to engage in physical activities.	3: Very supportive 2: Fairly supportive 1: Not supportive at all
11. Does your school have a playground?	2: Yes 1: No
12. How do you go to school?	3: By walking 2: By rickshaw 1: By car 99: Others: _____
13. What kind of food do you prefer for tiffin?	3: Homemade 2: Process food 1: Canteen bought food 99: Others: _____
14. Who carries your school bag?	3: Yourself 2: Parents 1: Others
15. Do you sleep well at night?	2: Yes 1: No
16. How many times a day do you eat?	3: 4 to 5 times a day 2: 3 times a day 1: 2 times a day
17. Do you have any disease?	2: No 1: Yes,
18. Do you use any medicine?	2: No 1: Yes,

Question Number	Food Group	Examples	YES=1 NO=0
1	CEREALS	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + insert local foods e.g. ugali, nshima, porridge or paste	
2	WHITE ROOTS AND TUBERS	white potatoes, white yam, white cassava, or other foods made from roots	
3	VITAMIN A RICH VEGETABLES AND TUBERS	pumpkin, carrot, squash, or sweet potato that are orange inside + other locally available vitamin A rich vegetables (e.g. red sweet pepper)	
4	DARK GREEN LEAFY VEGETABLES	dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach	
5	OTHER VEGETABLES	other vegetables (e.g. tomato, onion, eggplant) + other locally available vegetables	
6	VITAMIN A RICH FRUITS	ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100% fruit juice made from these + other locally available vitamin A rich fruits	
7	OTHER FRUITS	other fruits, including wild fruits and 100% fruit juice made from these	
8	ORGAN MEAT	liver, kidney, heart or other organ meats or blood-based foods	
9	FLESH MEATS	beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects	
10	EGGS	eggs from chicken, duck, guinea fowl or any other egg	
11	FISH AND SEAFOOD	fresh or dried fish or shellfish	
12	LEGUMES, NUTS AND SEEDS	dried beans, dried peas, lentils, nuts, seeds or foods made from these (e.g., hummus, peanut butter)	
13	MILK AND MILK PRODUCTS	milk, cheese, yogurt or other milk products	
14	OILS AND FATS	oil, fats or butter added to food or used for cooking	
15	SWEETS	sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies, and cakes	
16	SPICES, CONDIMENTS, BEVERAGES	spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages	
Household level only	Did you or anyone in your household eat anything (meal or snack) OUTSIDE the home yesterday?		
Individual level	Did you eat anything (meal or snack) OUTSIDE the home yesterday?		

APPENDIX 2: Synopsis



Daffodil
International
University

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Daffodil Smart City, Birulia, Savar, Dhaka – 1216, Bangladesh

- 1. Student's Name: Sadia Hossain Somaiya**
- 2. Id: 191-34-927**
- 3. Section: 191 (B)**

Title: Triggering Factors Behind Childhood Obesity.

1. Introduction

1.1 Background

Childhood obesity, once considered a challenge limited to affluent societies, has transcended socio-economic boundaries to become a pervasive global concern. This phenomenon is not isolated to developed nations but is increasingly prevalent in low- and middle-income countries, with Bangladesh as a poignant example. The escalating rates of childhood obesity in Bangladesh mirror a broader trend across South Asia, reflecting a shift in health dynamics from infectious diseases to non-communicable diseases (Islam et al., n.d.)

1.2 Rationale for the Study

This research is motivated by the imperative to understand and address the intricate web of factors contributing to childhood obesity in Bangladesh. While global literature provides valuable insights, the unique socio-economic and cultural context of Bangladesh necessitates a focused investigation. By identifying the specific triggers of childhood obesity in this setting, the research aims to contribute nuanced insights that can inform targeted interventions, ensuring they are not only effective but also culturally sensitive and contextually relevant. In the subsequent chapters, this thesis unfolds, delving into the literature surrounding childhood obesity, outlining the methodologies employed in the study, providing a demographic and health profile of Bangladesh, and systematically

exploring the triggering factors, health consequences, socio-cultural dynamics, and policy landscape related to childhood obesity in this dynamic South Asian nation. (Kamruzzaman, 2022)

1.3 Research Questions

- Questions about their identity, height, weight, gender.
- Questions about students' activities like physical activity, Screen time, Device game etc.
- Questions about students' food habits and routine.
- Questions about students' school environment.
- Questions about whether they are aware of the topic or not.

2. Research Objectives

The objectives contribute to building a comprehensive framework for addressing childhood obesity

- **Identify and Analyze Triggering Factors:** Explore the intricate web of factors contributing to the rise of childhood obesity in Bangladesh, including dietary patterns, sedentary lifestyles, socio-economic status, cultural norms, and environmental influences (Hossain et al., 2020).
- **Assess the Impact on Health and Well-being:** Examine the immediate and long-term health consequences of childhood obesity in the context of Bangladesh, considering the specific challenges and vulnerabilities of the population.
- **Understand Socio-Cultural Dynamics:** Investigate how socio-cultural factors shape attitudes and behaviors related to childhood nutrition and physical activity, with a focus on understanding the cultural norms that may contribute to the obesity epidemic.
- **Propose Recommendations:** Based on the findings, propose evidence-based recommendations for interventions and policies that could effectively address childhood obesity in the Bangladeshi context, considering the unique challenges and opportunities in the country.

3. Methodology

3.1 Research Design

The project employs a quantitative research approach to find out the factors that trigger or cause childhood obesity. Quantitative approaches provide very specific answers from participants, and it will help me to find out the purpose of this work most.

3.3 Study Setting and Participants

The study was carried out at certain schools in Khilgaon, Dhaka, Bangladesh. Also, the reason behind selecting this area is that here the maximum restaurants, food courts, and super shops are available. The participants were deliberately chosen from the school's population, with the help of the teachers and parents. The population was divided into two categories. Half of the students were selected from schools that have a playground, and the other half of the students were selected from schools that have no playground.

3.5 Data Sampling

3.6 Data Collection

The data was collected through the utilization of Key Informant Interviews (KIIs) from a single participant. Close-ended questions enable respondents to choose from a limited and specific set of predetermined answers regarding the current subject. Respondents are more likely to answer questions that are easy to understand, which provides a friendly atmosphere.

3.5 Data Analysis

Analysis of data required the use of Microsoft Excel 2016. The information was methodically categorized and coded into subdivisions and topics according to recurring patterns and fundamental concepts associated with the project's main target.

3.6 Ethical Considerations

Priority was given to ethical issues throughout the study. Throughout data collection, analysis, and reporting, confidentiality and anonymity were maintained, and informed consent was sought from everybody who participated. The study adheres to ethical protocols and secures the required authorizations from pertinent regulatory bodies.

3.7 Validity and Dependability of Research

To instill confidence in the findings of research, triangulation of data sources (interviews) is employed. Participant verifications were performed to validate the credibility and accuracy of the results. Comprehensive records of the procedure for the study will be upheld to augment the dependability and truthfulness of the study's results (The Pillars of Trustworthiness in Qualitative Research - ScienceDirect, n.d.).

4. Expected Outcomes

- High Consumption of Energy-Dense Foods is a reason for childhood obesity.
- Lower Engagement In physical activity, more screen time are also reason.
- Availability of process food and fast food.

5. Socio-economic Impact

5.1 Healthcare Costs

- including diabetes, hypertension, sleep apnea, and joint issues. These health concerns require medical treatment and intervention, which increases the burden on healthcare systems.
- Long-term impact: If left unchecked, childhood obesity can lead to chronic health conditions that persist in adulthood, including heart disease, stroke, and certain cancers. This places a long-term strain on both public health systems and the economy through medical expenses and lost productivity due to disability or premature death.

5.2 Educational Impact

- Academic performance: Children with obesity may face issues like lower academic performance, increased absenteeism, and lower self-esteem. These factors can affect their future education, limiting opportunities for higher education and professional development.

6. Social Implications

- Short-term impact: Childhood obesity leads to a range of immediate health problems, social stigma: Children who are obese often face social discrimination or bullying, which can affect their mental health, social development, and overall well-being. This can lead to feelings of isolation, anxiety, and depression, which in turn affect their ability to contribute positively to society.

- Intergenerational cycle: Research into the triggers behind childhood obesity often highlights socio-economic factors such as poverty, lack of access to healthy foods, and limited opportunities for physical activity. These factors can perpetuate a cycle of poor health across generations, as children who grow up in environments where obesity is prevalent may have a higher risk of developing obesity as adults, thereby impacting the future socio-economic fabric.

5.4 Economic Productivity

- Workforce impact: Obesity in childhood has been linked to an increased risk of disability and lower productivity in adulthood. Workers who suffer from obesity-related health conditions may take more sick leave, experience reduced productivity, or even retire early, which can impact overall workforce productivity and economic growth.

6. References:

Hossain, M., Luies, S., & Biswas, T. (2020a). Prevalence and factors associated with overweight and obesity among primary school children (9–14 years) in a selected area of Dhaka, Bangladesh: A cross-sectional study. *Indian Journal of Community Medicine*, 45(4), 429. https://doi.org/10.4103/ijcm.ijcm_466_19

Hossain, M., Luies, S., & Biswas, T. (2020b). Prevalence and factors associated with overweight and obesity among primary school children (9–14 years) in a selected area of Dhaka, Bangladesh: A cross-sectional study. *Indian Journal of Community Medicine*, 45(4), 429. https://doi.org/10.4103/ijcm.ijcm_466_19

Islam, M. T., Khan, M., Sultana, T., Shahriar, A., Shamsul, C., Kibria, H., Hassan, M., & Kawser, C. A. (n.d.). *Prevalence of Overweight and Obesity among the School-Going Children (6-12 Years) of Urban and Rural Areas in Bangladesh*. <https://doi.org/10.3329/jawmc.v12i1.75254>

The pillars of trustworthiness in qualitative research - ScienceDirect. (n.d.).

Daniels, S. R., Arnett, D. K., Eckel, R. H., et al. (2005). Overweight in children and adolescents: Pathophysiology, consequences, prevention, and treatment. *Circulation*, 111(15), 1999-2012.

SWang, Y., & Lobstein, T. (2006). Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity*, 1(1), 11-25.

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Daffodil International University

APPENDIX 3: Plagiarism Report

TRIGGERING FACTORS BEHIND CHILDHOOD OBESITY

ORIGINALITY REPORT

12%

SIMILARITY INDEX

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