A PROJECT REPORT ON

EVALUATING ADULT WEIGHT STATUS, PHYSICAL ACTIVITY, NUTRITIONAL KNOWLEDGE, HEALTHY HABITS, AND RISK FACTORS: A MULTIFACETED HEALTH ASSESSMENT APPROACH

BY
FAHMIDA FAIZA FARIHA
ID: 201-34-282

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

Supervised By

Dr. Md. Mahbubur Rahman

Associate Professor

Department of Nutrition and Food Engineering

Co-Supervised By

Mr. Md. Harun-Ar Rashid

Assistant Professor

Department of Nutrition and Food Engineering

FACULTY OF HEALTH AND LIFE SCIENCES (FHLS)

DAFFODIL INTERNATIONAL UNIVERSITY

MAY 2024

APPROVAL

This thesis titled **"Evaluating Adult Weight Status, physical activity, Nutritional Knowledge, Healthy Habits, and Risk Factors: A Multifaceted Health Assessment Approach."** submitted by **Fahmida Faiza Fariha** 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.

EXAMINING COMMITTEE

Chairman of the Board _____ _____

External Member _____ _____

Internal Member-1 _____ _____

Internal Member-2 _____ _____

_____

Dr. Nizam Uddin

Head,

Department of Nutrition and Food Engineering

Faculty of Health and Life Sciences

Daffodil International University

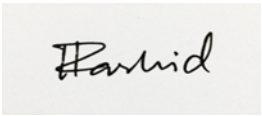
DECLARATION

We hereby declare that we have done this present thesis under the supervision of **Dr. Md. Mahbubur Rahman**, Associate Professor, and co-supervisor **Mr. Md. Harun-Ar Rashid,** Assistant Professor, Department of Nutrition and Food Engineering, Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for the award of any degree.

Supervised by:

……..
Dr. Md. Mahbubur Rahman
Associate Professor
Department of Nutrition and Food Engineering
Daffodil International University

Co-Supervised by:



……..
Mr. Md. Harun-Ar Rashid
Assistant Professor
Department of Nutrition and Food Engineering
Daffodil International University

Submitted by:

…….
Fahmida Faiza Fariha
ID: 201-34-282
Department of Nutrition and Food Engineering
Daffodil International University

ACKNOWLEDGEMENT

First, I express my heartiest thanks and gratefulness to the almighty for His divine blessing that makes it possible to complete the final year project/internship successfully.

I am grateful and wish my profound indebtedness to my supervisor **Dr. Md. Mahbubur Rahman**, **Associate Professor,** Department of Nutrition and Food Engineering, Faculty of Health and Life Sciences, Daffodil International University. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts, and correcting them at all stages have made it possible to complete this thesis.

I am also grateful to my co-supervisor **Md. Harun-Ar Rashid,** Assistant Professor, Department of Nutrition and Food Engineering, Faculty of Health and Life Sciences, Daffodil International University, for his cooperation and guidance.

I am also grateful to **Dr. Nizam Uddin**, Associate Professor and Head, Department of Nutrition and Food Engineering, Faculty of Health and Life Sciences, Daffodil International University, for his cooperation and acceptance of this work.

I am also grateful to Professor **Dr. Md. Bellal Hossain,** Dean and Professor, Department of Nutrition and Food Engineering, Faculty of Health and Life Sciences, Daffodil International University, for his cooperation and guidance.

I would like to thank my entire course mates at Daffodil International University, who took part in this discussion while completing the coursework.

Finally, I must acknowledge with due respect the constant support and patience of my parents.

ABSTRACT

This thesis examines adult health through a comprehensive evaluation that covers weight, physical activity, nutritional knowledge, healthy behaviors, and various risk factors. Current insights lack a nuanced understanding of the complex interactions between leisure physical activity, body mass index (BMI), bodily risks, unhealthy eating habits, and their combined effects on adult health. The research aims to deepen the understanding of these interactions and their impact on well-being, identifying effective intervention strategies. Important variables include sedentary behaviors linked to technology use, stress levels, sleep habits, and their combined impact on lifestyle choices and long-term health outcomes. The study's challenge is to identify effective interventions that promote healthier lifestyles and mitigate associated health risks, with the primary goal being to determine the most significant and lasting improvements in health outcomes. This research seeks to fill the knowledge gap by examining the overall effects of leisure-time physical activity, BMI, and dietary habits on adult health. The main objectives include constructing a comprehensive health profile by combining information on weight status, physical activity levels, nutritional knowledge, and related factors. These objectives involve examining the relationships between BMI categories and adult health (obesity, overweight, underweight) for both genders and investigating the links between leisure physical activity categories and health issues. The study also analyzes the relationship between nutritional knowledge, dietary habits, and overall health, as well as the complex interplay of risk factors and their impact on health outcomes. The research employed a mixed-methods design, including surveys and physical assessments, with 200 participants (N = 200). Findings indicated that obese individuals were more likely to have health problems compared to those in other BMI groups. Unhealthy eating habits and insufficient physical activity were linked to obesity and health issues, highlighting the impact of lifestyle choices. Data analysis revealed positive correlations between occupation, lifestyle, BMI levels, and health problems, offering insights into the complex relationships among obesity, physical activity, age, unhealthy eating habits, and lack of physical activity in understanding adult health outcomes. Exploring the connections between nutritional knowledge, eating habits, and overall well-being identified specific areas for education and behavior change. Understanding the complex interaction of risk factors underscored the need for a comprehensive approach to interventions. This study contributes valuable insights to the broader discussion on adult health, emphasizing the importance of a thorough and personalized approach to assessing and promoting health.

Keywords: Adult Health, Leisure Physical Activity, Body Mass Index (BMI), Dietary Habits, Risk Factors, Obesity, and Lifestyle.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the 21st century, global health has seen a significant shift, with lifestyle-related diseases becoming more common. The World Health Organization attributes chronic conditions like cardiovascular disease, diabetes, and various cancers to factors such as insufficient physical activity, poor diet, and obesity. Research shows that inactivity not only doubles health risks but also imposes a societal burden comparable to smoking, obesity, and hypertension. Inactivity in middle age can reduce life expectancy (Frank J. Penedoa and Jason R. Dahna, 2005). Understanding health outcomes, especially non-communicable diseases (NCDs) and their risk factors, is crucial for preventing illnesses and informing treatment strategies. Numerous studies highlight the health benefits of physical activity, including lower mortality rates (Barbosa, 2016). However, there's a decline in healthy lifestyle habits among adults, particularly older adults, with smoking being the only exception. The rising prevalence of obesity, cardiovascular disorders, and metabolic syndromes emphasizes the need for a comprehensive approach to adult health (Zhao, 2018). As maintaining a healthy lifestyle becomes more challenging globally, a deeper investigation beyond isolated factors is necessary. One study found that men with a normal BMI but high waist-to-hip ratios had an increased risk of developing type 2 diabetes (Conway, 2011).

Bangladesh, a densely populated country in South Asia, faces a dual challenge concerning children's health. On one hand, it grapples with high rates of underweight children, with about one-third falling into this category according to the 2014 Bangladesh Health and Demographic Survey. On the other hand, there has been a concerning rise in childhood obesity, affecting 3.5% of obese and 9.5% of overweight among 6 to 15-year-olds (Health Survey Key Indicators Report, 2017). This dual burden of malnutrition highlights significant public health issues, compounded by risks for non-communicable diseases later in life. Factors contributing to these trends include sedentary lifestyles, low parental awareness, and socio-economic factors like maternal education and hygiene behavior (Biswas, 2017). The situation underscores a broader global health challenge, with implications for current child health and future adult health, economic productivity, and healthcare costs. Addressing these issues is crucial for improving overall population health in Bangladesh and similar contexts across South Asia, where research gaps still exist in understanding and combating this complex health issue (Querol, 2021).

In our contemporary sedentary lifestyles, coupled with the widespread availability of processed foods, there has been a notable surge in obesity rates, presenting a significant public health challenge. This trend is exacerbated by insufficient physical activity, poor dietary choices, and a general lack of awareness about healthy lifestyle habits. Research has consistently shown a strong link between the consumption of unhealthy foods and the onset of various health issues (Weaver, 2021). Poor dietary habits significantly contribute to conditions like obesity, type 2 diabetes, cardiovascular diseases, and certain types of cancer. Habitual intake of processed foods, sugary

drinks, and fast food is particularly associated with an increased risk of chronic illnesses. Conversely, adopting a diet that includes ample fruits, vegetables, whole grains, and lean proteins has been shown to lower the likelihood of developing such health problems.

The World Health Organization recommends that children and adolescents engage in at least 60 minutes of moderate to vigorous physical activity daily. According to data from the Centers for Disease Control and Prevention (CDC), the prevalence of obesity among adolescents aged 12 to 19 has risen dramatically from 5% in 1980 to 21% in 2012 (Eltayeb, 2016). Every aspect of lifestyle, including dietary patterns, physical activity levels, smoking, alcohol consumption, and sleep patterns, can be influenced by various factors, whether individual choices or external influences. These adjustments may stem from personal efforts aimed at improving health or may be necessitated by external events such as those brought on by a pandemic (Tosato, 2022).

The current study takes a fresh approach by examining various factors together regarding how much physical activity adolescents engage in, unlike past studies that focused on singular aspects. This preliminary study is seen as valuable for future research and provides a foundation for creating a health education program through a randomized controlled trial (Al-Haroni, 2024). Notably, this program is unique in its approach to tackling obesity and overweight issues in adolescents by aiming to change lifestyles and behaviors to encourage a healthier lifestyle, including proper diet and regular physical activity. This initiative shows promise for enhancing the health outcomes of the targeted group. The study suggests that future evaluations should be conducted over time to monitor changes in health. Moreover, it emphasizes the importance of addressing changeable risk factors like lack of physical activity and inadequate nutrition to improve overall health results (Conway, 2011). Moving forward, assessments should be tailored to individual preferences and needs to promote active participation and adherence to healthy habits. To sum up, the study highlights the importance of implementing a comprehensive and personalized health assessment and promotion strategy.

1.2 Background of the Study

The rising prevalence of non-communicable diseases (NCDs) among adults underscores the urgent need for a thorough examination of diverse health facets to formulate effective preventive measures (World Health Organization, 2022). Evaluating weight status, physical activity levels, nutritional literacy, healthy behaviors, and related risk factors in adulthood is crucial for comprehending and tackling public health challenges linked to chronic ailments like obesity, cardiovascular diseases, and metabolic disorders. This comprehensive approach to health assessment offers a holistic insight into individual health behaviors and their broader implications for overall well-being.

Research consistently highlights the pivotal role of weight status in determining health outcomes. Obesity, characterized by a body mass index (BMI) of 30 kg/m^2 or higher, significantly heightens the risk of various chronic conditions, including type 2 diabetes (Warburton, 2006), hypertension, and certain cancers. The impact of physical activity levels on both weight status and overall health

is closely intertwined. Regular physical activity is associated with myriad health benefits, such as weight management, enhanced cardiovascular fitness, and reduced susceptibility to chronic diseases. Conversely, sedentary lifestyles correlate with an increased risk of obesity and associated health complications.

In the realm of nutrition, grasping the fundamentals of healthy eating and recognizing the significance of dietary habits represents a foundational step toward behavior modification. Nutritional knowledge (NK) encompasses an individual's cognitive grasp of food-related information and plays a pivotal role in food choices and the prevention of NCDs (Axelson, 1992). The nexus between nutritional knowledge and dietary behaviors significantly influences maintaining optimal health and preventing chronic diseases. Unhealthy dietary patterns typified by excessive consumption of processed foods, sugar-laden beverages, and inadequate intake of fruits and vegetables contribute substantively to the onset of obesity and associated comorbidities. Conversely, a balanced diet rich in whole grains, fruits, vegetables, and lean proteins is associated with a diminished risk of chronic diseases (Malik, 2006). Adopting healthy habits constitutes another critical facet of lifestyle modification, encompassing behaviors such as adequate sleep, stress management, and abstention from detrimental substances like tobacco and excessive alcohol consumption. These behaviors exert profound ramifications on overall health and well-being (Conway, 2011). Recognizing the intricate interplay between weight status, physical activity levels, nutritional literacy, healthy behaviors, and associated risk factors is indispensable for devising efficacious interventions and public health strategies aimed at fostering health promotion and averting chronic diseases in adulthood.

1.3 Aim of the Study

The main objective of the study is to comprehend the complex interaction between these variables and their combined impact on overall well-being. Key aims include classifying adults based on their body weight, examining the prevalence of overweight and obesity, and assessing both quantitative and qualitative aspects of physical activity. Furthermore, the research intends to gauge participants' understanding of nutrition, investigating their awareness of dietary principles and the nutritional content of various foods. It will also explore the adoption of healthy behaviors, encompassing lifestyle decisions related to diet, physical activity, and sleep patterns. Additionally, the study aims to pinpoint and analyze specific risk factors that contribute to negative health outcomes in adulthood, such as genetic predisposition, environmental influences, and lifestyle choices. By adopting a comprehensive approach, the study seeks to provide valuable insights that can inform public health efforts aimed at promoting healthier lifestyles among adults.

1.4 Objectives of the Study

1. To determine how many adults are overweight or obese using standard measures like body mass index (BMI).

2. To combine results from weight status, levels of physical activity, knowledge about nutrition, healthy behaviors, and factors that may affect health in a complete evaluation of adult health.
3. To evaluate how well adults understand important nutritional concepts such as dietary guidelines, macronutrients, and micronutrients.
4. To study how common healthy habits are among adults, like getting enough sleep, managing stress, and avoiding harmful substances like tobacco and excessive alcohol.
5. To discover and measure different factors that increase the risk of chronic diseases, such as family medical history, sedentary lifestyles, and eating habits.

CHAPTER 2

LITERATURE REVIEW

2.1 Weight Status and BMI

This paper builds on previous research highlighting the individual impacts of physical activity (Siddiqui, 2023), BMI, and diet on health. The current study explores the interplay among leisure physical activity, BMI, and diet about health outcomes in adults, in response to increasing global focus on these areas. It identifies significant associations between age, BMI, poor dietary habits, and employment status with health problems. However, it finds no connection between leisure physical activity and marital status. The study shows that individuals with obesity face more health issues than those who are not obese, and regular physical activity helps maintain a healthy weight. Overweight and obesity are now global epidemics with notable sociodemographic and economic implications. The economic impact of these conditions is considerable across different regions and economies, projected to average 3.29% of GDP by 2060, with the highest increases in lower-income countries (Okunogbe, 2022). Effective interventions include mandatory labeling of processed foods, enhanced consumer education, strong fiscal policies like taxing unhealthy foods, investment in early childhood nutrition programs, and improved urban planning, such as creating playgrounds and walking and biking paths (Okunogbe et al, 2021).

Weight gain is caused by excess energy intake, while weight loss occurs when energy expenditure exceeds intake. Another article, "Energy Balance Dynamics: Exercise, Appetite, Diet, and Weight Control," published in the American Journal of Lifestyle Medicine in 2021 (Esquivel, 2021), examines how exercise, diet, and appetite influence weight loss and overall health. This discussion explores the complex relationship between exercise and energy balance, highlighting challenges in achieving weight loss goals. It recommends a balanced approach combining exercise and dietary changes for sustainable weight loss. The insights suggest that exercise can lead to healthier eating habits and potentially improve overall diet quality. Weight management is a complex interplay between diet and physical activity (Romieu, 2017). Brief studies show that higher levels of physical activity can mitigate the effects of energy-dense diets, particularly in low-activity societies. Effective weight management requires understanding the dynamics of energy balance, dietary habits, and physical activity (Moschonis, 2023). Tailoring diet and physical activity to individual lifestyles is crucial for long-term success.

2.2 Physical Activity Level

The Physical Activity Guidelines for Americans (Physical Activity Guidelines for Americans 2nd edition, 2018), recommend that adults consistently engage in physical activity, with a suggestion of at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity each week. In addition, adults should perform muscle-strengthening exercises on two or more days per week. It is also important to minimize sedentary behavior and incorporate light physical activity throughout the day. For adults with disabilities, the guidelines suggest

aiming for 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity aerobic activity weekly (Kim, 2022). These recommendations are inclusive and apply universally, regardless of gender, cultural background, or socioeconomic status, covering all age groups. They are based on robust scientific evidence that links regular physical activity with improved health, disease prevention, and overall well-being.

Combining nutrition and physical activity interventions leads to synergistic health benefits. For example, integrating a low-calorie diet with regular exercise can result in significant weight loss, reduced body mass index, and lower body fat percentage (Elliot, 2018). This combined approach has shown particularly beneficial effects in breast cancer survivors, highlighting the enhanced health outcomes of combining diet and exercise over either intervention alone. Research indicates that this combination can improve weight management, and hormonal balance, reduce cancer-induced fatigue, decrease inflammatory factors, and boost mental health. The findings emphasize the importance of personalized nutrition and exercise plans for optimal health, underlining their potential to achieve weight control, metabolic health improvements, and overall well-being (Conway, 2011).

2.3 About Nutrition Knowledge

The study (Olatona, 2023), underscores the significant link between nutritional knowledge, dietary habits, and health outcomes, highlighting that this relationship varies in strength and direction across different populations. The findings emphasize notable associations with obesity, educational levels, and regional differences, underscoring the need for a comprehensive approach to nutrition education. Understanding nutrition is essential for shaping the dietary behaviors of individuals and communities (Bermudez, 2020). A lack of nutritional knowledge often leads to unhealthy eating habits and various health issues. Therefore, nutritional education is crucial in preventing the adverse effects of poor and unbalanced nutrition. Nutritional literacy gaps persist due to limited research and a disconnect between research findings and their practical application. Addressing health concerns such as obesity, diabetes, and heart disease requires educational initiatives aimed at enhancing food and nutrition literacy. Research shows that nutritional education effectively raises levels of nutritional awareness, with a positive correlation between education levels and the extent of nutritional knowledge acquired (Silva, 2023). The longstanding recognition of the connection between nutrition and various health ailments highlights the importance of nutritional education as a preventive measure. Programs should focus on promoting knowledge, skills, and behaviors for healthy eating, understanding nutritional concepts, and making informed food choices. Efforts should be targeted toward improving functional, interactive, and critical nutrition literacy to empower individuals to make healthier choices. Bridging the health literacy gap through timely and applicable health education can lead to better health outcomes (Bermudez, 2020). Recognizing the importance of both knowledge and skills in nutrition and food literacy is crucial for effectively communicating health information.

2.4 Risk Factor

Obesity and malnutrition in adults are associated with numerous risk factors. The global prevalence of overweight and obesity among children (ages 0 to 12) and adolescents (ages 13 to 19) is a major public health issue due to their link to chronic non-communicable diseases (NCDs) later in life (Bradley, 2023). These conditions are connected to comorbidities like diabetes, cardiovascular disease, and cancer. In developing countries, the rising rates of overweight and obesity present increasing public health challenges. The World Health Organization (WHO) estimates that there has been a notable rise in research efforts over recent decades to evaluate the prevalence of these conditions in both urban and rural areas of Bangladesh (Chatterjee, 2020). However, the findings from these studies are highly variable, likely due to differences in the demographics surveyed, the methodologies used, the geographic focus (urban versus rural), and the timing of the research. Despite these variations, all studies highlight the urgent need to address overweight and obesity among children in Bangladesh as major public health concerns.

Obesity can also be associated with risk factors for malnutrition and micronutrient deficiencies. Therefore, public health policies should emphasize the promotion of healthy behaviors and the enhancement of access to nutritious food, while also addressing the sociodemographic factors that impact malnutrition outcomes (Querol et al, 2021). The increasing prevalence of overweight and obesity worldwide, including among children in developing countries, places significant burdens on healthcare systems and society. Among older adults, the risk of undernutrition varies: it is 18% among those who are overweight, 29% among those who are obese, and 27% among those of normal weight.

Malnutrition remains a significant public health challenge globally, particularly in regions like Southeast Asia and sub-Saharan Africa. It is an indicator of inadequate nutrition and has severe impacts on human health, social, and economic progress within communities (Sulmont, 2022). Among children and adolescents worldwide, malnutrition is one of the leading causes of illness and death, with over 10 million fatalities annually attributed to preventable and treatable conditions. Alarmingly, at least half of these deaths are directly linked to malnutrition. Prolonged malnutrition in children and adolescents leads to stunted physical growth, impaired motor and cognitive development, reduced cognitive function, diminished intellectual capacity, poor social skills, increased behavioral problems, and heightened vulnerability to diseases. The consequences of malnutrition also extend into adulthood, affecting physical growth, work performance, reproductive capabilities, and the risk of chronic illnesses (Querol et al, 2021).

2.5 Healthy Habit

Successful public health policies for promoting healthy lifestyles encompass a range of strategies. These include mandates and restrictions to influence behaviors, economic incentives aligned with health outcomes, marketing limits to regulate advertising, information provision for raising awareness, and environmental defaults that support healthy choices (Gorski, 2015). Policymakers employ a multifaceted approach, incorporating mandates, incentives, marketing regulations,

information provision, and environmental changes, to promote healthier lifestyles, reduce unhealthy behaviors, and enhance overall public health. According to the study (Gorski, 2015) Successful public health policies for promoting healthy lifestyles encompass a range of strategies. These include mandates and restrictions to influence behaviors, economic incentives aligned with health outcomes, marketing limits to regulate advertising, information provision for raising awareness, and environmental defaults that support healthy choices. Policymakers employ a multifaceted approach, incorporating mandates, incentives, marketing regulations, information provision, and environmental changes, to promote healthier lifestyles, reduce unhealthy behaviors, and enhance overall public health.

CHAPTER 3

METHODOLOGY

3.1 Research Design

The study's research design employs a comprehensive approach to health evaluation. It incorporates a mixed-methods strategy and uses a cross-sectional design to gather data simultaneously, enabling the simultaneous analysis of multiple factors. To ensure diverse demographic representation, a stratified random sampling method was used, taking into account age, gender, BMI, and weight.

The research employs both quantitative and qualitative approaches to gather data, encompassing numerical information that can be subjected to statistical analysis. Eligible participants include students aged 18 to 30 on campus or at home. There are initiatives to ensure that the members represent a diverse array of universities and academic disciplines.

Structured surveys and assessments were employed to collect quantitative data. These surveys incorporated standardized tools to evaluate various aspects: weight status through BMI calculations, physical activity levels via validated questionnaires or activity trackers, and nutritional knowledge using multiple-choice questions designed to test understanding of dietary guidelines. Participants were also questioned about their commitment to healthy habits, which included maintaining a balanced diet, engaging in regular exercise, and avoiding harmful behaviors such as smoking and excessive alcohol consumption. In addition to quantitative methods, qualitative data was gathered through comprehensive interviews. These interviews allowed for an in-depth exploration of the participants' perceptions, experiences, and attitudes toward health-related behaviors and risk factors.

Data collection was executed through two primary methods. The majority of the questionnaires were administered directly via face-to-face interviews. These in-person interviews were scheduled during break hours to enhance efficiency and collect a substantial volume of data within a condensed period. Additionally, an online survey was created using Google Forms. The link to this digital questionnaire was disseminated to potential respondents through various channels including email, social media groups, and university communication networks. Participants were briefed on the study’s purpose, given the choice to participate voluntarily, and assured of the confidentiality of their responses.

The research adheres to ethical guidelines to safeguard participants' confidentiality, ensure their informed consent, and allow them the freedom to withdraw from the study at any point without repercussions. Participants are informed that their data is securely stored and solely utilized for research purposes. Ethical approval from institutional review boards is sought to guarantee compliance with ethical standards. The cross-sectional survey design enables the acquisition of comprehensive information, contributing to a nuanced understanding of the intricate connections between weight status, physical activity, nutritional knowledge, healthy habits, and risk factors

during adulthood. This knowledge, in turn, informs targeted interventions aimed at promoting overall health and well-being.

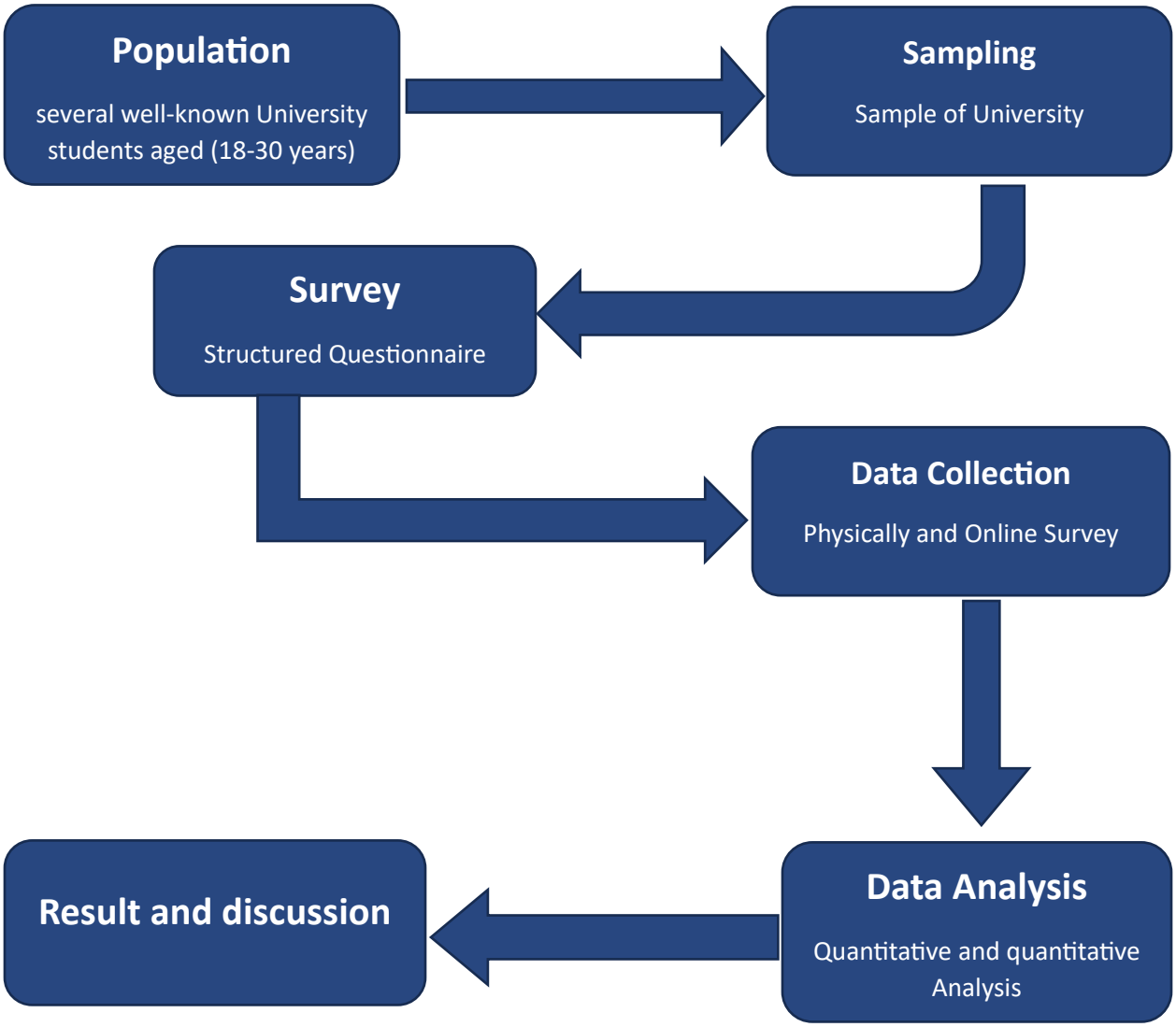


Figure 1: Research design methods

3.2 Research Sampling and Technique

The sample consisted of a randomly selected and stratified representation of the entire adult population from several well-known universities in Bangladesh. Convenience sampling is selected for its practicality and ease of access, facilitating the recruitment of readily available and willing participants. The study involved both male and female individuals classified as young adults and adults within the 18 to 30 age range. A total of 200 participants successfully filled out the questionnaire, which encompassed inquiries related to physical activity, weight status, BMI, risk factors associated with obesity, and nutritional knowledge concerning healthy habits.

3.3 Research Participants

As an observational investigation, we analyzed the outcomes of the research questionnaire to comprehensively fulfill the research objectives. The study comprised a total of 200 participants, with 124 males and 76 females, constituting 62% and 38% of the total, respectively. All participants were adults, with 78% holding bachelor's degrees, 21% possessing master's degrees or higher, and 1% being college students among the respondents. Both virtual and physical participation were options for the study participants.

3.4 Research Methods

For the acquisition of empirical data, we employed a questionnaire to gather information from participants. The questionnaire included a brief series of demographic inquiries aimed at identifying the respondent's gender, height, weight, education, and marital status. The subsequent section of the questionnaire focused on the participant's weight status and BMI, health condition, level of physical activity, and health-related risk factors.

3.4.1 Weight Status and Body Mass Index (BMI)

Weight status is a term used to classify a person's body weight concerning their height. The Body Mass Index (BMI) is the most commonly used method for determining weight status. BMI is calculated by taking an individual's weight in kilograms and dividing it by the square of their height in meters. The World Health Organization (WHO) has established the following BMI categories:

1. Underweight: BMI less than 18.5
2. Normal weight: BMI between 18.5 and 24.9
3. Overweight: BMI between 25 and 29.9

To calculate BMI, you use the formula BMI = kg/m^2, where kg represents a person's weight in kilograms and m^2 represents their height in meters squared.

3.4.2 Health Risk Assessment

The health assessment section comprised a set of well-established self-reported questions aimed at gauging the participants' health status. These questions touched on various health-related issues, including heart disease and other cardiovascular conditions, substance abuse, tobacco use, alcohol consumption, diabetes, hypertension, and problems with high or bad cholesterol. Additionally, mental health concerns such as depression, stress, and anxiety were addressed. The questionnaire also included inquiries about lifestyle factors. For each question, participants were provided with response options of either 'yes' or 'no'.

3.4.3 Nutritional Knowledge and Healthy Habits

To assess both positive and negative dietary habits and understanding of nutrition, reliable self-reported Food Frequency Questionnaires were employed. Participants provided information on their consumption of healthy and unhealthy foods, with responses to sugary drinks, sweet snacks,

and junk food grouped as unhealthy. Fruits, vegetables, dairy products, fish, and whole-grain foods were categorized as indicators of healthy eating. Additionally, aspects such as breakfast consumption, water intake, inclusion of nutritious foods in meals, and overall nutrition knowledge were included in the assessment.

3.4.4 Physical Activity

The section on physical activity included questions designed to assess and quantify the exercise routines of participants diagnosed. Participants provided information on the duration of light, moderate, and vigorous physical activities they undertook each week, broken down into intervals of 15 minutes, 1 hour, and 2 hours. Additionally, they reported the frequency of such activities, specifying whether they occurred 3-4 days per week or 1-2 days per week.

3.5 Statistical Analysis

The sample size was calculated using the standard formula: $n = z^2p(1-p)/d^2$ (Naing and Winn, 2006). In this formula:

- N represents the total population size.
- P stands for the anticipated prevalence.
- d denotes the desired precision.
- z is the corresponding value from the normal distribution for the desired confidence level.

The value of z is obtained from probability tables. For example, if a 99% confidence level is required, the value of z is 2.576 (as derived from standard normal variate tables). Assuming a prevalence of 5%, this would be represented as 0.05 in decimal form, with a desired precision (d) of 4%.

$$n = \frac{z^2 P(1-P)}{d^2}$$

$$n = \frac{(2 \cdot 576)^2 (0.05)(1-0.05)}{(0.04)^2}$$

$$n = 196.99 \approx 197$$

In the calculation, the result is 197, but for practical purposes, a random sample of 200 from the target population was chosen.

3.6 Ethical Considerations

This research study placed significant emphasis on ethical considerations to safeguard the rights, well-being, and confidentiality of participants. The survey specifically addressed the following ethical considerations:

3.6.1 Research Ethics Approval: The university's review board committee approved the research protocol, ensuring the protection of participant privacy and consent. The ethical approval letter is attached to this report as an appendix.

3.6.2 Informed Consent: Participants were provided detailed information about the study's goals, their responsibilities, as well as the possible advantages and risks. They made an informed decision to join the study, fully understanding the implications involved.

3.6.3 Researcher Integrity: The study was carried out with honesty, following established professional norms and guidelines. Transparency was upheld, and there were no instances of conflicting interests.

3.6.4 Plagiarism and Academic Integrity: Ensured proper acknowledgment and citation of all sources to prevent plagiarism. Maintained academic integrity by attributing credit to the original authors and adhering to copyright regulations.

3.6.5 Debriefing and Feedback: Participants were given the chance to obtain a synopsis of the study results and offered pertinent feedback or resources.

Ethical considerations represent a continuous obligation throughout the research journey. The survey encompassed a statement addressing these ethical concerns, assuring participants about the study's ethical conduct, and guaranteeing confidentiality.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Participants Characteristics

For data collection and research analysis, 200 surveys were deemed suitable. Out of the respondents, 123 (62%) were male, and 77 (38%) were female. The majority of respondents fell within the normal weight BMI category (18.5-24.9), with 157 individuals (78.89%). The next largest BMI category was overweight (25-29.9), which included 30 individuals (14.57%). There were 8 respondents (4.0%) categorized as obese (BMI of 30 or more) and 5 respondents (2.5%) categorized as underweight (BMI less than 18.5). Most respondents held a bachelor's degree (157 individuals, 78%), followed by those with a master's degree or higher (42 individuals, 21%), and 1% had completed college or technical training.

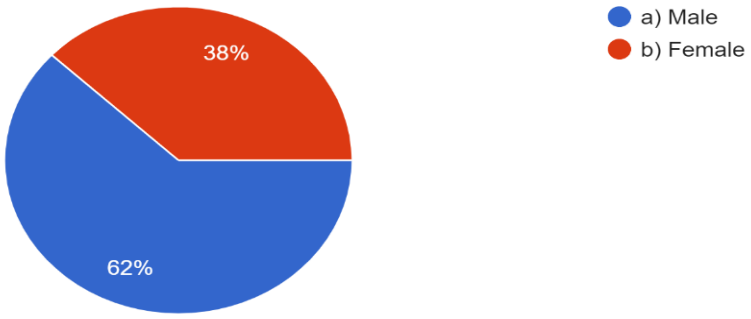


Figure 2: Male and female percentage of response.

The percentage of males is 38% and the percentage of females is 62%.

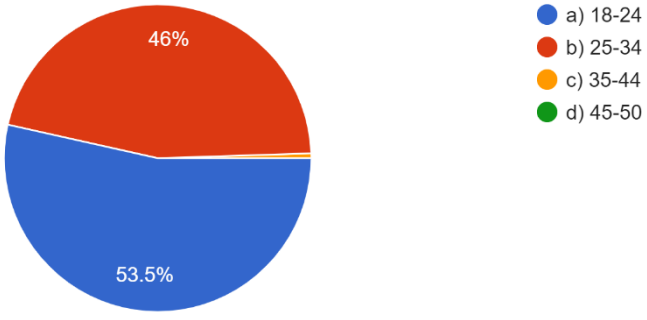


Figure 3: Percentage of age

The highest percentage, 53.5%, is in the 18-24 age group, followed by 46% in the 25-34 age group, and 5% in the 35-44 age group.

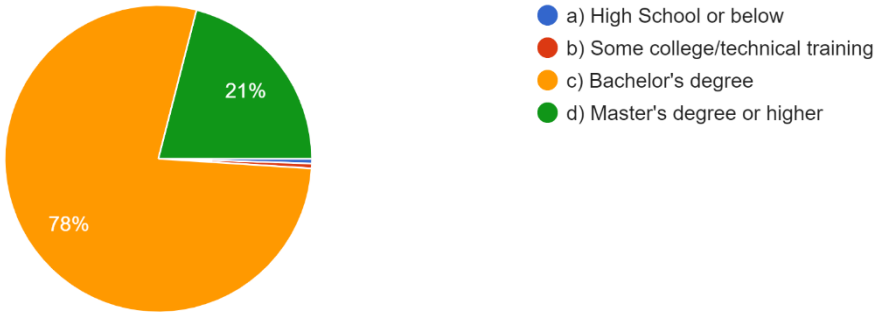


Figure 4: Percentage of educational background in university students

According to the pie chart, 78% of the degrees are bachelor's, while 21% are master's and 1% is college/technical training.

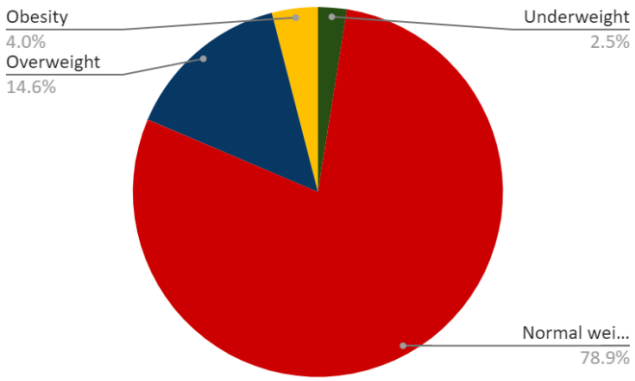


Figure 5: Percentage of BMI among males and females.

The pie chart displays BMI categories, showing that 2.5% of individuals are underweight, the largest group is of normal weight at 78.9%, 14.6% are overweight, and 4% are classified as obese.

4.1.2 Weight Status

Table 2. Comparison of male and female participants (%) in body mass index groups

Gender	Underweight (less than 18.5)	Normal weight (18.5 to 24.9)	Overweight (25 to 29.9)	Obesity (30 or more than 30)	Grand Total
Male	40.00%	63.29%	58.62%	62.50%	62.00%
Female	60.00%	36.71%	41.38%	37.50%	38.00%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%

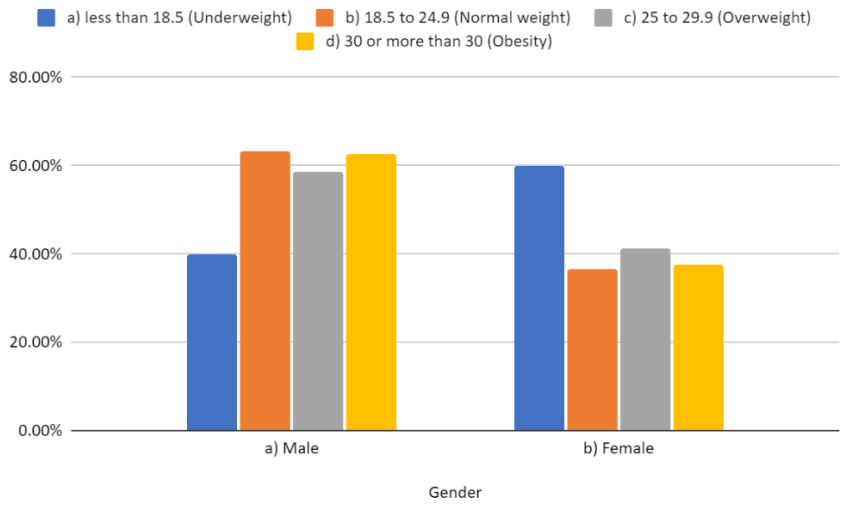


Figure 6: Comparison of male and female participants (%) in BMI

According to the table and chart, there are two divisions: Male and Female. It presents the percentage of participants within each BMI category for both genders. In Table 1, For males, 40.00% fall under Underweight, 63.29% in Normal weight, 58.62% are Overweight, and 62.50% are Obese. Likewise, among females, 60.00% are Underweight, 36.71% Normal weight, 41.36% Overweight, and 37.50% Obese. In the chart, we see that the total percentage of males is 62%, while females make up 38%. The accompanying chart visually illustrates this data, depicting the percentage of males and females in each BMI category through bars. This graphical representation facilitates a rapid comparison of male and female distribution across BMI categories.

4.1.3 Physical Activity Levels

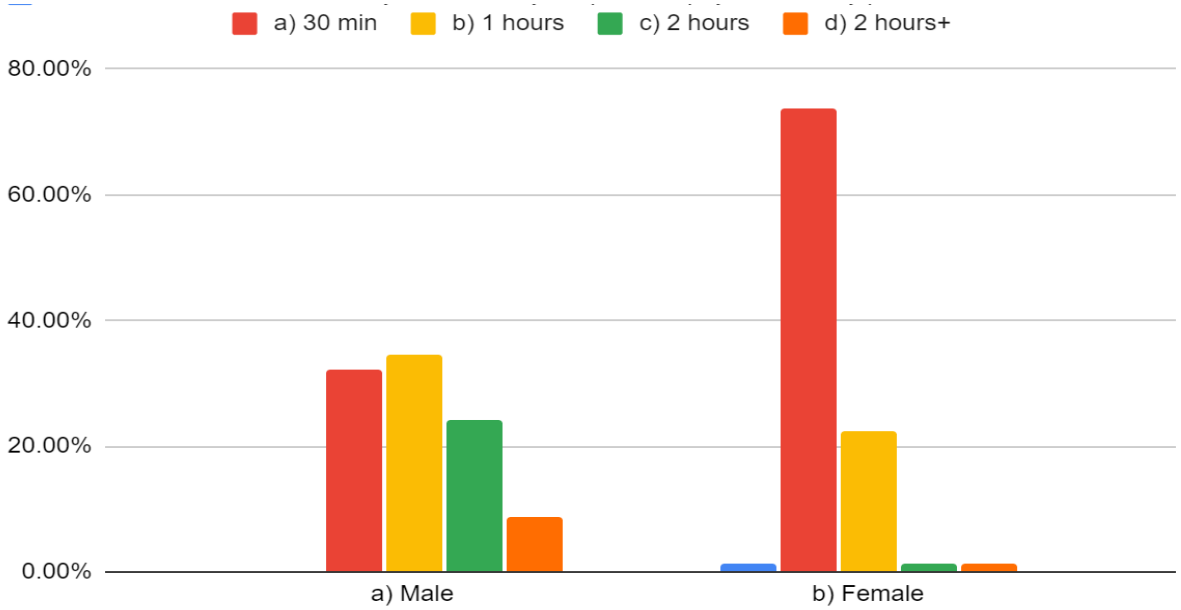


Figure 7: Compare the percentage of time males and females dedicate to exercising each day.

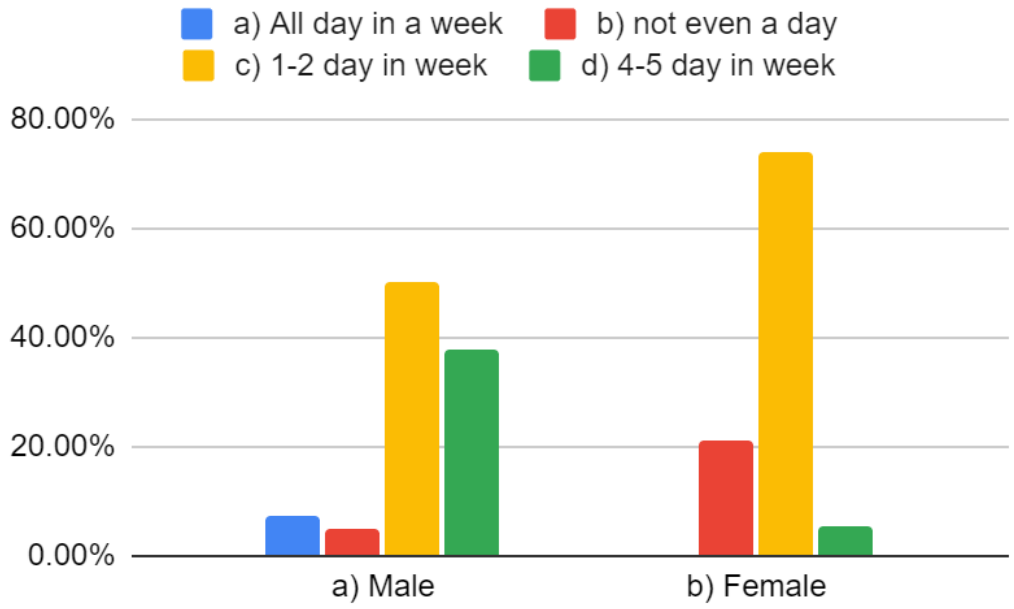


Figure 8: Compare the percentage of frequency of engagement in physical activities (e.g., running, aerobic exercise) between males and females.

The provided data tables and charts offer insights into the exercise habits of males and females, focusing on both the duration and frequency of physical activity. Figure 7 illustrates a clear contrast between males and females regarding the time spent on exercise daily. Males typically engage in longer sessions, with 34.68% dedicating one hour, while females predominantly opt for shorter sessions, with 73.68% spending 30 minutes. Notably, there is a significant gender difference in sessions lasting 2 hours or more, with 8.87% of males compared to only 1.32% of females.

Moving to Figure-8, it displays the frequency of vigorous-intensity physical activities per week. Males show a higher likelihood of engaging in physical activities for 4-5 days a week, accounting for 37.90%, whereas females exhibit a higher percentage in the category of 1-2 days a week, at 50.00%. A stark contrast is noticeable in the category of "not even a day," where 73.68% of females fall compared to 4.84% of males.

Upon comparing the two tables and corresponding charts, it becomes evident that gender significantly influences physical activity patterns. Males tend to engage in longer sessions and more frequent physical activities. Conversely, females generally opt for shorter sessions and are more likely to have days without any physical activity.

4.1.4 Nutritional Knowledge

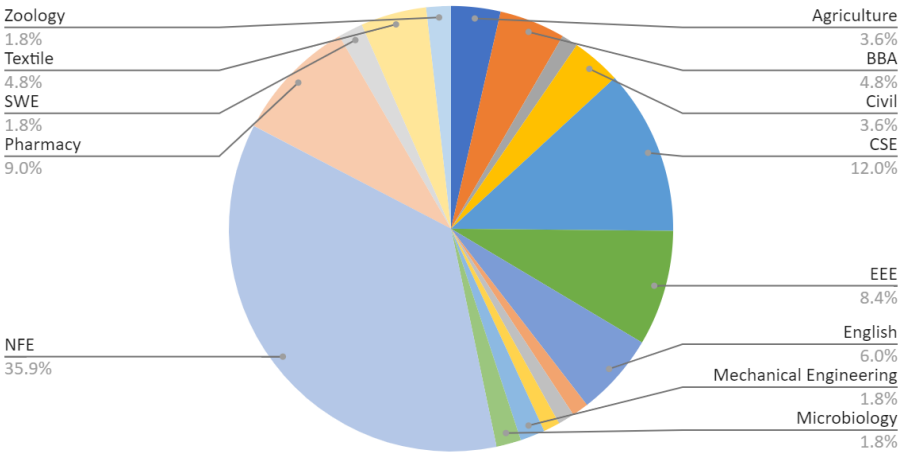


Figure 9: Percentage of Knowledge about nutrition in various departments among University students.

The provided diagram illustrates the distribution of knowledge regarding nutrition across different academic departments within a university. It presents each department alongside the corresponding percentage reflecting its grasp of nutrition concepts. The data indicates varying levels of emphasis on nutrition education among the departments, with some displaying higher percentages than others.

Regarding the question about essential nutrients, the correct answer is carbohydrates, proteins, and fats (option a). Noteworthy is the disparity in knowledge levels across departments. The department with the highest percentage is NFE at 33%, while the departments with the lowest percentages are Chemistry and MBA, each with 1.20%. The Department of Agriculture has a percentage of 3.59%, which is lower compared to several other departments. Specifically, CSE has 11.98%, EEE has 8.38%, English has 5.99%, and both BBA and Textile have 4.79%. The Law, Mechanical Engineering, and Zoology departments have 1.20%. Furthermore, the Agriculture, Civil, and Textile departments each have a percentage of 3.59%. This comparison underscores the differing degrees of importance of nutrition across various academic departments. NFE showcases a notably stronger dedication to comprehending this vital aspect of health and well-being compared to departments with lower knowledge percentages in this domain.

4.1.5 Healthy Habits

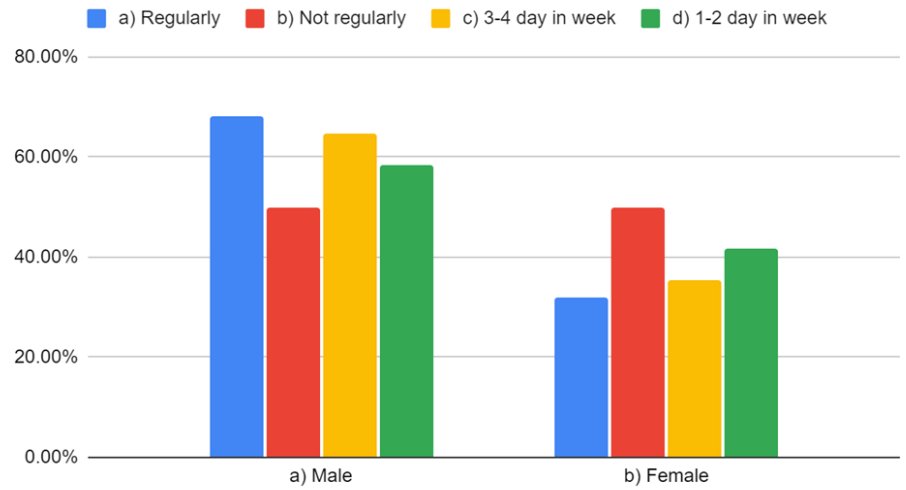


Figure 10: Compare the proportion of nutritious food intake between males and females.

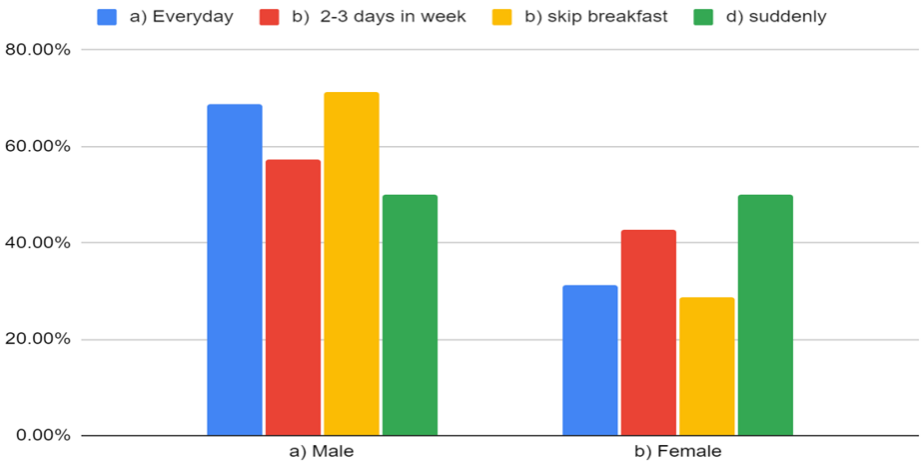


Figure 11: Compare the ratio of Consumed breakfast among males and females.

The explanation chart in the document serves to illustrate and contrast the consumption patterns of healthy foods and breakfast routines among males and females. These visual aids offer a clear breakdown of the data, displaying the proportions of individuals who regularly consume nutritious foods, the frequency of their consumption, and the prevalence of daily breakfast consumption versus occasional or skipped breakfasts. By organizing this information into a chart format, the document aims to facilitate a quick and straightforward comprehension of the disparities in eating habits between males and females, highlighting trends and discrepancies in their nutritional preferences and morning routines.

The provided data compares the consumption of healthy foods and breakfast practices between genders. Concerning the consumption of nutritious foods from Figure 10, most males (68.18%)

reported regular intake, contrasting with a lower percentage among females (31.82%). Conversely, among those not consuming nutritious foods regularly, females (50.00%) were more prevalent compared to males (50.00%). For those consuming nutritious foods 3-4 days per week, a higher percentage was observed among males (64.75%) compared to females (35.25%). Similarly, in the category of consuming nutritious foods 1-2 days per week, males (58.33%) outnumbered females (41.67%).

In terms of breakfast habits from Figure 11, a larger proportion of males (68.75%) reported having breakfast daily compared to females (31.25%). Among those having breakfast 2-3 days per week, males (57.38%) outnumbered females (42.62%). Interestingly, a higher percentage of females (50.00%) reported skipping breakfast compared to males (28.57%).

Overall, the data suggests significant disparities between males and females regarding the consumption of nutritious foods and breakfast routines, with males generally exhibiting higher rates of regular healthy food consumption and daily breakfast intake compared to females.

4.1.6 Risk Factors

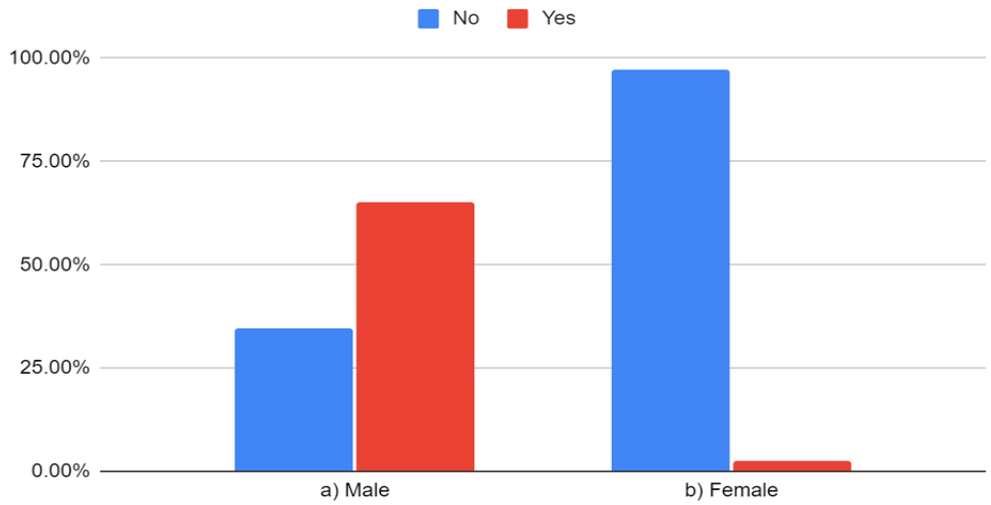


Figure 12: The comparison of tobacco consumption ratios between males and females.

From Figure 12, the data presented in the document illustrates a comparison of tobacco consumption between males and females. The table indicates a significant contrast in smoking habits, with a notably higher proportion of males (65.32%) smoking compared to females (2.63%). This substantial gap emphasizes a gender-based inequality in tobacco usage, with a considerably larger percentage of males engaging in smoking compared to females.

The chart visually depicts this information, illustrating the distribution of tobacco consumption among males and females. Both the table and the chart vividly demonstrate that smoking prevalence is markedly higher among males than females. This data underscores the importance of recognizing and tackling gender-specific trends in tobacco use to implement effective public health measures and policies aimed at reducing smoking rates and the associated health hazards.

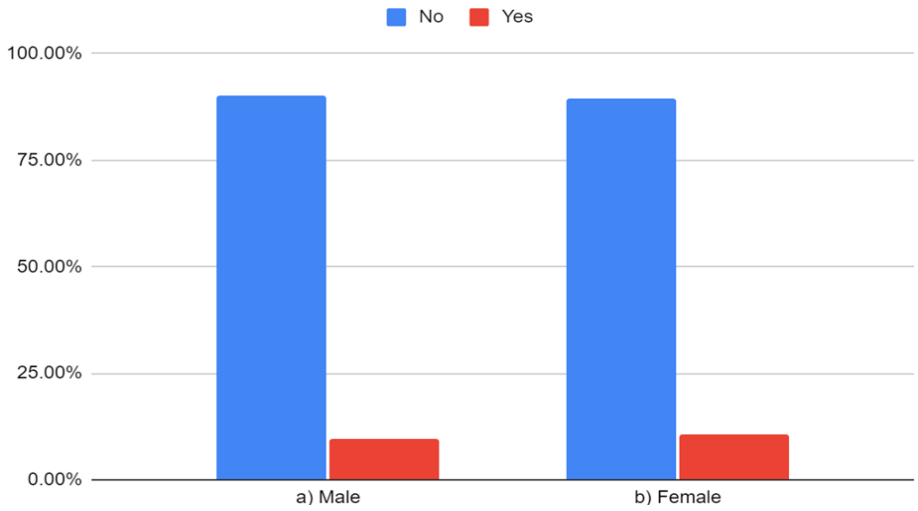


Figure 13: The proportion of chronic health conditions (e.g., diabetes and hypertension) among males versus females.

The provided chart illustrates the occurrence of chronic health issues, such as diabetes and hypertension, across genders. The data is divided by gender, indicating the proportion of individuals with and without chronic health problems within each category. Figure 13 shows that among males, 90.32% are free from chronic health concerns, while 9.68% have been diagnosed with such conditions. Conversely, among females, 89.47% are without chronic health issues, while 10.53% have been diagnosed with them. These figures offer a direct contrast in the health status of males and females concerning chronic ailments like diabetes and hypertension. The chart further dissects this data by gender, providing a comprehensive overview of the prevalence of chronic health conditions within each group. It underscores the slightly higher occurrence of these ailments among females compared to males, although the differences between the genders are relatively minor.

4.2 Discussion

Among adults, achieving and sustaining optimal health requires navigating a complex interplay of numerous interconnected elements, encompassing factors such as weight status, levels of physical activity, nutritional awareness, adherence to healthy practices, and assorted risk factors. This study's outcomes provide a significant understanding of how these factors interact and their ramifications on overall health and quality of life. The examination uncovered a wide spectrum of weight statuses among the subjects, encompassing normal weight, overweight, and obesity. These results highlight the widespread presence of weight-related concerns in adulthood and emphasize the necessity for tailored interventions to tackle these issues effectively.

The health of an individual is greatly affected by their Body Mass Index (BMI), dietary habits, and level of physical activity. Our research reveals a strong correlation between an adult's health and factors such as age, BMI, dietary choices, and physical exercise. BMI serves as a crucial indicator for various health issues, with obesity being identified as a significant contributor to chronic

illnesses, as observed in prior studies (Leung, 2020). Moreover, our findings align with existing research indicating that higher BMI levels correspond to elevated risks of health complications. This conclusion is reinforced by a meta-analysis, which demonstrates that individuals classified as overweight based on BMI face heightened mortality and increased susceptibility to cardiovascular ailments. This study found Males had higher percentages in the Normal weight and Overweight categories compared to females and Females showed a higher percentage in the Underweight category.

Engaging in physical activity is essential for maintaining good health and lowering the risk of chronic diseases. We explored the links between physical activity levels in both men and women and their health issues, finding that these relationships differed by gender. Inactive women were more likely to experience heart disease, substance dependency, and depression compared to their active or moderately active counterparts. These findings support previous studies showing that physical activity helps reduce depression (Overdorf, 2016). This thesis investigates adult physical activity patterns, including sedentary behavior, exercise frequency, and adherence to guidelines. The research found that men generally exercised for longer periods than women, while women were more likely to have fewer days of physical activity each week compared to men. This study aims to support public health efforts to boost physical activity levels across the population by emphasizing the significance of regular exercise in preventing diseases and promoting health.

A society cannot sustain healthy living, fulfill basic functions, foster economic growth, or enhance social prosperity if its individuals consume insufficient and imbalanced diets. Consequently, ensuring adequate and balanced nutrition is essential not only for individual growth but also for societal advancement (Özcelik, 2008). Thus, individuals must possess adequate nutritional knowledge and translate that knowledge into healthy dietary habits. Nutritional knowledge and dietary habits significantly influence overall health outcomes, yet many adults struggle to make informed food choices. While some individuals demonstrated a strong grasp of nutrition principles, others exhibited gaps in knowledge, particularly regarding portion control, food labeling, and dietary guidelines. This thesis evaluates the level of nutritional knowledge among adults and assesses dietary patterns, including intake of fruits, vegetables, whole grains, and processed foods. Through surveys, interviews, and dietary assessments, the study explores the factors shaping individuals' dietary behaviors and investigates the impact of socioeconomic, cultural, and environmental factors on food choices. By identifying gaps in nutritional education and promoting evidence-based dietary guidelines, this research seeks to empower individuals to make healthier food choices and reduce the burden of diet-related diseases.

In addition to factors like weight, physical activity, and diet, various aspects of our lifestyle significantly impact our overall health and well-being (Gorski, 2015). Healthy behaviors encompass a wide range of activities, including how we eat, exercise, sleep, manage stress, and more. Our research delved into how prevalent these healthy habits are among adults and pinpointed areas where there's room for improvement. While some individuals reported sticking to healthy routines like regular exercise and balanced eating, others showed less favorable habits, such as

poor sleep patterns. Our findings revealed that males tended to consume nutritious foods regularly and have breakfast daily more often than females. Conversely, females were more prone to skipping breakfast and eating nutritious foods less frequently compared to males. By analyzing both longitudinal data and behavioral surveys, we aim to identify interventions that can encourage healthier lifestyle choices. Promoting positive habits necessitates a comprehensive approach that addresses individual needs, socio-cultural factors, and environmental influences.

Evaluating risk factors is essential for identifying people at higher risk for chronic diseases and applying targeted interventions to reduce these risks. This dissertation integrates knowledge from various fields to assess how multiple risk factors collectively impact health outcomes in adulthood (Chatterjee, 2020). Using statistical modeling and epidemiological analysis, the study measures how different factors contribute to chronic conditions like obesity, diabetes, hypertension, and cardiovascular diseases. The research shows that obese individuals are more likely to develop health issues such as cardiovascular diseases, diabetes, and hypertension. Moreover, even those with normal weight are at an increased risk for certain problems, including high blood pressure, joint issues, high cholesterol, and depression.

Furthermore, our findings indicate that chronic health conditions like diabetes and hypertension are marginally more prevalent among females compared to males. One possible explanation for this gender disparity could be the presence of high body fat or central obesity among individuals with a normal weight. Through risk stratification and predictive modeling, this research aims to pinpoint populations at high risk and tailor interventions accordingly. By identifying modifiable risk factors, healthcare practitioners can devise personalized intervention strategies aimed at alleviating the burden of disease and enhancing long-term health outcomes.

In future contributions, this study has the potential to lay the groundwork for tailored interventions designed to encourage healthier lifestyles and diminish the prevalence of chronic illnesses linked with inadequate weight management, sedentary behaviors, and suboptimal nutrition. Moreover, the knowledge derived from this investigation can guide policy endeavors aimed at enhancing public health outcomes through a comprehensive approach to addressing various health determinants. The research underscores the necessity of employing a multi-faceted method in health assessment to achieve a thorough comprehension of individual health conditions (Leung et al, 2020). Through the examination of diverse factors such as weight status, levels of physical activity, and nutritional understanding, a more holistic view of health can emerge, facilitating the implementation of targeted interventions and preventive strategies for health enhancement and disease mitigation. The thesis' findings underscore the interconnected nature of different health parameters and stress the significance of adopting a well-rounded lifestyle that includes healthy dietary habits, consistent physical activity, and a solid grasp of nutrition. Furthermore, the identification of risk factors offers valuable insights into specific areas requiring focused attention for individuals to preserve or enhance their health status.

CHAPTER 5

CONCLUSION

5.1 Conclusion

Upon conducting a thorough assessment of adult health, several key findings emerge. The analysis underscores the interconnected nature of weight management, physical activity levels, and dietary habits in shaping overall well-being. It highlights the pivotal role of nutritional knowledge in guiding healthy eating choices and reducing health risks associated with sedentary lifestyles and poor dietary habits. The assessment advocates for holistic interventions that promote nutritional education, encourage regular physical activity, and cultivate supportive community environments. Such efforts not only enhance individual health but also inform effective public health policies aimed at addressing broader socio-environmental determinants of health. By adopting a comprehensive approach that considers these multifaceted factors, policymakers and healthcare providers can better mitigate health disparities and foster sustainable improvements in population health. Embracing this holistic perspective is crucial for achieving meaningful advancements in adult health outcomes and promoting healthier lifestyles across communities.

5.2 Limitations of the Study

This study delves into factors impacting adult health through a multifaceted approach, examining weight, physical activity, nutrition, habits, and risks. It provides a nuanced analysis, revealing complex interactions among variables crucial for health promotion and interventions. Findings suggest areas for targeted strategies to enhance well-being, yet reliance on self-reported data and a cross-sectional design pose limitations on accuracy and generalizability. Focus on specific demographics may restrict broader application. Future research could mitigate these issues with longitudinal studies and enhanced methodologies. Despite limitations, this thesis enriches understanding of adult health complexities, offering insights valuable for long-term health outcomes and intervention development.

REFERENCES

1. Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Current opinion in psychiatry*, *18*(2), 189-193.
2. US Department of Health and Human Services. (1996). Physical activity and health: A report of the Surgeon General Atlanta. *GA: Centers for Disease Control and Prevention*.
3. Barbosa, L. B., Vasconcelos, S. M. L., Correia, L. O. D. S., & Ferreira, R. C. (2016). Nutrition knowledge assessment studies in adults: a systematic review. *Ciencia & saude coletiva*, *21*, 449-462.
4. Conway, N., Guest, D., & Trenberth, L. (2011). Testing the differential effects of changes in psychological contract breach and fulfillment. *Journal of vocational behavior*, *79*(1), 267-276.
5. Weaver, R. G., Hunt, E. T., Armstrong, B., Beets, M. W., Brazendale, K., Turner-McGrievy, G., ... & Ressor-Oyer, L. (2021). COVID-19 leads to accelerated increases in children's BMI z-score gain: an interrupted time-series study. *American journal of preventive medicine*, *61*(4), e161-e169.
6. Siddiqui, U. H. (2023). *Health issues in relation to leisure physical activity, body mass index, and nutrition among adults* (Doctoral dissertation, Lietuvos sporto universitetas).
7. Weaver, R. G., Hunt, E., Armstrong, B., Beets, M. W., Brazendale, K., Turner-McGrievy, G., ... & Ressor-Oyer, L. (2021). Impact of a year-round school calendar on children's BMI and fitness: final outcomes from a natural experiment. *Pediatric obesity*, *16*(10), e12789.
8. Södergren, M., Wang, W. C., Salmon, J., Ball, K., Crawford, D., & McNaughton, S. A. (2014). Predicting healthy lifestyle patterns among retirement age older adults in the WELL study: a latent class analysis of sex differences. *Maturitas*, *77*(1), 41-46.
9. dos Santos Tavares, D. M., Fernandes Bolina, A., Aparecida Dias, F., dos Santos Ferreira, P. C., & José Haas, V. (2014). Quality of life of elderly. Comparison between urban and rural areas. *Investigación y Educación en Enfermería*, *32*(3), 401-413.
10. Axelson, M. L., & Brinberg, D. (1992). The measurement and conceptualization of nutrition knowledge. *Journal of Nutrition Education*, *24*(5), 239-246.
11. Després, J. P., & Lamarche, B. (1994). Low-intensity endurance exercise training, plasma lipoproteins and the risk of coronary heart disease. *Journal of internal medicine*, *236*(1), 7-22.
12. Tosato, M., Ciciarello, F., Zazzara, M. B., Janiri, D., Pais, C., Cacciatore, S., ... & Landi, F. (2022). Lifestyle changes and psychological well-being in older adults during COVID-19 pandemic. *Clinics in Geriatric Medicine*, *38*(3), 449-459.
13. Zhao, C., Noble, J. M., Marder, K., Hartman, J. S., Gu, Y., & Scarmeas, N. (2018). Dietary patterns, physical activity, sleep, and risk for dementia and cognitive decline. *Current nutrition reports*, *7*, 335-345.

14. Eltayeb, R., Salmiah, M. S., & Suriani, I. (2016). Association of health literacy with obesity and overweight among Arabic secondary school students in Kuala Lumpur and Putrajaya, Malaysia. *International Journal of Public Health and Clinical Sciences*, *3*(5), 110-121.
15. Al-Haroni, H., Nik Farid, N. D., & Azanan, M. S. (2024). Effectiveness of education intervention, with regards to physical activity level and a healthy diet, among Middle Eastern adolescents in Malaysia: A study protocol for a randomized control trial, based on a health belief model. *Plos one*, *19*(1), e0289937.
16. Okunogbe, A., Nugent, R., Spencer, G., Powis, J., Ralston, J., & Wilding, J. (2022). Economic impacts of overweight and obesity: current and future estimates for 161 countries. *BMJ global health*, *7*(9), e009773.
17. Okunogbe, A., Nugent, R., Spencer, G., Ralston, J., & Wilding, J. (2021). Economic impacts of overweight and obesity: current and future estimates for eight countries. *BMJ global health*, *6*(10), e006351.
18. Esquivel, M. K. (2021). Energy Balance Dynamics: Exercise, Appetite, Diet, and Weight Control. *American Journal of Lifestyle Medicine*, *15*(3), 220-223.
19. Romieu, I., Dossus, L., Barquera, S., Blottière, H. M., Franks, P. W., Gunter, M., ... & IARC working group on Energy Balance and Obesity. (2017). Energy balance and obesity: what are the main drivers?. *Cancer causes & control*, *28*, 247-258.
20. Moschonis, G., & Trakman, G. L. (2023). Overweight and Obesity: The Interplay of Eating Habits and Physical Activity. *Nutrients*, *15*(13), 2896.
21. Benedet, J., Assis, M. A. A. D., Calvo, M. C. M., & Andrade, D. F. D. (2013). Overweight in adolescents: exploring potential risk factors. *Revista Paulista de Pediatria*, *31*, 172-181.
22. Olatona, F. A., Adeniyi, D. B., Obrutu, O. E., & Ogunyemi, A. O. (2023). Nutritional knowledge, dietary habits and nutritional status of adults living in urban Communities in Lagos State. *African Health Sciences*, *23*(1), 711-24.
23. Silva, P., Araújo, R., Lopes, F., & Ray, S. (2023). Nutrition and Food Literacy: Framing the Challenges to Health Communication. *Nutrients*, *15*(22), 4708.
24. Kim, J., Hong, Y., Baek, S., Lee, K. P., & Ahn, S. (2022). The synergistic effect of physical activity and nutrition to improve the quality of life in breast cancer patients: a systemic review. *Physical Activity and Nutrition*, *26*(4), 22.
25. Elliot, C. A., & Hamlin, M. J. (2018). Combined diet and physical activity is better than diet or physical activity alone at improving health outcomes for patients in New Zealand's primary care intervention. *BMC Public Health*, *18*, 1-10.
26. Bradley, M., Melchor, J., Carr, R., & Karjoo, S. (2023). Obesity and malnutrition in children and adults: A clinical review. *Obesity Pillars*, 100087.
27. Chatterjee, A., Gerdes, M. W., & Martinez, S. G. (2020). Identification of risk factors associated with obesity and overweight—a machine learning overview. *Sensors*, *20*(9), 2734.

28. Estecha Querol, S., Iqbal, R., Kudrna, L., Al-Khudairy, L., & Gill, P. (2021). The double burden of malnutrition and associated factors among south Asian adolescents: Findings from the global school-based student health survey. *Nutrients*, *13*(8), 2867.
29. Gorski, M. T., & Roberto, C. A. (2015). Public health policies to encourage healthy eating habits: recent perspectives. *Journal of healthcare leadership*, 81-90.
30. Naing, L., Winn, T. B. N. R., & Rusli, B. N. (2006). Practical issues in calculating the sample size for prevalence studies. *Archives of orofacial Sciences*, *1*, 9-14.
31. Gorski, M. T., & Roberto, C. A. (2015). Public health policies to encourage healthy eating habits: recent perspectives. *Journal of healthcare leadership*, 81-90.
32. Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Cmaj*, *174*(6), 801-809.
33. Malik, V. S., Schulze, M. B., & Hu, F. B. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review–. *The American journal of clinical nutrition*, *84*(2), 274-288.
34. Leung, Y. S., Lee, J. J. W., Lai, M. M. P., Kwok, C. K. M., & Chong, K. C. (2020). Association between obesity, common chronic diseases and health promoting lifestyle profiles in Hong Kong adults: a cross-sectional study. *BMC public health*, *20*, 1-9.
35. Overdorf, V., Kollia, B., Makarec, K., & Alleva Szeles, C. (2016). The relationship between physical activity and depressive symptoms in healthy older women. *Gerontology and geriatric medicine*, *2*, 2333721415626859.
36. Özcelik, A. O., & Ucar, A. (2008). Gender differences in adult's knowledge about dietary fats, cholesterol, fiber and energy. Pak J Nutr, 7, 234-9.

APPENDICES

Appendix 1: Synopsis

1. Thesis title: Comprehensive Evaluation of Weight Status, Physical Activity Levels, Nutritional Knowledge, Healthy Habits, and Risk Factors in Adulthood: A Multifaceted Approach to Health Assessment.

2. Introduction

Living a healthy lifestyle, which includes proper nutrition and regular physical activity, is vital for protecting against a range of diseases such as cardiometabolic conditions, hypertension, various cancers, obesity, and related illnesses. Encouraging healthy habits among adolescents and young adults has a profound impact on their psychosocial and behavioral well-being, providing numerous protective benefits while also addressing potential risks (Al-Nakeeb, 2015). However, the prevalence of obesity differs greatly across countries and populations, shaped by factors such as socioeconomic disparities, cultural differences, and variations in national and local environments, including transportation infrastructure. The concept of health encompasses both physical and mental aspects (Perry, 1987). Education about nutrition, exercise, and the psychological elements of a healthy lifestyle can empower individuals to make informed choices and address obesity-related challenges. Health behaviors typically develop early in life and can have a lasting impact on one's well-being. Early habits, such as dietary patterns and physical activity levels, lay the foundation for long-term health (Sanchez, 2007). Various physiological and psychological factors, such as changes in identity and roles, insufficient exercise, the quality of cafeteria food, and the accessibility of junk food, can contribute to the onset of disordered eating. Maintaining a balanced diet is crucial for preventing immediate health complications and long-term consequences like cardiovascular diseases, diabetes, high blood pressure, stroke, cancer, dental issues, asthma, and psychological disorders such as depression (Bartolomew, 2001). A healthy diet can significantly lower the risk of these health issues and promote overall well-being. Unhealthy lifestyle behaviors, including poor diet, lack of physical activity, smoking, and excessive alcohol consumption, can often be modified and improved. Many of these habits are established during youth or young adulthood, making it essential to encourage healthy choices and habits early in life to reduce the risk of chronic health problems later on. Addressing these concerns early is key to promoting a healthy lifestyle and preventing long-term health issues (Dodd, 2010). By focusing on education and the development of healthy habits from a young age, individuals can be better equipped to make decisions that support their physical and mental health throughout their lives. This proactive approach helps mitigate the risk of developing chronic conditions and enhances overall quality of life.

2.1 Aim of the study

The study aims to understand the complex dynamics of health factors, categorizing adults by weight, assessing physical activity, nutritional knowledge, and lifestyle habits. It investigates risk

factors like genetics and environment to inform public health initiatives for healthier adult lifestyles.

2.2 Rationale

This holistic approach to health is pivotal for several reasons. It acknowledges that health is influenced by various factors, including lifestyle, knowledge, and environment. By assessing weight, activity levels, nutrition knowledge, and habits together, the study aims for a comprehensive understanding of health. It recognizes the interplay between these factors, such as how weight can be affected by activity and diet (Burdette, 2017). Understanding these dynamics can inform tailored interventions for better long-term health. Despite extensive research on individual health factors like weight status or physical activity, studies comprehensively assessing multiple aspects of adult health are limited. Existing research often focuses on specific demographics, limiting generalizability. Addressing these gaps, this thesis could offer valuable insights into public health and enhance adult health promotion strategies.

3. Problem Statement and Justification

The modern era witnessed a surge in lifestyle-related health issues, notably obesity and chronic diseases, attributed to sedentary lifestyles and poor diets. Assessing weight, activity levels, nutrition knowledge, and habits in adults is vital for targeted interventions, promoting health, and improving community well-being, offering a proactive strategy to enhance quality of life.

4. Objective

1. To determine how many adults are overweight or obese using standard measures like body mass index (BMI).
2. To combine results from weight status, levels of physical activity, knowledge about nutrition, healthy behaviors, and factors that may affect health in a complete evaluation of adult health.
3. To evaluate how well adults understand important nutritional concepts such as dietary guidelines, macronutrients, and micronutrients.
4. To study how common healthy habits are among adults, like getting enough sleep, managing stress, and avoiding harmful substances like tobacco and excessive alcohol.
5. To discover and measure different factors that increase the risk of chronic diseases, such as family medical history, sedentary lifestyles, and eating habits.

5. Hypotheses

1. People who are more physically active are generally better at keeping a healthy weight as adults than those who lead inactive lives.

2. Those with a greater understanding of nutrition tend to make healthier food choices compared to those with less nutritional knowledge.
3. Adults who consistently exercise are more likely to adopt healthy lifestyle practices, such as getting enough sleep, managing stress well, and minimizing sedentary activities.

6. Methods

Undergraduate students will receive a structured and confidential self-report survey, with details of the survey methodology disclosed in advance. A sample of 200 male and female students will be randomly chosen from various categories and academic years within the university's (18–30) year age range. The question papers will be distributed among the class ten minutes before the end of the lesson.

7. Methodology

7.1 Study design: This study, employing a cross-sectional approach, will evaluate the health of adults by including BMI measurements, monitoring physical activity, conducting surveys on nutritional knowledge, and examining lifestyle habits across various backgrounds.

7.2 Data Collection: Create a survey that encompasses topics such as well-balanced eating habits, understanding of nutrition knowledge, and physical activity or workout routines. The survey will reveal their thoughts and ideas about all of this.

7.3 Data analysis: Using statistical techniques is advisable for investigating the correlation between adhering to a healthy diet, an individual's physical fitness, BMI evaluation, and a strong understanding of nutrition.

7.4 Anthropometric analysis: Anthropometric evaluations will include calculating the Body Mass Index (BMI), which requires measurements like weight in kilograms, height in meters, and hip and waist circumferences in centimeters.

7.5 Statistical Analysis: Descriptive statistics were employed to assess the comprehension of nutrition and the uptake of healthy lifestyles across the Nutrition Department and other departments.

7.6 Ethical Considerations: Obtain permission from the university's review board and ensure the privacy and consent of participants.

8. Expected Outcome

The importance of maintaining a nutritious diet, the need for physical activity, and the essence of a healthy lifestyle will be understood. Knowledge of nutritional assessment in adults will improve. Acquiring the ability to identify risk factors and the knowledge to mitigate them will be achieved. Foundation for Further Research: Certainly, using this study as a foundation for future research in the area is a promising approach to further our understanding.

9. Time Schedule of Activities in the Proposed Study

	Activities by months (starts to end)					
	1	2	3	4	5	6
Literature research						
Synopsis development						
Study protocol and questionnaire development						
Ethical approval						
Pretesting of study protocols, questionnaire						
Data and sample collection phase						
Data analysis and report writing						
Report Submission						

10. Conclusion

Academic institutions should implement health-promoting policies, offering nutritious cafeteria menus, diverse activities for healthy eating and exercise, and support systems. Undergraduate students should engage in mandatory physical education courses within an environment conducive to physical activity, including evaluations of dietary habits and their impact on health.

11. Reference

1. Al-Nakeeb, Y., Lyons, M., Dodd, L. J., & Al-Nuaim, A. (2015). An investigation into the lifestyle, health habits and risk factors of young adults. *International journal of environmental research and public health*, *12*(4), 4380-4394.

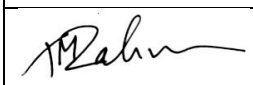
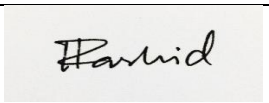
2. Perry, C. L., Klepp, K. I., Halper, A., Dudovitz, B., Golden, D., Griffin, G., & Smyth, M. (1987). Promoting healthy eating and physical activity patterns among adolescents: a pilot study of 'Slice of Life'. *Health Education Research*, *2*(2), 93-103.

3. Burdette, A. M., Needham, B. L., Taylor, M. G., & Hill, T. D. (2017). Health lifestyles in adolescence and self-rated health into adulthood. *Journal of health and social behavior*, *58*(4), 520-536.

4. Sanchez, A., Norman, G. J., Sallis, J. F., Calfas, K. J., Cella, J., & Patrick, K. (2007). Patterns and correlates of physical activity and nutrition behaviors in adolescents. *American journal of preventive medicine*, *32*(2), 124-130.

5. Dodd, L. J., Al-Nakeeb, Y., Nevill, A., & Forshaw, M. J. (2010). Lifestyle risk factors of students: a cluster analytical approach. *Preventive medicine*, *51*(1), 73-77.

6. Bartolomew, L. K., Parcel, G. S., Kok, G., & Gottlieb, N. (2001). Designing theory and evidence-based health promotion programs. *intervention mapping. Columbus, OH: Mountain View*.

Signature of supervisor	Signature of co-supervisor
 …….. **Dr. Md. Mahbubur Rahman** Associate Professor Department of Nutrition and Food Engineering Faculty of Health and Life Sciences.	 …… **Mr. Md. Harun-Ar Rashid** Assistant Professor Department of Nutrition and Food Engineering Faculty of Health and Life Sciences.

Appendix 2: Questionnaires

Section 1: Demographic Information

i. Name:

ii. Department name:

iii. Age:

a) Male b) Female
c) Non-binary d) Prefer not to say.

iv. Gender:

a)18-24 b) 25-34
c) 35-44 d)45-50

v. Educational Background:

a) High School or below
b) Some college/technical training
c) Bachelor's degree
d) Master's degree or higher

vi. University name:

vii. Academic year:

a) 1st year b) 2nd year
c) 3rd year d) 4th year

Section 2: Weight Status

i. Weight:

ii. Height:

iii. What is your Body Mass Index (BMI)? (BMI= Kg/m^2, Here Kg = person's weight and m^2 is their height in meter squared)

a) less than 18.5 (Underweight) b) 18.5 to 24.9 (Normal weight)
c) 25 to 29.9 (Overweight) d) 30 or more than 30 (Obesity)

iv. Have you experienced significant weight changes in the past year?

a) Yes b) No

Section 3: Physical Activity Levels

i. How many days per week do you engage in moderate-intensity physical activities (e.g., brisk walking, cycling)?

a) Regularly b) Not regularly

c) 3-4 day in week d) 1-2 day in week

ii. How many days per week do you engage in vigorous-intensity physical activities (e.g., running, aerobic exercise)?

a) All day in a week b) Not even a day
c) 1-2 days in a week d) 4-5 days in a week

iii. On average, how many minutes do you spend on physical activity per session?

a) 30 min b) 1-hour
c) 2 hours d) 2 hours+

Section 4: Nutritional Knowledge

i. How would you rate your nutrition knowledge?

a) Excellent b) Good
c) Fair d) Poor

ii. What are the three essential nutrients?

a. Carbohydrate, Protein, Fat.
b. Carbohydrate, Vitamin, Mineral.
c. vitamins, minerals, water.
d. others.

iii. How often do you read nutrition labels when purchasing food products?

a. Always
b. Often
c. Occasionally
d. Rarely

Section 5: Healthy Habits

i. How many days each week do you consume breakfast?

a) every day b) skip breakfast
c) 2-3 days in week d) suddenly

ii. How many liters of water do you drink in a day?

a) 1 or less/day b) 2-4/day
c) 5-8/day d) 9+/day

iii. Which of the following beverages do you drink regularly?

a) Milk b) Juice
c) Coffee/tea d) Water

e) Other

iv. Do you consume nutritious foods in your meals?

a) Regularly b) Not regularly
c) 3-4 days in week d) 1-2 day in week

Section 6: Risk Factors

i. Do you currently smoke tobacco products?

a) Yes b) No

ii. How often do you consume alcoholic beverages?

a) Never b) Occasionally
c) Monthly d) Weekly
e) Daily

iii. Have you been diagnosed with any chronic health conditions (e.g., diabetes, hypertension)?

a) Yes b) No

Section 7: Additional Comments

i. Is there anything else you would like to share about your lifestyle, health, or any challenges you face in maintaining a healthy lifestyle?