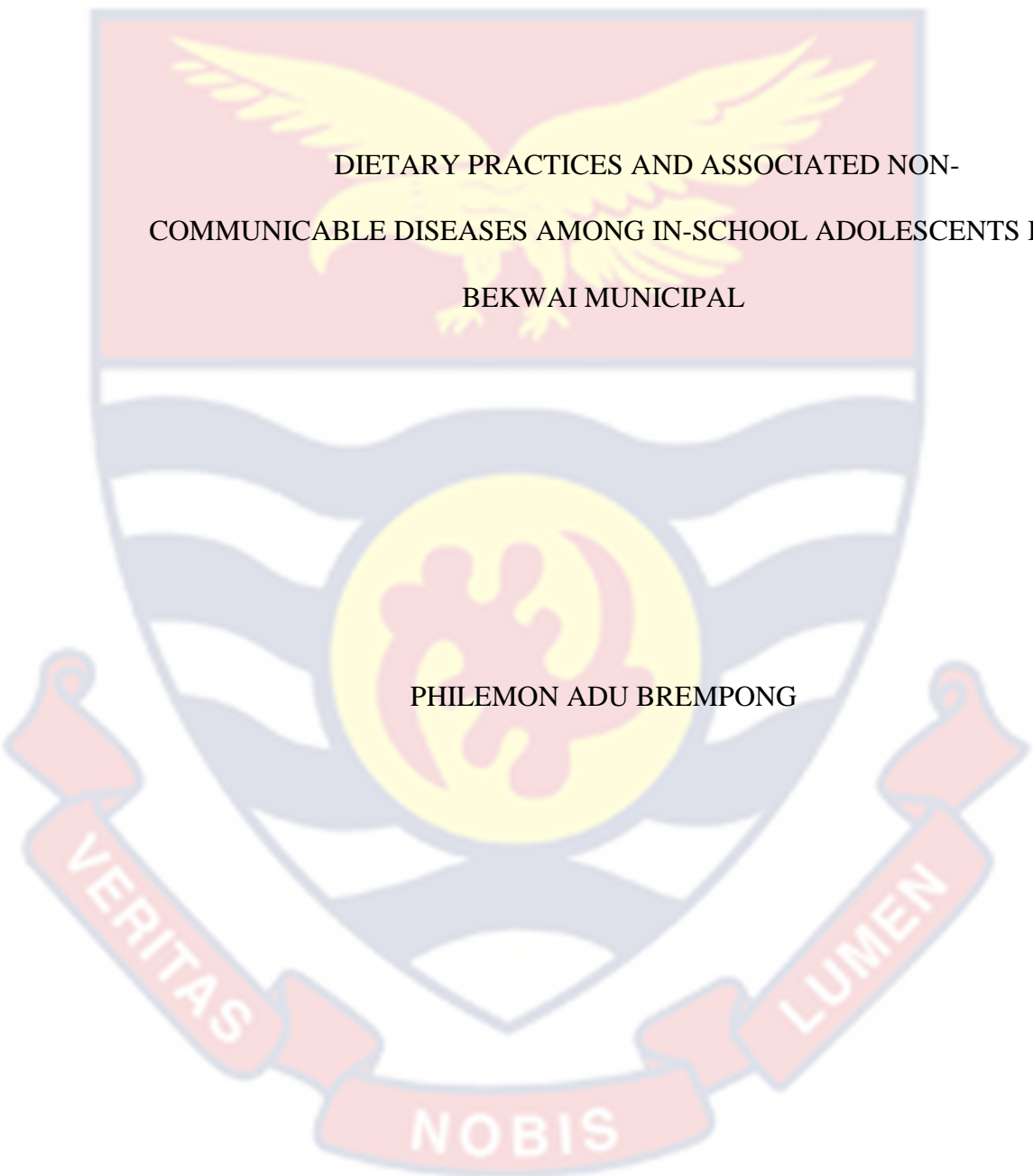


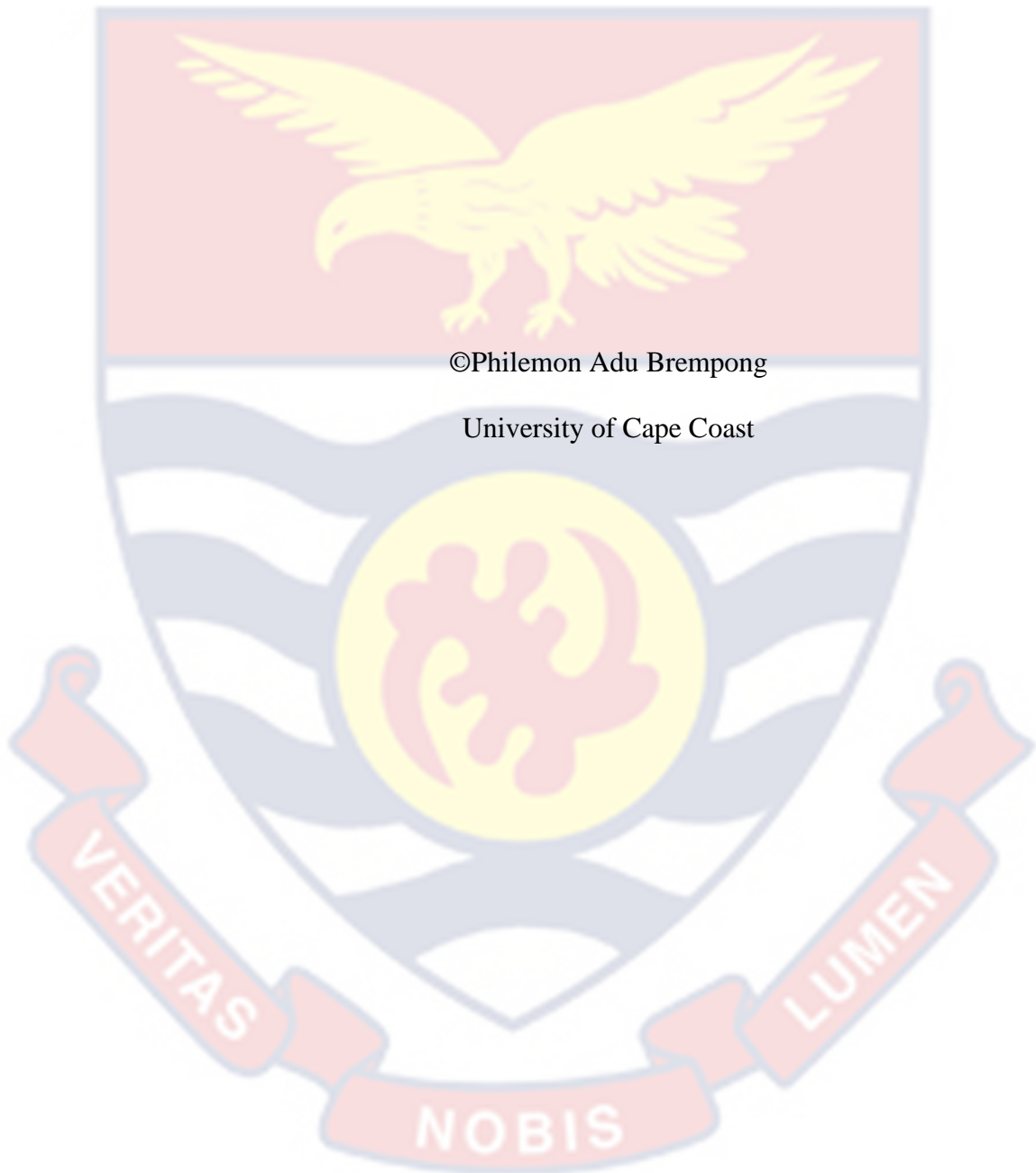
UNIVERSITY OF CAPE COAST



DIETARY PRACTICES AND ASSOCIATED NON-  
COMMUNICABLE DISEASES AMONG IN-SCHOOL ADOLESCENTS IN  
BEKWAI MUNICIPAL

PHILEMON ADU BREMPONG

2023



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DISEASES AMONG IN-SCHOOL ADOLESCENTS IN BEKWAI

MUNICIPAL

BY

PHILEMON ADU BREMPONG

Thesis submitted to the Department of Health, Physical Education and  
Recreation of the Faculty of Science and Technology Education, College of  
Education Studies, University of Cape Coast, in partial fulfilment of the  
requirements for the award of Masters of Philosophy degree in  
Health Education.

OCTOBER 2023

## DECLARATION

### Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature ..... Date .....

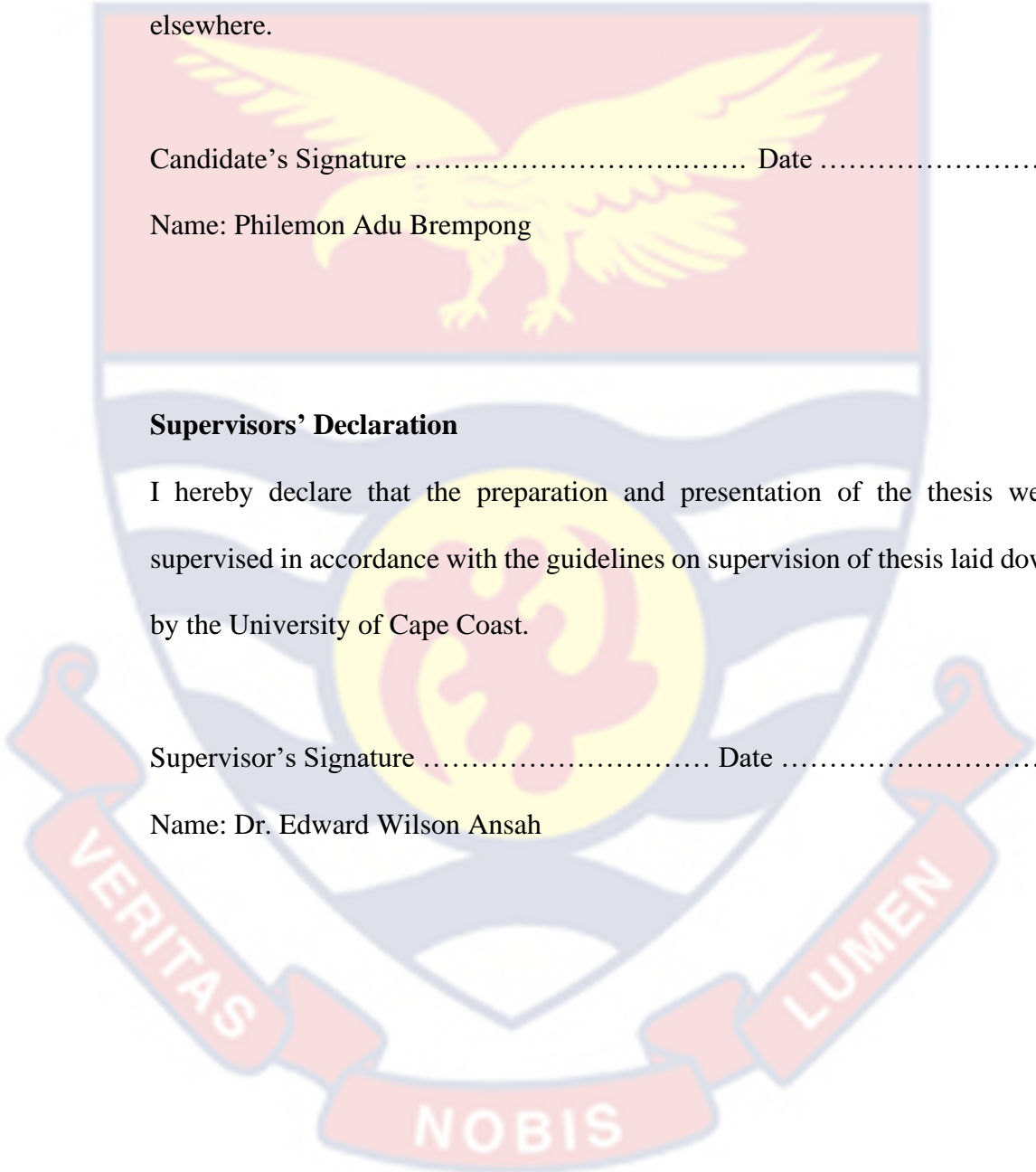
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### Supervisors' Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature ..... Date .....

Name: Dr. Edward Wilson Ansah



## ABSTRACT

Non-Communicable Diseases (NCDs) have gradually become common due to a cumulative cluster of factors such as poor dietary practices and a sedentary lifestyle. Poor dietary quality (high salt intake, high saturated and trans-fatty acid intake, and low fruit and vegetable consumption) and insufficient physical activity are key risk factors for NCD development. Therefore, the study investigated dietary practices and associated NCDs among adolescents in Bekwai Municipal. The study was a descriptive cross-sectional survey that employed a quantitative method. Simple random sampling and stratified sampling techniques were used to select students from four schools in the municipality. A total of 1,714 students participated in the study. Analysis was done using frequency, mean scores, Chi-square, Mann–Whitney test, and logic regression. Most (65%) of the adolescents had inadequate knowledge about NCDs. Most of the adolescents had poor dietary practices, and this was higher among girls than boys. Boys and girls differed in the intake of drinks, meat, fish, bread, dairy products, and fats. There was no association between the dietary practices of adolescents and the development of NCDs. However, those who consumed many fruits were 42% less likely to develop NCD. Being a female, traditionalist, and Muslim had increasing odd of developing NCDs. Females are at greater risk of being obese and overweight ( $X^2=24.28$ ,  $p\text{-value}=0.001$ ). Thus, encouraging the consumption of fruits and vegetables and reducing the intake of unhealthy foods and beverages can help in reducing NCD risk among these adolescents.

## KEYWORDS

Non-communicable diseases

Diet

Dietary practices

Adolescents





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**DEDICATION**

To Augustine Adu-Brimpong and Janet Antwiwaa





**TABLE OF CONTENTS**

Table	Page
DECLARATION	ii
ABSTRACT	iii
KEYWORDS	iv
ACKNOWLEDGEMENTS	v
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ACRONYMS	xii
CHAPTER ONE: INTRODUCTION	
Background to the Study	1
Statement of the Problem	12
Purpose of the Study	15
Research Questions	15
Significance of the Study	16
Delimitation	17
Limitations	17
Definition of Terms	18
Organisation of the Study	18
CHAPTER TWO: LITERATURE REVIEW	
Factors Associated with NCDs	20
Prevalence of NCDs Globally and in Ghana	22
Knowledge Level of NCDs	27

Dietary Practices among Adults and Various Populations	28
Influence of Socio-Demographic Variables on Development of NCDs	34
Dietary Practices and Development of Some Major NCDS	36
<b>CHAPTER THREE: RESEARCH METHODS</b>	
Research Design	50
Study Area	51
Population	52
Sampling Procedure	52
Data Collection Instruments	53
Data Collection Procedure	55
Ethical Consideration	55
Data Processing and Analysis	56
<b>CHAPTER FOUR: RESULTS AND DISCUSSION</b>	
Research Question 1	59
Research Question 2	63
Research Question 3	67
Research Question 4	69
Research Question 5	73
Research Question 6	76
<b>CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</b>	
Summary	82
Main Findings	85
Conclusions	87
Recommendations	87

Suggestions for Further Research	88
REFERENCES	89
APPENDICES	113
APPENDIX 1: QUESTIONNAIRE	114
APPENDIX II: CLEARANCE, INTRODUCTORY AND PERMISSION LETTERS	123



## LIST OF TABLES

Table		Page
1	Sociodemographic Characteristics	58
2	Distribution of Knowledge of NCD and Source of Information	61
3	Dietary Practice of Food Categories among Adolescents	64
4	Association between Gender, BMI and NCDS	68
5	Association between Gender and Dietary Practices	70
6	Association between Dietary Practices and Development of NCDs and Obesity (N=1714)	74
7	Association between Dietary Practices and Development of NCDs and Obesity among Adolescents	74
8	Association between Socio-Demographic Variables of Adolescents and the Development	77
9	Association between Socio-Demographic Variables of Adolescents and the Development of Obesity	78
10	Relationship between Socio-demographics of Adolescents and Development of NCDs	79

**LIST OF FIGURES**

Figure		Page
1	Conceptual base of study	48
2	Knowledge level of adolescents in bekwai municipal on NCDs	60
3	Overall nature of dietary practices among adolescents	66



**LIST OF ACRONYMS**The logo of the University of Cape Coast is a watermark in the background. It features a shield with a yellow eagle with wings spread, perched on a yellow circular emblem containing a red and white design. The shield is flanked by two red banners with white text: 'VERITAS' on the left and 'LUMEN' on the right. Below the shield is a red banner with the Latin phrase 'NOBIS'.

WHO	World Health Organization
NCD	Non-communicable Disease
MOH	Ministry of Health
GHS	Ghana Health Service
GES	Ghana Education Service
DHIMS 2	District Health Information Management System 2
RHNP	Regenerative Health and Nutrition Programme
LMICs	Low-and-Middle Income Countries
BM	Bekwai Municipal
HBM	Health Belief Model
SHS	Senior High School
FHH	Family Health History
CVD	Cardiovascular Diseases
FFQ	Food Frequency Questionnaire
IRB	Institutional Review Board
HPER	Health, Physical Education and Recreation
UCC	University of Cape Coast
CHPS	Community Health Planning Services
CCMA	Cape Coast Metropolitan Assembly
HPER	Health, Physical Education and Recreation
UCCIRB	University of Cape Coast Institutional Review Board
RA'S	Research Assistants
SPSS	Statistical Packages for the Social Science



## CHAPTER ONE

### INTRODUCTION

Non-Communicable Diseases (NCDs) have become increasingly common due to poor dietary practices, sedentary lifestyles, and reduced physical activity. Its negative impact began to manifest in the form of diabetes, hypertension, and obesity in the early 1990s, mostly in developing countries such as Ghana (Popkin et al., 2012). Epidemiological studies suggest that the continuous increase in NCDs could be a result of changes in nutritional partners (Raghavendra, 2014; Singh et al., 2014).

Advancements have been achieved in the pharmaceutical management and regulation of risk factors linked to NCDs (Azizi et al., 2009). Altering risk factors, such as engaging in regular physical exercise, adopting a balanced diet, refraining from tobacco smoking, and limiting alcohol consumption, have been recognised as a cost-effective and enduring method of managing the occurrence of NCDs (Azizi et al., 2009).

#### **Background to the Study**

Non-communicable diseases (NCDs) are long-lasting health conditions that progress gradually and are not caused by infectious agents. According to Daar et al. (2007), NCDs are conditions that develop slowly over time and are not linked to any specific pathogen. These diseases arise from various risk factors, which may be modifiable or not, such as genetic, metabolic, behavioural, and environmental influences. If not identified and managed promptly, NCDs often persist for extended periods, progress slowly, and can ultimately lead to death (Nelson et al., 2015). Sajwani et al. (2009) note that these diseases are closely associated with poor lifestyle choices, including

inadequate nutrition, lack of exercise, smoking, excessive alcohol consumption, and irregular sleep patterns. The World Health Organization (WHO) highlights four main modifiable risk factors for NCDs: tobacco use, unhealthy diets, physical inactivity, and excessive alcohol consumption, which contribute to biological and metabolic problems that increase the likelihood of developing these diseases (WHO, 2019).

Non-communicable diseases (NCDs) cover a range of health conditions, including cardiovascular diseases (CVDs) such as heart disease and stroke, peripheral vascular disease, various cancers, chronic respiratory conditions like chronic obstructive pulmonary disease (COPD) and asthma, diabetes, mental health disorders, vision and hearing impairments, bone and joint issues, and genetic disorders. Among these, cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are notably prevalent (WHO, 2013). Recently, obesity has received considerable attention and is now officially recognized as a distinct condition (Pollack, 2013).

Non-communicable diseases (NCDs) encompass a variety of conditions such as cardiovascular diseases (CVDs), including heart disease and stroke; peripheral vascular disease; different types of cancer; chronic respiratory conditions like chronic obstructive pulmonary disease (COPD) and asthma; diabetes; mental health disorders; vision and hearing impairments; bone and joint disorders; and genetic disorders. Cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are some of the most common NCDs (WHO, 2013). Recently, obesity has also gained significant attention and is now officially classified as a distinct condition (Pollack, 2013).

In 2015, 22% of adults worldwide aged 18 and above had high blood pressure, affecting 25% of men and 20% of women. Hypertension, or high blood pressure, is characterized by systolic and/or diastolic blood pressure readings of 140/90 mmHg or more (Anto et al., 2020; WHO, 2013). According to the World Health Organization (WHO, 2018), it is a significant risk factor for chronic kidney disease, coronary heart disease, and ischemic stroke. If not properly managed, hypertension can result in complications such as peripheral vascular disease, heart failure, kidney failure, vision problems, retinal hemorrhage, dementia, and stroke (WHO, 2018).

In 2016, 1.9 billion people worldwide were overweight, with 650 million classified as obese. Furthermore, 340 million children and teenagers aged 5-19 and 40 million children under 5 were impacted (Bentham et al., 2017). The rising rates of obesity and its link to various chronic diseases like hypertension, diabetes, and cancers highlight the urgent need for significant efforts to combat obesity (Lobstein & Jackson-Leach, 2016; Pollack, 2013; WHO, 2016). For adults, overweight is defined by a Body Mass Index (BMI) between 25.0 and 29.9, obesity by a BMI of 30.0 or higher, and severe obesity by a BMI of 40 or higher (Flegal et al., 2002).

Obesity rates are significantly higher in adults from America (29%), Europe (23%), and the Eastern Mediterranean (21%) compared to those in low-income countries (7%) (Bentham et al., 2017). This variation in obesity prevalence is closely linked to the accessibility of advanced food technology and processed foods. To address the rising obesity rates in Europe, the European Union has taken a strong stance against genetically modified foods. Since

obesity is largely preventable, a global goal for non-communicable diseases is to curb its increase (WHO, 2013).

Cancer is a prominent global cause of mortality, accounting for 8.2 million deaths globally, or around 22% of all fatalities linked to NCDs (Fatiregun et al., 2020). Projections indicate that the number of deaths caused by cancer will grow by about 70% in 2030, resulting in an estimated 13.1 million fatalities (Fatiregun et al., 2020). Cancer is characterised by the excessive and unregulated growth of abnormal cells in various parts of the body. Cancer cells, malignant cells, or tumour cells are synonymous terms for these abnormal cells. These cells can infiltrate and spread to healthy areas of the body, including the lungs, stomach, liver, and colon. According to Fatiregun et al. (2020), breast cancer is the primary cause of death from cancer annually. Consumption of carbonated drinks, sugar-sweetened beverages, and fruit compotes or sweetened fruit soups has been associated with a higher likelihood of developing cancer (Divisi et al., 2006). Epidemiological studies in humans indicate associations between diet and blood insulin levels, as well as the occurrence of cancer and cancer-related illnesses (Myers & Cantley, 2012).

Non-communicable diseases (NCDs) are the leading cause of death and illness globally, surpassing all other causes combined. According to the World Health Organization (WHO), NCDs account for 71% of all annual deaths worldwide. Cardiovascular diseases are the primary NCDs, responsible for 17.9 million deaths, which is 44% of all NCD deaths and 31% of total global deaths. Cancers cause 9 million deaths, making up 22% of NCD deaths and 16% of all deaths globally. Chronic respiratory diseases result in 3.8 million deaths, constituting 9% of NCD deaths and 7% of total deaths. Diabetes leads to 1.6



million deaths, accounting for 4% of NCD deaths and 3% of global deaths. In 2016, the likelihood of developing one of the four main NCDs was 18%, contributing to 75% of premature deaths among individuals aged 30-69 years. Men were more frequently affected (22%) compared to women (15%) (Global Health Estimates, 2016; WHO, 2018).

The probability of premature mortality due to NCD varies across different regions of the WHO. In comparison to the Americas, European, and Western Pacific regions (with rates of 15%, 17%, and 16% respectively), the likelihood of adults dying prematurely from NCD is higher in the African (22%), Eastern Mediterranean (24%), and South-East Asian (23%) regions. Additionally, the risk of premature mortality from NCD is lower for females than for males (WHO, 2018). The estimated mortality rates for NCDs in certain African countries are as follows: Central African Republic (26%), Chad (27%), Democratic Republic of Congo (28%), Nigeria (29%), Mali (30%), Gambia (34%), Cameroon (35%), Congo (35%), Equatorial Guinea (36%), Côte d'Ivoire (37%), Ethiopia (39%), Gabon (41%), Ghana (43%), Madagascar (43%), Libya (72%), Morocco (80%), and Egypt (84%). Ghana is among the African nations that have a higher death rate for NCDs (WHO, 2018).

The financial impact of NCDs cannot be over-emphasized. NCDs are associated with high health costs, which is a major contributor to public health expenditure, increasing government spending on the cost of services and treatment (Chaker et al., 2015). The global expenditure on health in 2015 amounted to US\$ 7.3 trillion, which accounted for almost 10% of the worldwide Gross Domestic Product [GDP] (WHO, 2018). The detrimental impact of NCDs on national economies is associated with a decrease in the availability of labour

and productivity, a decline in tax revenues, and diminishing returns on investments in human capital (WHO, 2018). The economic burden on health systems of member states of the European Union accounted for nearly €111 billion in 2015, and an additional cost of €100 billion for non-health care costs due to production losses (Chaker et al., 2015). The financial impact of the high cost of care for NCDs in low-and-middle-income countries (LMIC) is devastating as it further drives the poor into poverty (de Graft Aikins et al., 2012). Care for NCD is often financed via a combination of personal resources such as cash and savings and social networks (Mahal et al., 2010). Most low-income patients still cannot afford low-cost generic drugs for NCDs, which has a negative impact on patient health. As a result of rising medical costs, many families are forced to live below the poverty line, and those who seek treatment on a regular basis run the danger of slipping further into poverty as a result of their outlays (Krishnan et al., 2011).

Furthermore, Anarfi et al. (2016), in their studies in Ghana, indicated that Families of children with NCDs frequently bear high financial and social costs, including the expense of hospitalization. Most parents and carers already carry a heavy social and financial load without having to rely on friends and family for help (Anarfi et al., 2016). A study of individuals with diabetes residing in rural and urban areas found that a significant number of impoverished rural men and women rely heavily on financial support provided by both close and distant relatives. The reliance on financially unstable family members resulted in family conflicts and strained relationships, which, in some instances, resulted in family members being abandoned and socially isolated (MOH, 2012).



Non-communicable diseases (NCDs) place substantial financial strain on those affected and their older dependents. The premature deaths of individuals lead to reduced income, lost investment opportunities, and a general decline in family economic growth. NCDs contribute to disability, lower productivity, and discomfort, negatively impacting people's quality of life globally (Bhattacharjee et al., 2015; Chaker et al., 2015; Unwin & Alberti, 2006; WHO, 2010). The WHO (2010) reports that diseases like diabetes, stroke, and heart conditions impose an economic burden ranging from 1% to 5% of the Gross Domestic Product (GDP) annually. Studies in 23 low- and middle-income countries (LMICs) suggest that non-communicable diseases (NCDs) could result in an \$84 billion loss in economic output.

Both common mental health issues like anxiety and depression, as well as more severe conditions such as schizophrenia and bipolar disorder, are linked to various physical health problems, including cardiovascular diseases, diabetes, cancer, and respiratory conditions (Stein et al., 2019). Research shows that early experiences of common mental health problems increase the risk of heart disease later in life. Moreover, early stressors are associated with a higher likelihood of developing cardiovascular disease in adulthood (Von et al., 2009). Various mental disorders, including bipolar disorder, schizophrenia, depression, post-traumatic stress disorder, and cognitive impairments, are connected to diabetes (Stein et al., 2019; Vancampfort et al., 2016). Studies also indicate that individuals with diabetes often experience comorbid conditions such as depression, irritable bowel syndrome, binge eating disorder, and bulimia nervosa (Von et al., 2009). Additionally, depressive disorders, anxiety

disorders, and post-traumatic stress disorder have been linked to cancer (Nanton et al., 2018).

In an attempt to salvage the situation of the increasing prevalence of NCDs and its associated impacts on people, their families and their economy, which appealed to the international community to take action toward the global crisis of NCD through the launched “Package for essential NCD interventions for primary healthcare in low-resource settings to” improve fairness in interventions and to provide a prioritised set of cost-effective interventions (WHO, 2010). The international community has emphasised that NCDs represent a worldwide catastrophe and need a comprehensive global approach (Beaglehole et al., 2011). The World Health Organisation (WHO) has taken on a leadership role in this effort and, as a result, developed the WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020 (WHO, 2013). As a result, the WHO has launched the worldwide NCD Action Plan, which includes a set of voluntary global objectives to be met by 2025 and a global monitoring mechanism.

In Ghana, the prevalence of the top four non-communicable diseases (NCDs) is expected to increase due to population aging, urbanization, and unhealthy lifestyle choices. Hypertension is a major concern, affecting up to 48% of the population (Christian et al., 2021), while diabetes affects 9%. To mitigate the impact of NCDs on public health, the Ministry of Health (MOH) initiated the Regenerative Health and Nutrition Programme (RHNP) in 2006. As part of this effort, the MOH developed a health strategy that prioritizes the delivery of health and nutrition services and promotes environments that

support healthy living (Adu-Gyamfi et al., 2020). The RHNP strategy is essential for the prevention and treatment of NCDs.

The national health policy inspires the NCD Policy and aligns with the health objectives of the Ghana Shared Growth and Development Agenda 2010 (MOH, 2012). As of 2019, specific NCD prevalence rates in Ghana are as follows: obesity in females (3,843) is nearly three times higher than in males (1,360); hypertension affects 194,416 males and 431,900 females; diabetes mellitus impacts 60,290 males and 117,747 females, almost double the rate for males. The total prevalence of all cancer types is 30,626. Additionally, the prevalence of NCDs among adolescents is rising. In the 10 to 14 age group, obesity, diabetes, hypertension, and cancers are 310, 421, 368, and 697, respectively. In the 15 to 17 age group, these figures are 185, 790, 737, and 701, respectively. In the 18 to 19 age group, the numbers are 182, 2,298, 1,559, and 895, respectively. The data indicate that, except for obesity, the prevalence of NCDs increases with age. Hypertension is the most prevalent NCD, ranking 4th among causes of Outpatient Department (OPD) morbidity in 2016 (Bosu et al., 2021).

Research indicates that the rise in non-communicable diseases (NCDs) in developing nations like Ghana may be linked to rapid urbanization and industrialization (Kraja et al., 2016; Peykari et al., 2017). These changes often lead to alterations in lifestyle and shifts in disease patterns within the population (Raghavendra, 2014). The main NCDs have common origins, which may be classified into three categories: behavioural, physical, and biological risk factors. The behavioural risk factors include an unhealthy diet, tobacco use, insufficient physical activity, and alcohol consumption. The physical risk

factors consist of being overweight and obese (Chhaya, Devalia, & Kedia, 2015). However, a “nutrition transition” has been linked to an increase in the risk of obesity and NCDs (Singh et al., 2014), which can be explained by the fact that processed foods, fried foods, and unrefined carbohydrates have replaced more whole plant foods in people’s diets.

Studies suggest that the increase in non-communicable diseases (NCDs) in developing countries such as Ghana may be associated with fast-paced urbanization and industrialization (Kraja et al., 2016; Peykari et al., 2017). Such transformations frequently result in changes in lifestyle and shifts in disease patterns among the population (Raghavendra, 2014).

These strategies encourage burning off calories, consuming a variety of nutritious foods from all food groups, and reducing the intake of high-calorie, low-nutrient foods and beverages. The public is advised to limit alcoholic drinks and foods high in trans fats, cholesterol, added sugars, and salt, including processed foods. The Ministry of Health recommends eating fish at least twice a week, especially fatty types (MOH, 2012).

Every individual consumes food in order to sustain their existence. Individuals consume food based on acquired habits related to manners, meal and snack routines, approved food choices, food pairings, and serving sizes. The components of a meal vary across different cultures but often consist of staples like rice, protein sources like meat, meat alternatives like fish, and side dishes like vegetables. Multiple meal guidelines provide recommendations for food choices, serving sizes, and daily consumption. Nevertheless, an individual’s consumption is mostly influenced by personal tastes, habits, family practises, social context, and several other variables. An individuals dietary practises, or



the food they eat, have a role in the development of one or more NCDs. Elevated blood pressure is connected with adverse lifestyle habits, such as increased dietary salt consumption (Hussain et al., 2016). According to Myers and Cantley (2012), limiting the intake of carbohydrates may decelerate the proliferation of cancer cells in patients. In other words, decreasing caloric consumption hinders the progression of cancer.

Furthermore, studies from the United States and Europe indicate that regularly consuming large amounts of red meat, especially processed types like sausages and cold cuts, is linked to a higher risk of overall mortality, cardiovascular diseases, colorectal cancer, and type 2 diabetes in both men and women (Richi et al., 2015). On the other hand, research from the United Kingdom suggests that eating bread, fibre, and morning cereals is associated with a lower risk of non-communicable diseases (NCDs). The same study also found that red meat, processed meat, and alcohol consumption are associated with an increased risk of colorectal cancer (Bradbury et al., 2020).

In addition, several factors linked to the rise of non-communicable diseases (NCDs) can be managed to lessen their adverse effects. These factors encompass the decline in individuals' quality of life, as well as the psychological, social, and financial challenges faced by families, caregivers, and healthcare professionals (de Graft et al., 2012; WHO, 2018). Adopting health measures that promote a healthy lifestyle—such as managing stress, quitting smoking, reducing alcohol consumption, increasing fruit and vegetable intake, enhancing physical activity, and managing weight—is crucial for mitigating the impact of NCDs and advancing health equity (Ruano et al., 2015). The global burden of NCDs constitutes a public health emergency in slow

motion, as stated by former UN Secretary-General Ban Ki-moon (WHO, 2019). It is, therefore, of essence to investigate the dietary practices of adolescents and their risk of the development of NCDs in the near future.

### **Statement of the Problem**

Unhealthy eating habits and sedentary lifestyles are significant worldwide contributors to the onset and fatality of chronic diseases. These habits include consuming too much salt, eating foods high in saturated and trans fats, and not getting enough fruits and vegetables in one's diet. Despite being recognized as a crucial issues in global health, many developing nations still have average salt consumption levels above recommended thresholds. Chronic diseases were responsible for about three-quarters of all deaths globally in 2016, with the majority occurring in less economically developed countries.

Many of these deaths could be avoided with effective healthcare measures and by shaping public policies beyond the health sector to tackle common risk factors and the social and environmental causes of non-communicable diseases (NCDs) (Global Health Estimates, 2016). The 2030 Agenda for Sustainable Development Goals (SDGs), established at the UN Summit on Sustainable Development in September 2015, includes goals for NCDs that align with this strategy. This approach also aligns with the World Health Organization's 13th General Programme of Work for 2019 (WHO, 2019). Specifically, SDG 3, which focuses on "Good Health and Well-Being," calls on nations to ensure healthy lives and promote well-being for all ages. SDG 3.4 aims to reduce premature deaths from NCDs by one-third by 2030 through prevention and treatment, emphasizing the importance of healthy



dietary habits in preventing these diseases (Adu-Gyamfi et al., 2020; Frieden et al., 2020).

The prevalence of NCDs continues to increase steadily over the years. In 2019, among the regions in Ghana, the Greater Accra region had the highest prevalence of 21.44%, followed by the Ashanti Region at 19.44%. However, the prevalence of cancer in the Ashanti Region is 54% of the total prevalence in the country, which draws attention to the region. Data from the District Health Information Management system revealed that NCDs have increased in three years, from 2016 to 2019; obesity has increased from 341 to 1,195; hypertension from 103,845 to 107,139; stroke from 1,609 to 3,579; diabetes mellitus from 33,478 to 38,667 and cancers from 1,206 to 16,554 (DHIMS, 2). Among the less urbanized municipalities and districts having similar socio-demographic characteristics in the region, Bekwai is the municipality that has a high prevalence of NCDs (DHIMS, 2).

Despite the increasing prevalence of non-communicable diseases (NCDs) in the country, maintaining a healthy lifestyle and adopting good eating habits are rarely observed. Tachi et al. (2020) found that roughly 25% of older Ghanaian adults had insufficient fruit and vegetable intake and consumed alcohol. On the other hand, Nelson et al. (2015) discovered that around 48% and 70.9% of participants consumed fruits and vegetables, respectively, at least three times a week.

Several risk factors can be mitigated or removed, including tobacco and alcohol consumption, high blood pressure, elevated lipid levels, obesity, low intake of fruits and vegetables, insufficient physical activity, and high blood glucose levels. The presence of these factors substantially heightens the risk of

cardiovascular diseases and mortality (Nelson et al., 2015). In low- and middle-income countries (LMICs), these risk factors are often more prevalent in urban settings and are increasing in frequency (Unwin & Alberti, 2006). Tobacco and alcohol use are also common among adolescents. Wilson et al. (2005) report that 23% of high school students smoke, which negatively impacts their ability to maintain a healthy diet and exercise regularly.

Furthermore, the regular intake of fast-food meals shown a substantial and direct correlation with the frequency of smoking (Larson et al., 2007). In Brazil, research has shown that over 50% of teenagers are physically inactive (Barbosa et al., 2014). Studies conducted in different contexts have shown that the prevalence of excessive consumption of sugary foods is 37%, whereas the rates of poor intake of fruits and vegetables are 31% and 33%, respectively (Barbosa et al., 2014). According to Asante and Kugbey (2019), 12.6 percent of Ghanaian teenagers (those aged 11 to 19) use alcohol. In sub-Saharan Africa, over 70% of all adolescents had insufficient fruit consumption (Berhane, 2020). These habits, which are commonly formed in early life, persist throughout adulthood and have far-reaching consequences for health (Barbosa, 2014). Among teenagers, in 2019, the incidence of NCDs was highest for hypertension (3,456), followed by obesity (677), diabetes (2,717), and cancer (2,293) (DHIMS, 2).

Various studies conducted across the globe have assessed the impact of different aspects of diet on the development of NCDs (Mirmiran et al., 2007; Sajwani et al., 2009; Schmidt et al., 2011). Other studies have focused on other aspects of nutrition and its role in health (Alavi et al., 2013; Schuit et al., 2002). Among the few studies on dietary practice and nutrition among adolescents and

children in Ghana are mostly focused only on nutrition with no focus on NCDs (Aganah, 2014; Amos et al., 2012; Kumah et al., 2015). Several childhood risk factors track into adulthood (MOH, 2012), and there is a need to include youth and adolescents in these studies as good nutrition has been identified to play a major role in the prevention of several chronic diseases, including obesity, coronary heart disease, stroke, type 2 diabetes, and certain types of cancers (Amos et al., 2012).

### **Purpose of the Study**

The study examined dietary practices and associated non-communicable disease risk among in-school adolescents in Bekwai Municipal.

### **Research Questions**

These research questions guided the study:

1. What is the knowledge level of adolescents in Bekwai Municipality on NCDs?
2. What is the nature of dietary practices of adolescents?
3. What is the relationship between gender and hypertension, diabetes, cancer and overweight/obesity risk among adolescents in Bekwai Municipality?
4. What is the extent to which boys and girls differ in their dietary practices among adolescents in Bekwai Municipality?
5. What is the extent to which dietary practices of adolescents influence their development of hypertension, diabetes, cancer and overweight/obesity among adolescents in Bekwai Municipality?
6. What is the extent to which socio-demographic variables of adolescents influence their development of hypertension, diabetes, cancer and overweight/obesity among adolescents in Bekwai Municipality?

### Significance of the Study

The significance of the study was to establish the dietary practices of adolescents and to use the findings to influence health promotion and policy formulation toward adolescents. Understanding what adolescents are eating can help the Bekwai Municipal in designing targeted health promotion campaigns to encourage healthier eating habits. The findings from the study can guide the municipality to develop health policies specifically geared towards adolescents. This can include guidelines for schools, parents, and communities to support healthier dietary choices among adolescents. Also, by identifying dietary practices in adolescents that predict the development of NCDs in the future, the study can contribute to preventive measures. This knowledge can help the Ghana Health Service lead interventions and educational programs aimed at reducing the risk factors associated with NCDs.

Furthermore, understanding the dietary habits of adolescents can provide insights into how to practically modify poor dietary practices in the Ghana Education Service institutions. This can involve educational programs, counselling, and interventions that target changing behaviour for the better. The study can assist healthcare systems in making projections about the future burden of NCDs. This information is vital for planning healthcare resources, infrastructure, and services to adequately address the growing health needs related to NCDs.

Similarly, by identifying specific foods that should be promoted or discouraged among adolescents, the study can guide efforts by GES, MOH and GHS to improve the availability and accessibility of healthier food options while discouraging the consumption of unhealthy foods. Additionally,



recognizing which gender is at higher risk of developing NCDs among adolescents allows for targeted health interventions. This gender-specific approach can be more effective in addressing the unique health needs of different groups. Also, to achieve SDG 3 to promote good health and well-being, tailored interventions aimed at controlling risk factors such as poor dietary practices underpinning the development of NCDs to reduce premature deaths need to be established using data from this study. Finally, the study aims to add to the existing body of knowledge on adolescent dietary practices. This helps fill gaps in the literature and can serve as a valuable resource for future researchers, policymakers, and healthcare professionals.

### **Delimitation**

The study was delimited to adolescents, males, and females aged between 14 to 20 years. The study area was delimited to four (4) schools, which were randomly selected in the Bekwai Municipal. The sub-themes that were considered were age, diet, dietary practise, knowledge of dietary practices, and body mass index. NCDs will be delimited to obesity, hypertension, diabetes, and cancers. Also, the study is delimited to questionnaires: Correlation and linear regression will be used to analyse data.

### **Limitations**

There is a probability that the respondent might not have been able to recall accurately the frequency of consumption of certain diets over a period. The quantity of certain food consumed was not evaluated, which could affect the risk of adolescents developing NCDs, and therefore, the association between dietary practices and NCDs cannot be concluded. Also, the study was conducted among In-school adolescents and cannot be general to the whole population of

adolescents in Bekwai Municipality. The double-track system made it difficult to get the full population of the schools to draw samples. Getting the actual population could have affected the result.

### **Definition of Terms**

Adolescent – A teenager, typically between the ages of 10 and 20, who is transitioning from childhood to adulthood and has significant control over their dietary choices.

Diet – The sum of food that a person consumes for nutrients.

Dietary Practice – Indicators of healthy or poor eating habits include any acts or behaviours that may be observed.

Non-communicable Diseases – These are diseases that develop gradually over some time in the absence of infection, and they include hypertension, diabetes, cancer and obesity.

### **Organisation of the Study**

The study is divided into five chapters. Chapter one dealt with the introduction of the study. This includes background to the study, statement of the problem, purpose of the study, research questions and significance of the study, delimitations, limitations, and definition of terms. Chapter two focused on the review of related literature, theoretical framework, conceptual perspectives, and review of articles related to the research questions. Chapter three was the method, which covered research design, study area, population, sampling procedure, data collection instrument, data collection procedures, and data processing and analysis. Chapter four concentrated on the analysis and presentation of results and discussion. Chapter five dealt with the summary,



main findings, conclusions, recommendations, and suggestions for further research.



## CHAPTER TWO

### LITERATURE REVIEW

Literature relating to the study was analysed and presented in order to provide a theoretical basis for the study. Literature on diet, dietary practices, and factors associated with NCDs was reviewed. Sources of information include journals, textbooks, internet and previous research literature within the scope of the study. The literature review covered the following:

1. Factors associated with NCDs
2. Prevalence of NCDs Globally and in Ghana,
3. Knowledge Level on NCDs,
4. Dietary Practices among Adolescents and various Populations,
5. Dietary Practices and Development of Hypertension,
6. Dietary Practices and Development of Some Major NCDs,
7. Theoretical Framework
8. Conceptual Framework
9. Summary

#### **Factors Associated with NCDs**

Non-communicable diseases (NCDs) are often chronic conditions that persist over time and develop gradually. These diseases are influenced by both changeable and unchangeable risk factors, such as genetics, lifestyle, metabolism, and environmental conditions. While previously associated primarily with high-income nations, NCDs now represent the most significant health challenge in low- and middle-income countries. The primary categories of NCDs include cardiovascular diseases, cancers, chronic respiratory illnesses, and diabetes (Allotey, 2011). Additionally, lifestyle factors and behaviours play

a crucial role in the onset of NCDs, and modifying these behaviours can help reduce the risk (GBD, 2016). Key behavioural risk factors for NCDs include smoking, excessive alcohol consumption, lack of physical activity, and poor dietary habits, such as low fruit and vegetable intake, high saturated fat consumption, and excessive salt intake (Popkin et al., 2012).

Several lifestyle factors significantly impact global mortality rates. Annually, tobacco use results in over 7.2 million fatalities, including those affected by secondhand smoke. High sodium consumption is associated with 4.1 million deaths per year. Alcohol-related deaths reach 3.3 million, with non-communicable diseases responsible for about half of these. Lack of adequate exercise contributes to approximately 1.6 million deaths yearly (GBD, 2016).

Diet significantly affects the risk of non-communicable diseases (NCDs), and there has been a noticeable rise in the consumption of ultra-processed foods, which has disrupted the balance of nutrients. Data from the U.K. National Diet and Nutrition Survey revealed an increase in ultra-processed food intake from 2008 to 2014. This change has led to higher levels of carbohydrates, free sugars, total fats, saturated fats, and salt, while protein, fibre, and potassium intake have decreased. The study's authors suggested that reducing ultra-processed food consumption could enhance diet quality and lower NCD risk (Rauber et al., 2018). Moreover, greater consumption of processed foods, dining out, sugary drinks, and a more sedentary lifestyle—with less physical activity—have been associated with the onset of diabetes, hypertension, and obesity (Popkin et al., 2012).

Higher consumption of red meat, particularly processed types, is linked to increased mortality rates. Individuals who consume the most processed meat

face a 23% higher risk of death, while those with high overall red meat intake have a 29% greater risk compared to those who eat the least. Multiple meta-analyses have found that eating 50g to 100g of red meat daily—whether processed or unprocessed—is associated with a higher risk of chronic conditions such as diabetes, coronary heart disease, colorectal cancer, and stroke (Chan et al., 2011; Kaluza et al., 2012; Micha et al., 2012). Furthermore, research in rural sub-Saharan Africa indicates that adults over 50 who engage in risky behaviours like smoking and alcohol consumption have an elevated risk of non-communicable diseases (Negin et al., 2011).

Many non-communicable diseases (NCDs) are preventable, and addressing this issue is crucial because there are various strategies available to reduce their impact (Action Plan for the Prevention and Control of NCDs in the WHO European Region, 2016). To maintain energy balance and a healthy weight, it is recommended to lower total fat intake, especially saturated fats, and to avoid trans-fatty acids. Incorporating legumes, whole grains, fruits, vegetables, and nuts into your diet is also beneficial. The WHO advises limiting free sugar intake, reducing overall salt consumption, and using iodized salt (Waxman, 2004).

### **Prevalence of NCDs Globally and in Ghana**

Non-communicable illnesses are an escalating worldwide issue, constituting a substantial proportion of yearly fatalities, resulting in the demise of more than 35 million individuals annually. Chronic illnesses are the primary cause of death and illness globally, exceeding all other causes combined. In 2016, they accounted for 71% of all global fatalities, according to Global Health Estimates. Over 80% of deaths in developing countries may be attributed to

NCDs (Eyles et al., 2012), with the vast majority of these deaths happening in those under the age of 60. NCDs have been on the rise, especially in low-income regions like sub-Saharan Africa. This adds stress to already overburdened healthcare systems (Heneghan et al., 2013; Nyirenda, 2016). There is a great deal of demand on already-fragile health care systems due to the prevalence of infectious and noncommunicable diseases (Waswa et al., 2018). People's physical and emotional health, as well as the financial stability of their families, are severely impacted by NCDs. NCDs have far-reaching effects on a country's healthcare system and economy, affecting much more than just the individuals and families that suffer from them.

The effects of NCDs include higher direct healthcare expenditures for people, lower income and prospects, and higher healthcare spending. Because of this, there are fewer workers available, tax revenue is reduced, and the advantages of investing in human talents are diminished. These outcomes have a significant impact on national economies. Despite these challenges, the most common NCDs—obesity, diabetes, hypertension, and cancer—continue to be chronic problems (WHO, 2018).

According to Eyles et al. (2012), noncommunicable diseases (NCDs) may be to blame for over 80% of fatalities in developing nations, with those under the age of 60 accounting for the great bulk of these deaths. The prevalence of NCDs has increased, particularly in low-income areas like sub-Saharan Africa. This further strains the already overworked healthcare systems (Heneghan et al., 2013; Nyirenda, 2016). Weak health systems are being severely strained by the prevalence of non-communicable and infectious diseases (Waswa et al., 2018). NCDs place a significant financial burden on



families and individuals as well as have a negative impact on people's physical and mental wellbeing.

The costs linked to non-communicable diseases (NCDs) affect not only the individuals and families who are directly affected but also the nation's whole healthcare system and economy as a whole. The effects of NCDs include higher direct healthcare expenditures for people, lower income and prospects, and higher healthcare spending. Because of this, there are fewer workers available, tax revenue is reduced, and the advantages of investing in human talents are diminished. These outcomes have a significant impact on national economies. Despite these challenges, the most common NCDs—obesity, diabetes, hypertension, and cancer—continue to be chronic problems (WHO, 2018).

According to statistics, women in West Africa had a greater prevalence of overweight and obesity (48.7%), with abdominal obesity being 14 times more common among women. The prevalence of underweight is higher in the 18–24 age range, and it rises with age and wealth (Turé et al., 2021). Overweight and obesity rates in Ghana are 25.4% and 17.1%, respectively, with greater rates seen in urban areas and among women. Approximately 45.6% of adult diabetics are fat or overweight. Overweight and obesity rates have been growing gradually from 1998 to 2016, and this trend is correlated with regional patterns and degrees of urbanisation (Ofori-Asenso et al., 2016). Overweight and obesity are more common in West African women overall, with an estimated 48.7% of them being overweight or obese.

In addition, women are 14 times more likely than males to be obese in the abdomen. Underweight people are more likely to be between the ages of 18 and 24, and this tendency tends to rise with affluence and age (Turé et al., 2021).

Overweight and obesity prevalence in Ghana is 25.4% and 17.1%, respectively, with greater rates seen in urban areas and among women. Adults with diabetes who are overweight or obese make up 45.6% of the population. Regional trends and urbanisation levels are related, as evidenced by the steady increase in the prevalence of overweight and obesity from 1998 to 2016 (Ofori-Asenso et al., 2016).

Roughly 10.5% of people between the ages of 20 and 79 are predicted to have diabetes in 2021. Globally, the number of people with diabetes is expected to increase from 536.6 million to 783.2 million by 2045, according to projections made by Rosengren and Dikaiou (2023). From 108 million to 422 million people worldwide in 2014, the prevalence of diabetes grew by nearly four times. 2014 saw high blood glucose levels in more than 9% of people worldwide. According to Abarca-Gómez et al. (2017), prevalence rates ranged from 7% to 9% throughout the Eastern Mediterranean Region, which had the highest rate at 14%. According to the research done by Ogurtsova et al. (2017), 3.8% of adult Africans have diabetes. Adult Ghanaians have a diabetes prevalence of 6.46, which is higher than the average for the entire continent of Africa. According to Asamoah-Boaheng et al. (2019), there is a significant risk of developing diabetes in those over 40 who have sedentary lifestyles and have a family history of the disease.

According to the World Health Organisation (WHO), non-communicable diseases (NCDs) account for around 22% of fatalities worldwide, with cancer being one of the leading causes of mortality in this category. The most common malignancies that cause fatalities each year are those of the stomach, liver, colon, lung, and breast. According to WHO

estimates, there will be 13.1 million cancer deaths by 2030, a substantial 70% increase from 2019 levels. Furthermore, research by Sersar et al. (2023) found that among Algerian adolescents aged 10-19, the prevalence of non-communicable diseases (NCDs) is 8.6%. Of the 1,222 participants in the study, 56.1% were female.

Mortality rates for non-communicable diseases (NCDs) have been assessed in various African countries. The poverty rates in these countries are as follows: Central African Republic at 26%, Chad at 27%, Democratic Republic of Congo at 28%, Nigeria at 29%, Mali at 30%, Gambia at 34%, Cameroon at 35%, Congo at 35%, Equatorial Guinea at 36%, Ivory Coast at 37%, Ethiopia at 39%, Gabon at 41%, Ghana at 43%, Madagascar at 43%, Libya at 72%, Morocco at 80%, and Egypt at 84%. Of these, Ghana has a notably high NCD mortality rate compared to other African countries based on total fatalities (WHO, 2018).

In 2019, the DHIMS 2 system in Ghana identified several non-communicable diseases (NCDs), including hypertension, diabetes mellitus, stroke, malignancies, and obesity. At that time, obesity was approximately three times more prevalent among females compared to males, with reported cases ranging from 1,360 to 3,843. There were also notable gender differences in the prevalence of various NCDs: hypertension affected 194,416 males and 431,900 females; stroke affected 11,773 males and 11,301 females; and diabetes mellitus impacted 60,290 males and 117,747 females. The overall incidence of cancer was 30,626, with breast cancer accounting for 2,485 cases in females and none in males. Cervical cancer had 1,112 cases, while prostate cancer had 6,407. Hepatic carcinoma was reported in 445 males and 192 females, and lymphoma

affected 1,429 males and 835 females. Additionally, 4,451 males and 13,270 females were diagnosed with other types of cancers (WHO, 2018).

### **Knowledge Level of NCDs**

A study conducted in Amsterdam, Netherlands, found that the Ghanaian participants had a generally poor understanding of hypertension (Agyemang, 2013). Similarly, research in Sri Lanka with teenagers aged 17-19 attending state schools showed that only 43% had sufficient knowledge about non-communicable diseases (NCDs), and their understanding of conditions like diabetes and hypertension was notably inadequate (Gamage & Jayawardana, 2018). In contrast, a study in Pakistan assessed the knowledge and practices related to healthy lifestyles and nutrition among medical and non-medical students. This study revealed that medical students had a better grasp of health-related topics, including food, lifestyle, and exercise (Sajwani et al., 2009).

Separate research conducted by Irani et al. (2022) examined the amount of awareness about NCDs, knowledge about NCD prevention, and the desire of women to adopt a healthy lifestyle. The study revealed that the general level of NCD awareness among the participants was quite high, with 61% demonstrating awareness.

The research titled “Adequate Knowledge of Non-Communicable Diseases (NCDs) and Associated Factors Among Adult Residents of North Shewa Zone, Oromia Region, Ethiopia,” used a mixed-method approach to evaluate participants’ knowledge about NCDs. The results indicated a high rate of inadequate knowledge among the participants. The study also found that owning a television and having a family member with an NCD were key factors linked to a better understanding of NCDs (Legesse et al., 2022). Another study



by Ashida and Schafer (2015) explored the psychosocial factors influencing the sharing of Family Health History (FHH). It discovered that 41% of participants who obtained their FHH from a parent were more likely to share it with their family. Additionally, research in Dhaka, Bangladesh, involving 183 urban school students, showed that 57.9% had a high understanding of NCDs, 41.5% had moderate knowledge, and only 0.5% had low knowledge. Knowledge levels were significantly related to factors such as gender, age, education, parents' occupations, family income, physical activity, smoking, and alcohol consumption (Islam et al., 2019).

Agaba and Muhumuza (2021) found that half of their study participants had a strong grasp of the risk factors for non-communicable diseases (NCDs). This level of awareness was largely due to public education campaigns across various media, including radio, television, newspapers, and health camps focused on preventive measures. Similarly, a study in Saudi Arabia showed that 85% of patients turned to social media to obtain health information and improve their understanding of NCDs (Marar et al., 2019).

### **Dietary Practices among Adults and Various Populations**

The development of unhealthy eating habits during adolescence is shaped by a variety of factors, including the desire for independence and social approval, increased mobility, time spent in school or work, concerns about appearance, marketing tactics, cultural and social influences, the wide range of food options, parental guidance, gender, self-image, and personality traits. Understanding these factors can help individuals make better-informed dietary choices (Amos et al., 2012). Rodriguez (2009) defines eating habits as



encompassing the reasons for food consumption, particular food selections, the social aspects of eating, and the methods of acquiring and managing food.

Consumption is essential for survival, and people typically adhere to specific eating habits, dietary preferences, portion sizes, and acceptable foods.

A typical meal often includes staples like rice, along with meat or alternatives such as fish or beans, and side dishes like vegetables. The exact components of a meal can vary based on cultural practices. Although dietary guidelines provide advice on food choices and portion sizes, individual food preferences are largely influenced by personal tastes, habits, family traditions, social factors, and other elements (Rodriguez, 2009). In Ethiopia, there is a widespread belief that unhealthy diets are common, partly due to the limited availability of fruits and vegetables and the notion that such foods are reserved for the sick or those in poor health (Kassa & Grace, 2018). Moreover, the tendency for individuals to have a higher body fat percentage and regularly consume animal fats to achieve a larger abdomen contributes to unhealthy eating habits (Kassa & Grace, 2018).

A comprehensive study was conducted to explore the relationship between socioeconomic status and behavioural risk factors for non-communicable diseases (NCDs) in low- and lower-middle-income countries. The results revealed that individuals from lower socioeconomic backgrounds had significantly higher rates of tobacco and alcohol use compared to those from higher socioeconomic backgrounds. Furthermore, people in lower socioeconomic groups consumed fewer vegetables, fruits, fibre, and fish, while those in higher socioeconomic groups had higher intakes of fats, salt, and processed foods (Allen et al., 2017). Despite the continued presence of vegetarianism, dietary changes in countries such as India are linked to rising

rates of NCDs and obesity. To address this problem, experts suggest a "global epidemiology" approach, which involves studying Asian Indians in regions where preventive dietary practices are prevalent, to help develop effective dietary strategies for tackling obesity and NCDs in India (Singh et al., 2014).

The eating habits of teenagers play a significant role in influencing their dietary practices as adults. A study on adolescent eating behaviours found that most participants regularly ate cereals and a considerable amount of bread. Additionally, most reported consuming two to three servings of eggs and meat each week, while only a few had these foods just once per week. Furthermore, a significant proportion of participants stated they ate at least one serving of fruits and vegetables daily (Alavi et al., 2013). In Pakistan, approximately 48.8% of participants reported having three meals a day, whereas the remainder either skipped breakfast or lunch (Sajwani et al., 2009).

Additionally, a study conducted in Shandong Province, China, found that urban residents had better knowledge, attitudes, and practices regarding dietary salt consumption compared to those in rural areas. Despite their place of residence, a large number of participants (80%) preferred lower sodium diets and favoured using non-sodium condiments like green onion, garlic, and vinegar (Zhang et al., 2013). Another investigation by Sajwani et al. (2009) identified notable differences in dietary habits between boys and girls.

In St. Vincent and the Grenadines, a study on dietary practices revealed that 50% of adult participants reported alcohol consumption, and over 50% of tobacco users smoked regularly. The majority of the participants were male. While most included fruits and vegetables in their diets, there were variations in consumption levels, with servings ranging from 1.7 to 3.3 per week (MOH,

2015). Additionally, research on teenagers in Tehran showed that their diets were predominantly made up of unhealthy snacks such as whole-grain biscuits, sausage sandwiches, Coca-Cola, crisps, maize balls, creamy wafers, cakes, chocolate, and toffee (Mirmiran et al., 2007).

On the other hand, research conducted in Bahia, Brazil, focusing on the energy and nutritional intake of school-aged children from five to 19 years old, found high consumption of sugar, salt, and saturated fats in their diets (Menezes et al., 2023). In Sri Lanka, a survey of teenagers in public schools within a specific educational district showed that only a small percentage of students reported consuming adequate amounts of vegetables (32%) and fruits (24%). The prevalence of smoking was 2.8%, with alcohol use reported at 11.5%. Notably, smoking was exclusive to males, and 83.5% of alcohol users were also male, with the average age of first alcohol use being 16 years. Additionally, the study indicated that 52.2% of females had better dietary practices compared to 32.8% of males, based on criteria such as lower salt intake, preference for natural fruit beverages, and daily vegetable consumption (Gamage & Jayawardana, 2018).

A study conducted among a specific group of urban students in Dhaka, Bangladesh, revealed that 6.0% of the participants frequently smoked and used alcohol. Furthermore, 88.5% of these students consumed fast food, and 66.7% included red meat in their diets (Islam et al., 2019). Another study in Ghana focused on dietary choices among teenagers in the Central Region and found that 49.9% (654) of adolescents followed healthy eating habits (Hormenu, 2022). Additionally, research by Agaba and Muhumuza (2021) on adolescent knowledge and practices related to non-communicable disease risk factors at

Kabwohe Health Centre showed that 62.4% of participants ate fruits weekly—either once, twice, or thrice a week—while 35 (37.6%) consumed them more frequently, up to daily. Regarding vegetable consumption, 60% of the participants ate fruits once, twice, or three times a week, while 40% did so regularly. Of the total participants, 64.3% consumed fruits less frequently, and 35.8% ate sugary foods more often, several times a week.

Hormenu (2022) found that nearly half (49.9%) of teenagers in school maintain good eating habits. Despite this, a large proportion of participants—93% and 90%—reported consuming more fizzy drinks and sweets. Gender differences were notable, with 54% of girls adopting healthier eating habits compared to 46% of boys, suggesting that girls are more likely to incorporate fruits and vegetables into their diets. Additionally, a study in Davao City, Philippines, investigated the link between vegetable consumption and BMI among teenagers in both urban and rural schools, revealing that adolescents generally consumed a wider variety of vegetables (Calumba et al., 2023).

Additionally, a cross-sectional study conducted in Brazil analyzed a nationally representative group of adolescents aged 11-19. It found that boys living only with their mothers, as well as girls, were more likely to engage in unhealthy eating habits, including the consumption of ultra-processed foods, sweets, soft drinks, and snacks. Conversely, single-parent households showed lower adherence to healthy dietary patterns (de Souza et al., 2023). In Ghana, a significant proportion of both boys and girls, specifically 54% and 58%, respectively, reported consuming carbonated soft drinks daily or more frequently (Curbing, 2015).



An in-depth analysis of fruit and vegetable consumption among teenagers aged 10 to 19 in Arab countries revealed that only a small percentage (between 10% and 29%) met the recommended five servings per day. Generally, fruit intake was lower than vegetable intake, with fruit consumption ranging from 4.2% to 53.7% and vegetable consumption from 7.8% to 66.3%. These findings raise concerns about the increased risk of non-communicable diseases and malnutrition in this demographic (Zeidan et al., 2023). In Canada, a 2015 study found that teenagers aged 13 to 18 obtained a substantial portion of their daily calories from ultra-processed foods, with boys consuming 53% and girls approximately 50% of their calories from these sources (Amson et al., 2023).

A study in Iraq revealed that men are more likely than women to consume fast food, sugary drinks, and energy drinks (Musaiger et al., 2014). Similarly, research in China with children aged 7 to 12 found that boys preferred meats, processed meats, quick meals, dairy products, eggs, snacks, and starchy foods more than girls (Qiu et al., 2023). According to Wrottesley et al. (2023), women were less physically active, more likely to skip breakfast, and had a preference for high-fat and high-sugar meals. An investigation in India found that self-reported non-communicable diseases (NCDs) had a total prevalence of 55 per 1,000 individuals, with a higher prevalence among women (63 per 1,000) compared to men (47 per 1,000), indicating a significant impact of NCDs on women (Patra & Bhise, 2016). Research conducted in India revealed that women exhibited elevated rates of self-reported NCDs in comparison to males, hence emphasising the presence of socio-economic disparities in the prevalence of NCDs (Sharma et al., 2020).



### **Influence of Socio-Demographic Variables on Development of NCDs**

Religion influences more than just the rituals performed in places of worship; it profoundly affects individuals' lifestyles, moral values, and ethical decisions. Its impact can be seen across various societal aspects, including attitudes. For example, a study on seeking medical care for children's non-communicable diseases (NCDs) found that a considerable proportion of caregivers who identified as Charismatic/Pentecostal Christians (53.1%) and Protestants (Anglican and Presbyterian) (47.65%) preferred prayer camps. Generally, Christian caregivers were more inclined to seek treatment from prayer camps compared to their Muslim counterparts. Interestingly, the belief that hospitals are ineffective in treating chronic diseases did not significantly influence the decision to choose prayer camps for care (Yawson et al., 2016). In an exploratory study in Uganda, it was discovered that Muslims, Pentecostals, and Seventh-day Adventists were more likely to self-report NCDs than Catholics.

The heightened susceptibility to non-communicable diseases (NCDs) observed among various religious communities is attributed to the sedentary nature of commercial jobs, such as shop-keeping, which are more prevalent among Muslims throughout their lives (Wandera et al., 2015). Research conducted in Thailand revealed that Muslims had a higher tendency to consume packaged snacks and deep-fried foods regularly, and they faced difficulties in managing hypercholesterolemia. These variations in dietary patterns and health risks resulted in differences in the prevalence of NCD risk factors between Muslims and non-Muslims (Wichaidit et al., 2014).

Agaba and Muhumuza (2021) conducted a study titled “Knowledge and Practices of Adolescents Regarding Risk Factors for Non-Communicable Diseases (NCDs) at Kabwohe Health Centre,” which identified a notable link between education levels and awareness of NCD risk factors. In a separate study in South Africa, Makamu-Beteck et al. (2022) investigated how an exercise intervention affected women’s understanding and awareness of modifiable NCD risk factors in a setting with limited resources. This research highlighted that cultural traditions played a significant role in shaping participants’ perceptions of these risk factors.

Furthermore, research into the impact of socioeconomic factors on obesity among urban Ghanaian women revealed that those with higher levels of education, income, managerial roles, and wealth were more prone to obesity (Amugsi & Dimbuene, 2023). A study conducted from May to July 2021 on adult patients identified a notable prevalence of non-communicable diseases (NCDs) among women, older adults, those who are overweight or obese, and individuals who drink alcohol. This research emphasized that age, gender, body mass index (BMI), alcohol consumption, and family history were significant factors influencing the occurrence of NCDs (Boakye et al., 2023).

A thorough cross-sectional study was carried out in Tamale Metropolis, Ghana, to assess the dietary habits, nutritional status, and associated factors among adolescents. The findings revealed that more than 25% of the adolescents were classified as underweight. This underweight condition was associated with poor dietary practices, average socio-economic status, and parents’ unemployment (Abdulai et al., 2023). Furthermore, Kassa and Grace

(2018) discovered a correlation between increased wealth and the occurrence of non-communicable diseases (NCDs) in Ethiopia.

### **Dietary Practices and Development of Some Major NCDs**

Poor eating habits can elevate the risk of conditions like hypertension, obesity, diabetes, and cancer (Chhaya et al., 2015). Research on Algerian teenagers aged 10 to 19 revealed low consumption of dairy, fruits, and vegetables, coupled with a high intake of fatty and sugary foods. Moreover, Sersar et al. (2023) highlighted that family history, active smoking, and passive smoking are risk factors for non-communicable diseases (NCDs). A study of Brazilian teenagers found that 85.8% had unhealthy diets, and 23.9% were overweight (Cureau et al., 2014). In Nepalese teenagers, boys were found to be more susceptible to risk factors such as smoking, drinking, inadequate fruit and vegetable intake, lack of physical activity, and obesity. The research discovered that certain demographic groups, including specific genders, age brackets, and education levels, showed a greater prevalence of risk factors. Specifically, males, particularly those aged 17 and in seventh grade, were more prone to having multiple risk factors. On the other hand, the rates of overweight and obesity were significantly lower among students in higher grades (Dhungana et al., 2019).

Moreover, a retrospective study in China investigated the likelihood of hypertension in adolescents by tracking their BMI changes from childhood. The results indicated that a higher BMI during adolescence is associated with an increased risk of developing hypertension. This highlights the significance of maintaining a healthy weight from an early age to reduce the risk of hypertension later in life (Ge et al., 2023). In addition, research conducted in

Ghana among adult patients at healthcare facilities revealed that the risk of non-communicable diseases (NCDs) was greater in females, older individuals, those who are overweight or obese, and alcohol consumers.

Moreover, variables such as age, gender, body mass index (BMI), alcohol use, and family medical history played a significant role in the rising rates of non-communicable diseases (NCDs) (Boakye et al., 2023). A study focusing on Brazilian teenagers aged 15 to 19 revealed that boys consumed fewer fruits and vegetables (53.0%) and more alcohol (40.8%) compared to girls. Silva et al. (2014) pointed out that while males and females often engage in similar risky behaviours, there are notable gender differences in these individual risk activities. This highlights the importance of preventive programs aimed at addressing these behaviours to enhance adolescent health outcomes.

### **Dietary Practices and Development of Hypertension**

The Mediterranean diet is often suggested as a way to prevent or control high blood pressure (Nissensohn et al., 2016). Research from China indicates that excessive salt intake is a major factor in hypertension, representing a serious public health concern (Zhang et al., 2013). In Ethiopia, studies have shown that higher income levels correlate with more sedentary behaviours, obesity, and greater intake of energy-dense foods, alcohol, and tobacco—factors associated with non-communicable diseases such as hypertension and cardiovascular conditions (Kassa & Grace, 2018).

A study conducted on people from North India revealed that both men and women who consumed trans-fatty acids had a significantly higher incidence of coronary artery disease (Singh et al., 2014). Conversely, Rastogi et al. (2004) found that mustard oil, in contrast to sunflower oil, offers protection against



heart disease and hypertension. Diets rich in trans-fatty acids, which are often present in processed and snack foods, are linked to cardiovascular issues such as hypertension (Singh et al., 2014). Furthermore, Pan et al. (2012) discovered that a higher intake of both unprocessed and processed red meat was related to an increased risk of death from cardiovascular diseases.

Notably, processed meat was found to pose a considerably greater risk for women than for men. Research carried out in Ghana highlighted aging, smoking history, alcohol use, high-calorie diets, and late-night eating as separate risk factors for hypertension. This study focused on professional drivers at Metro Mass Bus stations in Accra and Kumasi Metropolis (Anto et al., 2020).

### **Dietary Practices and Development of Diabetes**

Diets aimed at preventing diabetes typically feature an increased intake of fruits, vegetables, whole grains, nuts, legumes, healthy oils, and proteins. They also suggest moderate alcohol consumption and cutting back on processed meats and sugary drinks (Maiorino et al., 2017). Research has shown that the natural elements in brown rice may enhance insulin response and lower the risk of type 2 diabetes (Montonen et al., 2013; Sun et al., 2010). Conversely, white rice has been linked to insulin resistance, metabolic syndrome, and type 2 diabetes (Mohan et al., 2009). The growing incidence of diabetes could be associated with a shift from eating brown rice to consuming more white rice.

Furthermore, an increase in non-communicable diseases (NCDs) might be associated with a decrease in the consumption of certain whole grains, such as barley and millet, which are high in protein and fibre, as suggested by various studies (Pande et al., 2012; Mohan et al., 2009; Singh et al., 2014). Conversely,



potatoes, which are a primary source of refined carbohydrates, are commonly found in fried foods, fast foods, and snacks like chips. Although these processed products come from whole plant sources, they may have negative health impacts (Rastogi et al., 2004).

Additionally, consuming high amounts of total carbohydrates and glycemic load has been linked to an increased risk of type 2 diabetes (Gujral et al., 2013; Mohan et al., 2009; Rastogi et al., 2004). Studies suggest that meals high in fibre might offer protection against obesity and cardiovascular diseases by reducing insulin levels (Azizi et al., 2009). The connection between meat consumption and disease rates has been well-documented through numerous cohort studies in the US and Europe, along with meta-analyses of epidemiological data.

For example, a 2015 study by Richi et al. found a connection between meat consumption, especially red and processed meats, and higher mortality rates and a greater incidence of type 2 diabetes. A meta-analysis by Pan et al. showed that eating an additional 50 grams of processed red meat daily was linked to a 51% higher risk of type 2 diabetes while consuming an extra 100 grams of unprocessed red meat daily was associated with a 19% increased risk. Earlier cohort studies also indicated that consuming 42 grams or more of red meat per day was related to a 48% higher risk of developing diabetes over four years (Pan et al., 2012, 2013).

A study conducted in Kumasi used Reduced Rank Regression (RRR) to investigate the relationship between dietary patterns and biochemical risk factors for type 2 diabetes. The research revealed that a diet rich in plantain, beans, fermented maize products, green leafy vegetables, garden egg, fish,

fruits, and palm oil was positively linked to type 2 diabetes. Conversely, a diet that included rice, red meat, poultry, milk, eggs, sweets, fruits, and vegetables but was low in plantain showed a weaker association with the development of type 2 diabetes (Frank et al., 2015). Additionally, Malik et al. (2010) found that consuming 1-2 servings of sugar-sweetened beverages (SSBs) daily raised the risk of type 2 diabetes by 26% compared to those who drank no SSBs or less than one serving per month. This highlights the significance of reducing SSB intake to lower the risk of chronic metabolic diseases.

### **Dietary Practices and Development of Cancer**

Adopting a healthy lifestyle and making wise food choices could prevent around 30-40% of different cancer types. Increasing dietary fibre, cutting down on red meat, and keeping a balanced Omega-3 to Omega-6 fat ratio may help reduce cancer risk. On the other hand, a diet rich in fruits and vegetables could lower the chances of developing cancer (Divisi et al., 2006). Research on US Seventh-day Adventists indicated that replacing animal products with plant-based options like olives, legumes, grains, nuts, and whole-wheat bread was linked to a reduced risk of colon cancer (Butler, 2008). A UK study found a clear association between alcohol, red meat, and processed meat consumption and a higher risk of colorectal cancer, while coffee, tea, chicken, fish, cheese, fruit, and vegetables did not show a significant link to this risk (Bradbury et al., 2020). Furthermore, a meta-analysis by Chan et al. revealed that daily consumption of 17% of a 100g serving of red meat and 18% of a 50g serving of processed meat substantially increased the risk of colorectal cancer (Chan et al., 2011).

In addition, processed beef is classified as a Group One human carcinogen, along with alcohol, tobacco, and sun radiation, based on strong scientific evidence. Conversely, raw beef is thought to have the potential to cause cancer (Menezes et al., 2023). As processed foods are linked to a higher risk of cancer, Clinton et al. (2020) advocated limiting the amount of cooked red meat consumed to no more than 500 grammes per week and avoiding processed meats such as gammon, bacon, salami, hot dogs, and sausages.

### **Dietary Practices and Development of BMI and Obesity**

The American Medical Association has formally acknowledged obesity as a medical disorder (Pollack, 2013). According to Wang et al. (2011), it has been connected to a number of chronic illnesses, such as diabetes, liver damage, cancer, and cardiovascular problems. One of the main contributing factors to the complicated reasons for weight gain and obesity, especially in teens, is the use of high-fat and sugary meals (Kumah et al., 2015; Sersar et al., 2023). Anto et al.'s (2020) study conducted in Ghana discovered that professional drivers at Metromass Bus terminals in Accra and Kumasi Metropolis had a considerably higher risk of obesity when they ate late at night and drank sugar-sweetened drinks (SSBs) and fruit punches.

Furthermore, a study including female participants from the Nurses' Health Study II showed a strong correlation between the intake of fruit punch and soft beverages with added sugar and an increased risk of weight gain and type 2 diabetes. These drinks' high-calorie content and readily digested carbs are probably the cause of the link between them and weight gain (Schulze et al., 2004). According to research done in Accra, having more convenience stores and prepared food outlets together with fewer fresh fruits and vegetables was

linked to an increased incidence of obesity (Dake et al., 2016). Consuming sugar-sweetened drinks (SSBs) has been linked to a greater chance of gaining weight and developing an obesity or overweight condition. According to Malik et al. (2010), consuming fewer drinks with added sugar may reduce the chance of being overweight or obese.

Significant weight loss can result from a variety of situations, including lipodystrophies, malnutrition, hunger, systemic disorders such as cancer, endocrine abnormalities, infectious infections, severe chronic illnesses, neurological issues, and drug usage. Reproductive problems might arise from the loss of adipose tissue and the ensuing hormone abnormalities (Boutari et al., 2020). Studies have demonstrated a significant relationship between body mass index (BMI) and total caloric consumption; unprocessed foods, such as meat and grains, have a positive correlation with BMI. 34% of school-aged urban youngsters are overweight or obese (Menezes et al., 2023). According to Ng et al. (2011), the Arabian Gulf States have obesity rates of 8–9% for preschoolers and 40–46% for teens who are overweight or obese.

According to a 40-year research conducted in Israel, a rise in BMI during adolescence was linked to increased risks of cardiovascular and total mortality. According to Twig et al. (2016), there is a direct correlation between adult cardiovascular mortality rates and being overweight or obese. A study conducted in Sri Lanka's public schools examined the knowledge of teenagers between the ages of 10 and 19 on non-communicable diseases (NCDs) and healthy living practices. According to the research, 49.8% of the pupils were underweight based on their BMI, with females being more likely to be underweight (52.7%) than boys (46.3%). Overweight and obese people made



up 6.6% and 4.6% of the population, respectively. Males were much more likely than females to be overweight or obese (15%), according to Gamage and Jayawardana (2018). According to different research, women were more likely than males to be overweight or obese, while men were more likely to be stunted and skinny. According to Wrottesley et al. (2023), the chance of being obese is inversely correlated with the educational attainment of parents.

### **Theoretical Framework**

The Health Belief Model (HBM), a well-known paradigm for researching health behaviour, serves as the foundation for this study. The concept, which was created in the 1950s by social psychologists Howard Leventhal, Godfrey M. Hochbaum, S. Stephen Kegeles, and Irwin M. Rosenstock of the U.S. Public Health Service, attempts to explain why people might be hesitant to undergo early illness diagnosis or take preventative treatments. The HBM has changed throughout time to take into account how patients react to their symptoms and adhere to their treatment regimens. According to the concept, a person's perception of their health risks and how beneficial they believe specific acts are have an impact on their health-related behaviours.

The Health Belief Model (HBM), which draws on behavioural and psychological theories, focuses on two primary facets of health behaviour: the desire to stay well or get better quickly after being ill, as well as the conviction that certain behaviours will either prevent or cure illness. The HBM was first created to address the problem of low tuberculosis (TB) screening rates, even in the presence of mobile X-ray devices. Subsequently, the model has been widely employed to forecast a range of health-related behaviours, including prompt



illness identification via screening and immunisation. Additionally, it has been used to comprehend how patients react to symptoms, how well they follow their treatment plans, lifestyle decisions, and persistent behavioural patterns linked to long-term medical disorders (Janz & Becker, 1984).

Expectancy-value models, in particular, are the foundation of cognitive psychology theories that underpin the Health Belief Model (HBM). It implies that the anticipation that a specific activity will result in a desired outcome influences behaviour. This desired outcome in the context of health is usually the avoidance of disease. According to HBM, a person's assessment of their vulnerability to a health problem, the severity of the ailment, the advantages and disadvantages of acting, and the existence of cues to act can all differ from person to person and predict their participation in health-related activities. These structures help people assess the likelihood of a particular health action, leading to the intended outcome of mitigating or averting the perceived health risk. (Lewin, 1951).

***Perceived susceptibility*** - This concept has to do with a person's subjective assessment of their likelihood of contracting a certain illness or ailment. Before a woman expresses interest in getting a mammogram, she has to be aware that breast cancer might arise. Moreover, sharing data on the prevalence of NCDs in certain age groups or localities may help individuals realise how vulnerable they are.

***Perceived severity*** - A person's emotional assessment of the importance of contracting an illness or condition is known as perceived severity. This assessment takes into account both potential social and medical ramifications, such as effects on social life, family, and career, as well as medical aspects, such

as death, disability, and discomfort. Both vulnerability and severity contribute to the perceived threat of the illness. By providing information concerning the detrimental effects of unhealthy eating habits, such as health problems or decreased well-being, one may increase the sense of severity surrounding the matter.

***Perceived benefits*** - This idea has to do with a person's perception of the efficacy of various methods for treating or preventing disease. People's perceptions of their vulnerability to the disease and the possible advantages of the advised medical procedures influence their decision to seek therapeutic or preventative care. Individuals who accurately assess their susceptibility and the seriousness of a health issue are more inclined to take preventative action if they think it would lower their perceived risk.

***Perceived barriers*** - Perceived barriers are the obstacles or difficulties that an individual perceives to be associated with carrying out a suggested health intervention. This entails balancing the activity's putative advantages against their assessments of its potential costs, dangers (such as side effects), discomfort (including pain), time needs, or inconveniences. These difficulties might include monetary outlays, problems with accessibility, schedule restraints, or cultural differences. Overcoming these obstacles might make it more likely that someone will alter their behaviour.

***Cue to action*** - This is a reference to the stimulus that starts the process of deciding to do a recommended health activity. The symptoms can be classified as external or internal. Examples of external symptoms include asking for help from others, learning about a family member's illness, reading a newspaper article, or being influenced by media hype. For instance, based on a patient's

eating habits, a doctor could recommend periodic checkups or diagnostic procedures.

*Self-efficacy* - Self-efficacy is the belief in one's ability to perform a certain task successfully. The construct was included in the model in the middle of the 1980s and is seen as a crucial component of many behavioural theories, directly influencing a person's choice to engage in the desired action (Champion & Skinner, 2008). To increase one's confidence in their capacity to properly oversee their eating habits, offer helpful guidance, cooking classes, and group support. Encourage little changes to build confidence over time.

### **Application of HBM to Research**

The study made use of A psychological framework called the Health Belief Model (HBM) may be utilised to understand and promote healthy eating practices while also delaying or preventing the beginning of NCDs. The influence of students' perceptions and beliefs about their vulnerability, the seriousness of health issues, the advantages, obstacles, signals to action, and self-confidence on their eating behaviours has been studied using the Health Belief Model (HBM) as a conceptual framework. Using this method, the researchers have looked at a number of health behaviours, including food (Keshani et al., 2019). Furthermore, a quasi-experimental study lasting six months was carried out in Ethiopia utilising the Health Belief Model (HBM) to assess the influence of nutrition education on the promotion of additional meal products. Following the program's implementation, children in the intervention region had substantial increases in their average weight, weight-to-height ratio, and weight-to-age ratio (Muluaem et al., 2016).

When utilising the Health Belief Model to evaluate information on nutrition, influencing variables, dietary patterns, and NCDs, it is important to comprehend and address individual perspectives, beliefs, and obstacles pertaining to food and NCDs. Enhancing communication, providing social support, and implementing environmental improvements may help communities adopt healthier eating habits and reduce the prevalence of noncommunicable illnesses (Wang et al., 2022).

**Knowledge:** A person's knowledge, cognition, attitude, and perception of nutrition, food choices, NCDs, and perceived health dangers are influenced by factors including age, sex, ethnicity, and personality (Chen & Antonelli, 2020). All decisions and actions pertaining to dietary practices are based on knowledge (Chen et al., 2012).

**Modifying Factors:** These characteristics have a substantial influence on individuals' understanding of a phenomenon and their selection of food. Sex, age, personality, and ethnicity significantly impact the quantity of information individuals are exposed to. Additionally, the dietary choices of individuals are influenced by the practices and norms of their society.

**Dietary practices:** Dietary habits refer to the amount of food that a person consumes, taking into account things like meal frequency, variety, timing, and portion size. These practices are influenced by several factors, such as changing conditions and information. Dietary choices made by an individual may influence the development or prevention of non-communicable diseases (NCDs), depending on their degree of knowledge, perception of benefits, and vulnerability.

**Non-communicable Disease:** The occurrence of Diabetes Mellitus, Hypertension, Cancer, and Obesity is closely linked to an individual's dietary practices.

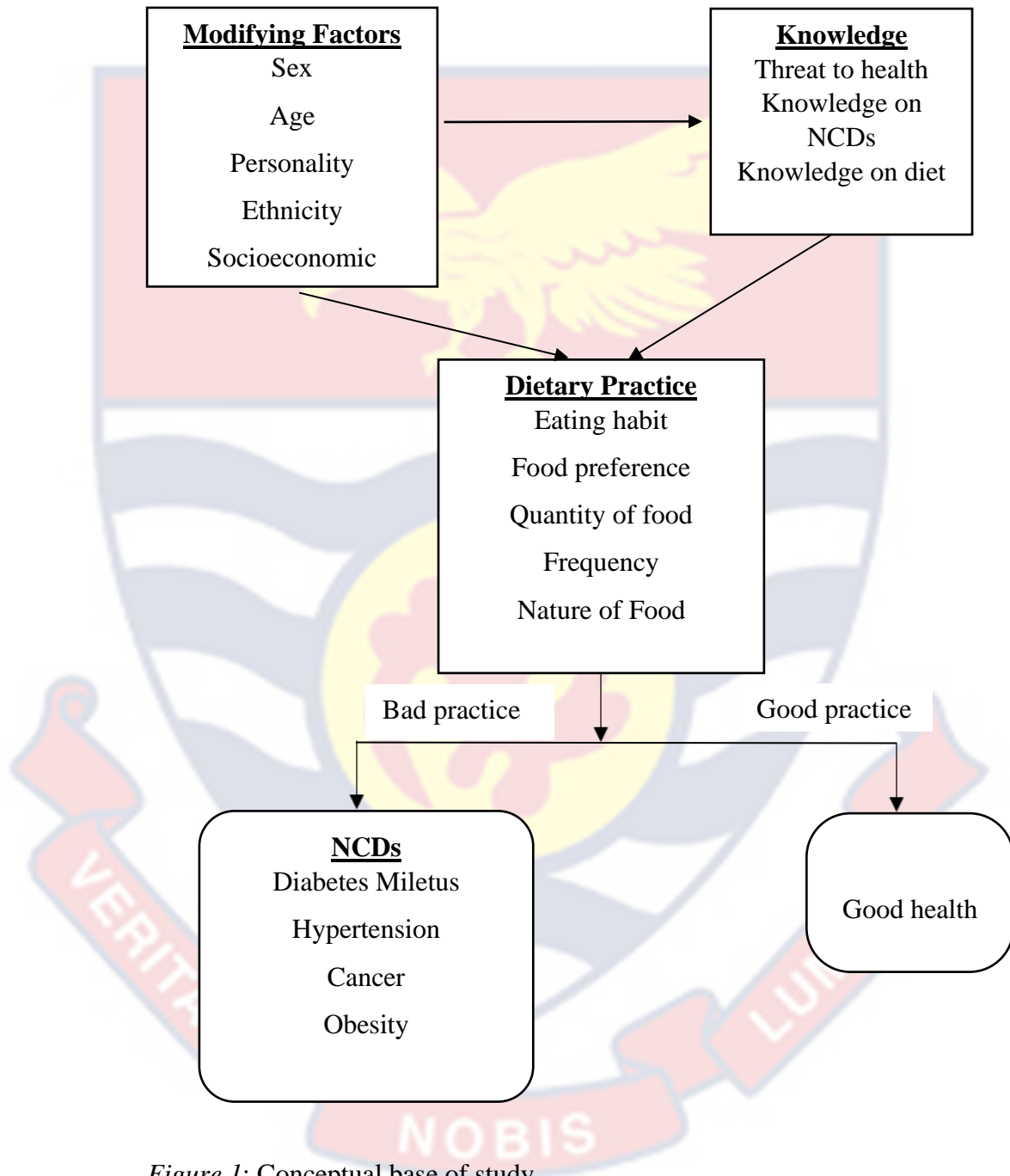


Figure 1: Conceptual base of study



## Summary

Adhering to a nutritious diet is crucial in order to decrease the rate at which chronic illnesses emerge. The risk, occurrence, and death rates of chronic diseases are influenced by urbanisation, evolving lifestyles (including unhealthy diets), ageing populations, globalisation, and inadequate health systems (de Graft Aikins et al., 2012). The consequences of NCDs on individuals, their families, and their countries are evident in various ways. These include financial losses due to decreased income and increased spending on medication, as well as the negative effects on the quality of life caused by dysfunction or impairment. Additionally, NCDs can lead to a decrease in labour supply and productivity, resulting in lower tax revenues. These factors contribute to the impoverishment of individuals, particularly in low- and middle-income countries (Anarfi et al., 2016; de Graft Aikins et al., 2012; MOH, 2012).

Reviews of the literature indicate how improper eating practices and a poor diet can contribute to the development of non-communicable diseases (NCDs) across a variety of worldwide populations and geographical areas. But adult subjects have received the majority of attention in food and nutrition research, with teens receiving less attention (Anto et al., 2020; Bradbury et al., 2020; Dake et al., 2016; DHIMS2; Kassa & Grace, 2018; Peykari et al., 2017; Sajwani et al., 2009). Furthermore, there is a dearth of current knowledge about certain NCD risk factors that affect both the general population and adolescents in Ghana, including tobacco use, alcohol use, obesity, inadequate intake of fruits and vegetables, and dietary patterns. Therefore, it is essential to fill this research gap, investigate teenage dietary habits, and propose solutions to mitigate the growing prevalence of NCDs associated with increasing incidence rates.

## CHAPTER THREE

### RESEARCH METHODS

The purpose of the study was to investigate the dietary practices and associated non-communicable diseases among adolescents in Bekwai Municipal. This chapter provides an overview of the research method, which covers the research design, study area, population, sampling procedure, instrument for data collection, data collection procedure, and data processing and analysis.

#### Research Design

There are three prevalent methodologies for doing research: quantitative, qualitative, and mixed techniques. Quantitative researchers aim to create explanations and forecasts that are applicable to different individuals and locations. Their goal is to establish, verify, or confirm relationships and to formulate generalizations that enhance theoretical knowledge (Williams, 2007). According to Williams (2007), quantitative research uses methods like experiments and surveys and gathers data through specific tools that produce statistical results (p. 18). Leedy and Ormrod (2001), as cited by Williams (2007), suggest that qualitative research is less rigidly structured, allowing for the development of new hypotheses. Qualitative research is characterized as a thorough approach conducted in real-world settings, providing researchers with a deep understanding through active engagement in real experiences (Williams, 2007). The mixed methods approach integrates quantitative and qualitative research methodologies for data collecting and analysis into a single study (Williams, 2007; Curry et al., 2009). Researchers use this strategy to maximise

the benefits and minimise the drawbacks of both quantitative and qualitative methodologies (Curry et al., 2009).

The research used a quantitative technique and was a cross-sectional descriptive survey. By defining the characteristics of NCDs and investigating how dietary behaviours affect the development of NCDs in the participants, the study looked at the existing state of affairs. Because the study was quantitative, data had to be gathered and then quantified using statistical methods. This study was cross-sectional, meaning that data was gathered all at once, without any follow-up with respondents. The factors included the age, gender, employment, education level, nutritional habits, and degree of knowledge regarding the NCDs, diabetes, cancer, hypertension, and obesity of the respondent.

### **Study Area**

The Bekwai Municipal Assembly is a constituent district within the Ashanti Region, which has a total of 43 administrative districts. The Legislative Instrument (L.I 1906, 2007) (Bekwai Municipal Assembly, 2015) established it. The notable settlements in the region include “Bekwai, Anwiankwanta, Dominase, Kokofu, Essumeja, Poano, Ofoase-Kokoben, Abodom, Bogyawe, Senfi, Huntado, Amoafu, Dadease, Kensere, Akyeremade, Dotom, Koniyaw, and Kokotro.” Based on the 2010 Population and Housing Census, the municipality’s population is 118,024 individuals, with 47,209 of them classified as youth, or 40.9% of the total population. According to the Municipal Planning and Co-ordinating Unit - Bekwai Municipal Assembly (2022), the population is projected to reach 148,694 by the year 2021. Of those who are employed, about 53.1 percent are engaged in skilled agricultural, forestry, and fishery professions, 16.1 percent work in service and sales positions, 11.6 percent are

involved in craft and related trades, and 1.6 percent hold managerial roles. Bekwai Municipal was selected for the study because it has a high rate of non-communicable diseases (NCDs) compared to other less urbanized municipalities and districts in the region with similar socio-demographic features.

### **Population**

The population of the study involved adolescents who are in Senior High Schools (SHS) at Bekwai Municipal. Adolescents in Senior High Schools at Bekwai Municipal, including Ofoase Kokoben Senior High School, have a population of 800 students, S.D.A. Senior High School, Bekwai, has a population of 2,500 students; Wesley High School, Bekwai, has a population of 400 students; and St. Joseph Senior High/Tech School has a population of 550 students (Field Data 2021).

*Inclusion criteria* – Adolescents enrolled in the chosen schools, aged 14 to 20.

*Exclusion criteria* – In-school adolescents age above 21 years and above and non-student in selected schools.

Participant demographics include age, gender, educational attainment, religion, and NCD history. 803 (46.85%) of the 1714 participants were men, and 911 (53.15%) were women. The age distribution of the participants ranged from 14 years to 19 years, with an average age and standard deviation (SD) of 17.53 and 1.34, respectively.

### **Sampling Procedure**

Simple random sampling was used to select four schools from a total of eight Senior High Schools in the Bekwai Municipal, which has a total population of 4,250 students. The stratified sample technique was used to



categorise students into SHS 1, 2, and 3. Subsequently, 50% of students in each stratum were chosen to participate in the research by simple random selection. Every student in every stratum received letters A and B. Those who have letter A were selected to participate in the study. Utilising simple random sampling eliminates any potential bias and is easier to implement compared to alternative methods. However, a limitation of this approach is that it necessitates having access to the entire population to obtain accurate statistical measures (Austin, 2014). Stratified sampling offers the benefit of guaranteeing sufficient representation of every stratum in the sample, thereby diminishing sampling errors and decreasing variability within each subgroup. This, in turn, enhances the precision and accuracy of your estimates, enabling you to make more meaningful comparisons among the different strata. An inherent drawback of the approach is its reliance on the fulfilment of many requirements for its effective use (Murphy, 2020). The research has a sample size of 2,125. Singh and Masuku (2014) state that bigger sample sizes often result in greater accuracy when estimating unknown parameters.

### **Data Collection Instruments**

The data collection questionnaire was modified and created based on the “Food Frequency Questionnaire (FFQ)” utilized by other researchers to evaluate dietary habits (Henn et al., 2010). The FFQ is a comprehensive inventory of food and drinks, accompanied by a part where respondents indicate the frequency at which they ingested each item over a certain timeframe. Sections A and B are included in Part 1 of the present questionnaire. Section A primarily addressed demographic variables such as age, gender, ethnicity, weight, height, education, BMI, and history of NCDs. Section B focused on the



comprehension of NCDs and consisted of four components. The items were presented in a multiple-choice format, where participants indicated their answers by marking the given boxes. They also penned their responses in the areas supplied where required.

Part 2 is the questionnaire, focused on dietary assessment aimed at assessing their dietary practices, and it had 13 items. The items have a scale of negative and positive poles of 1 to 4, i.e. 1=Always, 2=Usually, 3=Rarely, 4=Never. The 13 items covered various categories, including meat and fish, bread and savoury biscuits, cereals, potatoes, rice, and pasta; dairy products and fats; sweets and snacks; soups, sauces, and spreads; drinks; fruits and vegetables; as well as other evaluations.

### **Pre-testing**

The questionnaire was used to assess participant comprehension of the questions and identify any potential ambiguities. Additionally, I contributed to planning the data collection approach. Pretesting was done at the College of Accountancy in Bekwai.

Three research assistants (RAs) were selected and received training to support data collection. These individuals were recruited from the Akomaa Memorial SDA Hospital and underwent a comprehensive one-day training session. During this training, they were instructed on the procedures for gaining access to various facilities, taught how to establish rapport, and were guided on showing respect to school headmasters, teachers, and students. The research team members were responsible for personally distributing the questionnaires to the participants at the schools and providing guidance to them as they completed the survey. These three research assistants played a role in both the

pre-test study (conducted over one day for data collection) and the primary study data collection, which spanned ten days.

### **Data Collection Procedure**

“The ethical clearance (ID - UCCIRB/CES/2021/76) from the University of Cape Coast Institutional Review Board (UCC-IRB) and the introductory letter from the Department of Health, Physical Education and Recreation (HPER) were used /to obtain permission letters from Ghana Education Service (GES). Copies of the permission letters from GES were sent to the headmasters of the schools to get access to the students for data collection. Data was collected at the four (4) Senior High Schools in the Bekwai Municipal, namely Ofoase Kokoben Senior High School, S.D.A. Senior High School, Wesley High School and St. Joseph Senior High/Tech School”.

The study team conducted data collection by visiting many schools. Participants who agreed to take part in the research were provided with questionnaires after being informed about the study’s objectives. They were guided to go through the filling of the questionnaire. Participants promptly completed and returned their questionnaires on-site. Height and weight measurements were taken to determine their BMI. Data was collected over ten days. The participants were sufficiently briefed about the objective of the research and their entitlements. Participants were provided with self-administered questionnaires and asked to complete them voluntarily.

### **Ethical Consideration**

The ethical clearance (ID - UCCIRB/CES/2021/76) provided by the University of Cape Coast Institutional Review Board (UCC-IRB) and the introductory letter from the Department of Health, Physical Education and

Recreation (HPER) were used to secure permission letters from the Ghana Education Service (GES). These permission letters were then forwarded to the headmasters of the schools to allow access to the students for data collection. Participants' information was assured protection through confidentiality and anonymity, and they were informed of their right to withdraw from the questionnaire at any time.

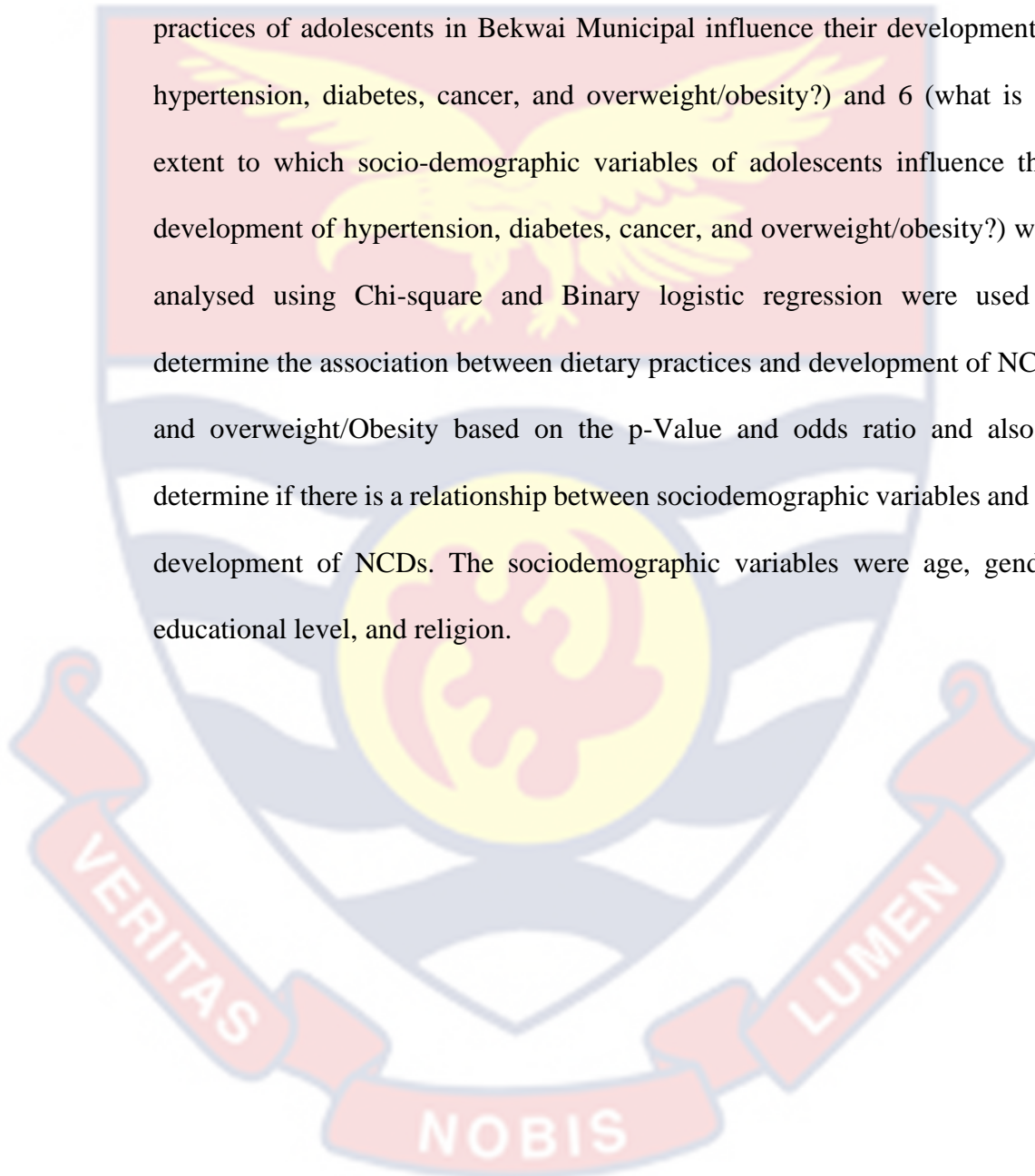
### **Data Processing and Analysis**

The obtained data were analysed using the Statistical Packages for the Social Sciences (SPSS) software, specifically version 20. The data underwent screening to identify any mistakes in data input, missing values, and outliers. This screening process included analysing the frequency and percentages of the data, as well as assessing its normality, homogeneity, and homoscedasticity using histograms.

Research questions 1 (what is the knowledge level of adolescents in Bekwai Municipality on NCDs?) and 2 (what is the nature of dietary practices of adolescents?) were analyzed using frequency and percentage. Knowledge scores were divided into three categories: 0 represents no knowledge, 2–9 represents inadequate knowledge, and 10 and above signifies adequate knowledge. Also, the nature of dietary practices was categorized into good or poor. Above the mean score was described as good dietary practice, while below the mean score is poor dietary practices.

Research question 3 (What is the relationship between Gender and Hypertension, Diabetes, Cancer and Overweight/Obesity among Adolescents?) was analysed by a two-sample Wilcoxon rank-sum (Mann–Whitney) test to determine the association between gender, BMI, and NCDs among adolescents.

Research question 4 (what is the extent to which boys and girls differ in their dietary practices?) was analysed using Chi-square and binary logistic regression. The P-value was used to determine how boys and girls differ in dietary practice. Research questions 5 (what is the extent to which dietary practices of adolescents in Bekwai Municipal influence their development of hypertension, diabetes, cancer, and overweight/obesity?) and 6 (what is the extent to which socio-demographic variables of adolescents influence their development of hypertension, diabetes, cancer, and overweight/obesity?) were analysed using Chi-square and Binary logistic regression were used to determine the association between dietary practices and development of NCDs and overweight/Obesity based on the p-Value and odds ratio and also to determine if there is a relationship between sociodemographic variables and the development of NCDs. The sociodemographic variables were age, gender, educational level, and religion.





## CHAPTER FOUR

## RESULTS AND DISCUSSION

The objective of the research was to examine the dietary practices and associated non-communicable diseases (NCDs) among adolescents in Bekwai Municipal. The results and analysis are presented in this chapter.

**Table 1: Sociodemographic Characteristics**

Variable	Frequency (N=1714)	Percentage (%)
<b>Age</b>	<b>Mean age= 17years* +/- 1.349</b>	
Adolescent	1714	100
<b>Gender</b>		
Male	803	46.85
Female	911	53.15
<b>Religion</b>		
Christian	1625	94.81
Muslim	9	4.03
Traditionalist	12	0.70
Others	8	0.47
<b>Educational Status</b>		
SHS 1	508	29.64
SHS 2	684	39.91
SHS 3	522	30.4
<b>History of NCD</b>		
Hypertension	194	11.33
Diabetes Mellitus	167	9.75
Cancer	40	2.34
Others	1312	76.58
<b>Heard of NCD</b>		
Yes	1223	71.35
No	410	23.92
Not sure	81	4.73
<b>Source of Information</b>		
Health Personnel	618	36.06
Social media	807	47.08
Parents	185	10.79
Peers	52	3.03
Relatives	52	3.03
<b>Total</b>	<b>1,714</b>	<b>100.00</b>

Source: Field data (2021)

Findings from the study reveal that the age distribution of the participants ranged from 14 years to 19 years, with an average age and standard deviation (SD) of 17.53 and 1.34, respectively. The female population in school is higher than the male population which is a good sign of the girl-child education policy of the country. The majority of participants being Christians is consistent with the national data on religion which has Christians being the majority of Ghanaians. From the study, a very small percentage of participants had a history of cancer as NCDs, with the majority of participants being others who had no history of any NCDs. The majority of the participants, 684 (39.91%), were in SHS 2. There is no significant difference in the number of participants in SHS 1 and 3 as they differ by only 18 students.

#### **Research Question 1: What is the Knowledge Level of Adolescents in Bekwai Municipality on NCDs?**

The study was to assess the knowledge of adolescents in Bekwai on NCDs, using frequency counts and percentages analysis. Nine items were used to assess the knowledge level of adolescents. Each item in the knowledge category was scored two (2) or zero (0), with a correct answer valued two (2), while a wrong answer scored zero (0). With a mean knowledge score of 6.20, knowledge scores were divided into three categories: 0 represents no knowledge, 2–9 represents inadequate knowledge, and 10 and above signifies adequate knowledge.

It was observed that a quarter of the participants (25%) had adequate knowledge about NCDs, 10% did not know, and 65% had inadequate knowledge. The results indicated that the majority of the adolescents (71.35%) had heard of NCDs from social media (47.08%) and health personnel (36.06%).

A small percentage (16.86%) obtained their information from parents, peers, and relatives (see Table 1 for data).

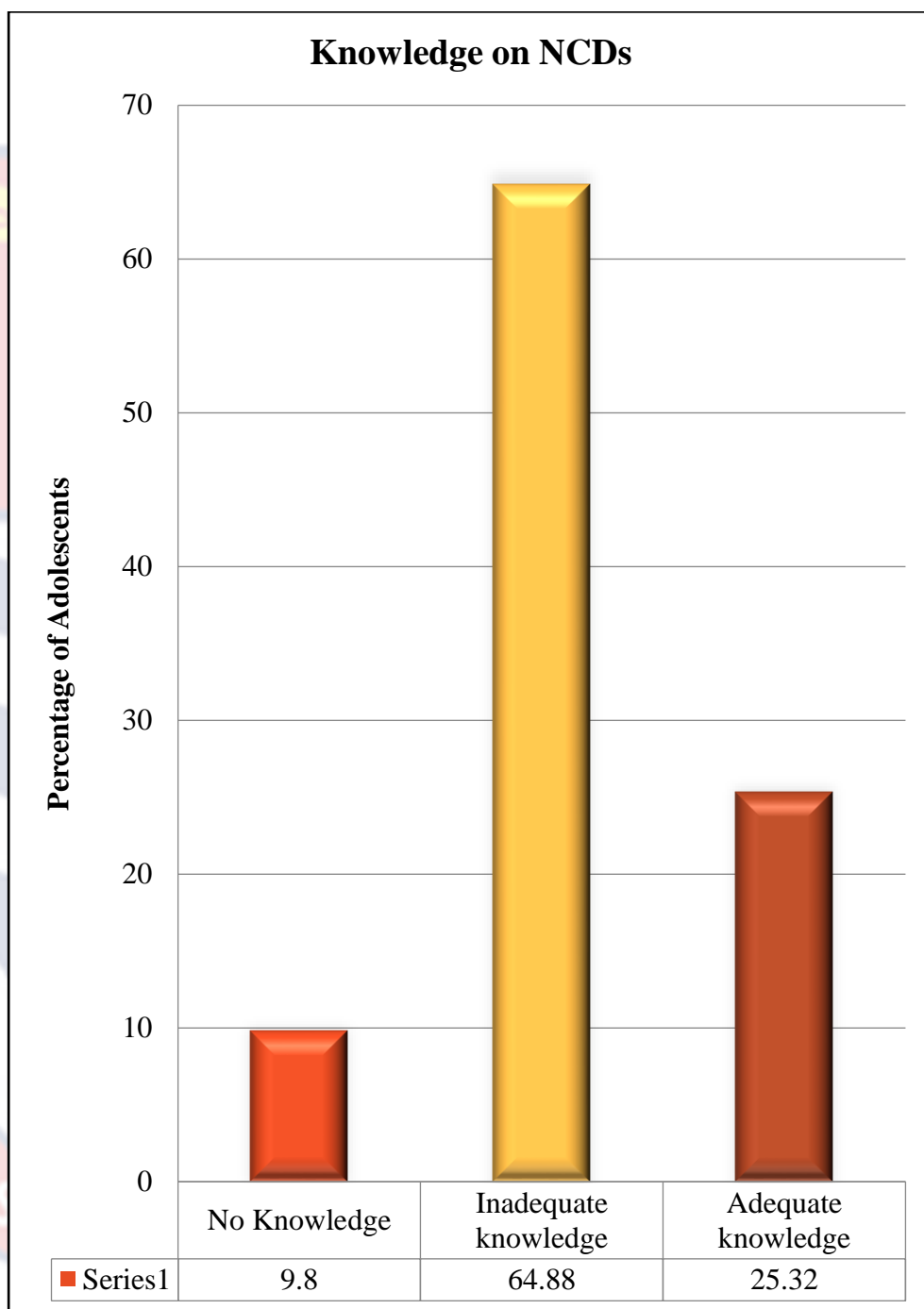


Figure 1: Knowledge level of adolescents in bekwai municipal on NCDs

**Table 2: Distribution of Knowledge of NCD and Source of Information**

Variable	Frequency (N=1714)	Percentage (%)
<b>History of NCD</b>		
Hypertension	194	11.33
Diabetes Mellitus	167	9.75
Cancer	40	2.34
Others	1312	76.58
<b>Heard of NCD</b>		
Yes	1223	71.35
No	410	23.92
Not sure	81	4.73
<b>Source of Information</b>		
Health Personnel	618	36.06
Social media	807	47.08
Parents	185	10.79
Peers	52	3.03
Relatives	52	3.03
<b>Total</b>	<b>1,714</b>	<b>100.00</b>

Source: Field data (2021)

The findings indicated that a higher percentage of adolescents have heard of NCDs, which is consistent with that of a recent study (Irani et al., 2022), in which a higher percentage of their participants had heard of NCDs. Furthermore, for those with some knowledge of or have heard of NCDs, their sources of information included social media, health personnel, parents, relatives, and peers (Table 1). Previous studies (Marar et al., 2019; Pecchioni & Sparks, 2007) have identified similar sources of information about non-communicable diseases (NCDs), including doctors, family members, nurses, friends, the internet, other medical personnel, and fellow patients. While these non-professional sources can enhance patient knowledge about NCDs, the risk of poor-quality information could negatively impact patients' adherence to



treatment, self-medication practices, and NCD prevention efforts (Marar et al., 2019).

The evaluation of knowledge showed that over half of the adolescents had insufficient understanding of NCDs, with some having no knowledge at all and only a quarter demonstrating adequate knowledge (Figure 1). This result contrasts with the findings of Islam et al. (2019), who reported that the majority of their participants (57.9%) had a good grasp of the subject. Research by Legesse et al. (2022) indicates that individuals who do not watch television or receive information from health professionals typically have poorer knowledge of NCDs compared to those who do or those who have a family member with an NCD. Additionally, since the participants are adolescents and NCDs mainly affect adults, they may not be motivated to learn about NCDs (Islam et al., 2019). This low level of knowledge among adolescents could adversely affect health promotion efforts, potentially leading to an increased risk of developing NCDs in the future and negatively impacting their health.

Inadequate knowledge about non-communicable diseases (NCDs) can result in delayed detection, poor management, insufficient reduction of risk factors, and low drug adherence, potentially accelerating the onset of related complications. For instance, Paakkari and Okan (2020) highlighted that health literacy is crucial for preventing NCDs. They observed that about a quarter of participants were aware of a family history of conditions like hypertension, diabetes, and cancer, but only 10% obtained this information from their parents or relatives. Additionally, Legesse et al. (2022) discovered a strong link between having a family member with NCDs and having adequate awareness of these diseases.

Furthermore, this phenomenon might be linked to the information individuals receive through caring for family members with non-communicable diseases (NCDs) (Legesse et al., 2022). This suggests a possible lack of health literacy, inadequate health knowledge transmission from parents to children, and restricted health information sharing within the family. Ashida and Schafer (2015) point out that avoiding common and complicated non-communicable diseases (NCDs), including cancer and heart disease requires an awareness of family health history. Absence of this crucial knowledge may affect how resources intended to prevent NCDs are used. This, however, is at odds with the results of the present study concerning the exchange of family medical records.

Several factors hinder patients from sharing information about their health conditions. Rai et al. (2020) found that patients with serious non-communicable diseases (NCDs) such as hypertension, cancer, and diabetes often face stigma, including blame, shame, and fear. This stigma negatively impacts their health, their ability to manage their conditions, and their overall quality of life, which also restricts their willingness to share critical information with family members and relatives. Consequently, adolescents miss out on vital information that could influence their health behaviours, potentially preventing or delaying the onset of NCDs, reducing disability, and easing the burden on the healthcare system (Bhattacharjee et al., 2015; Chaker et al., 2015).

### **Research Question 2: What is the Nature of Dietary Practices of Adolescents?**

The purpose of the analysis was to assess the nature of dietary practices among adolescents in Bekwai Municipality, using frequency counts and percentages analysis. The dietary practices were divided into nine sections:

meat and fish; bread and savoury; potato and rice pasta; dairy products and fats; sweets and snacks; soup sauces and spreads; drinks, fruits and vegetables.

The study's results indicated that adolescents exhibited positive dietary habits in various food categories, with good practices observed in bread and savoury (54%), potato and rice (60%), pasta, soup, sauces, and spreads (75%), fruits (90%), and vegetables (97%). Conversely, poor dietary habits were prevalent among most adolescents in the categories of meat and fish (58%), sweets and snacks (86%), dairy products and fats (58%), and drinks (64%) (Figure 3).

**Table 3: Dietary Practice of Food Categories among Adolescents**

Dietary Practices Frequency (%)			
	Item	Good Practice	Bad Practice
1	Meat and Fish	720 (42%)	994 (58%)
2	Bread and Savory	926 (54%)	788 (46%)
3	Potato and Rice Pasta	1028 (60%)	686 (40%)
4	Dairy Products and Fats	720 (42%)	994 (58%)
5	Sweets and Snacks	240 (14%)	1474 (86%)
6	Soup, Sauces and Spreads	1286 (75%)	428 (25%)
7	Drink	617 (36%)	1097 (64%)
8	Fruits	1543 (90%)	171 (10%)
9	Vegetables	1663 (97%)	51(3%)

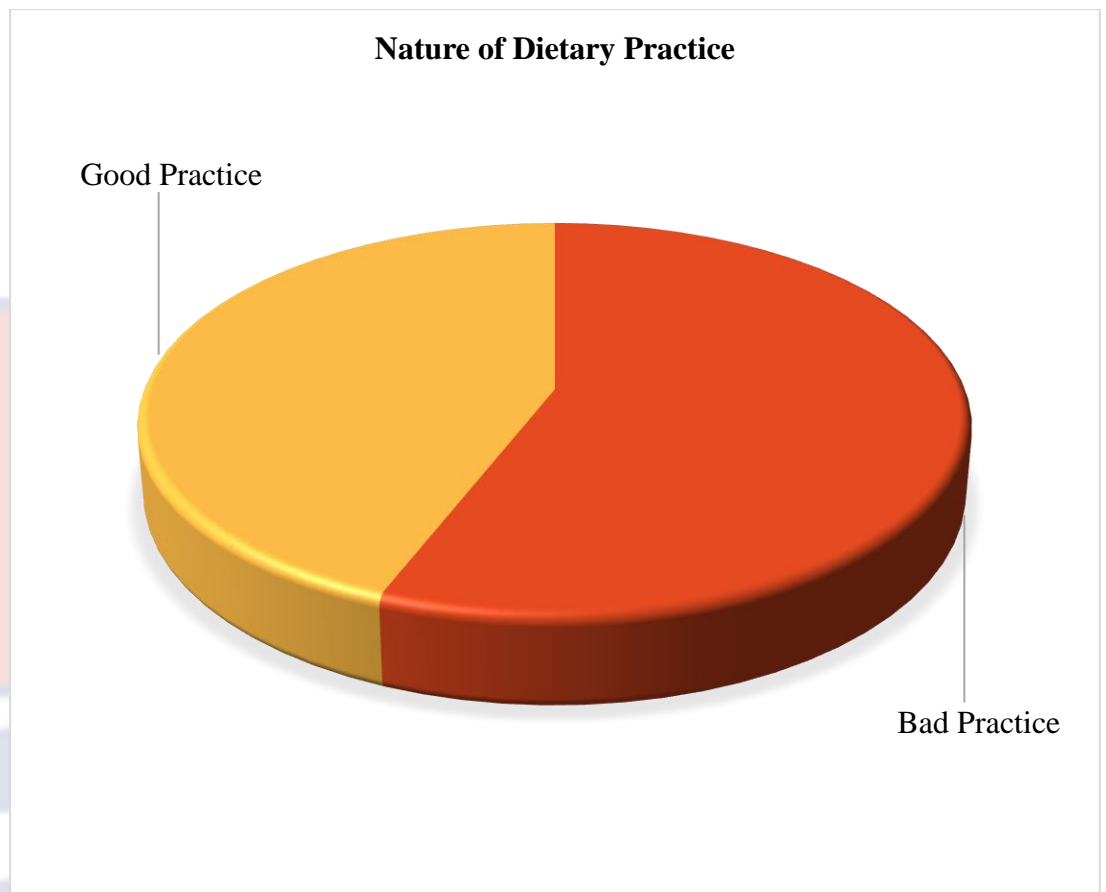
Source: Field data (2021)

Adolescents' dietary practices were determined by the type of foods they consumed and how frequently they consumed such foods. The adolescents demonstrated good dietary practices in categories such as bread, savoury foods, potatoes, rice, pasta, soups, sauces, spreads, fruits, and vegetables; their practices were poor in categories such as meat, fish, dairy products, fats, sweets, snacks, and drinks (see Table 2). The study found that a high percentage of

adolescents with poor dietary practices consumed meat, fish, dairy products, and fatty foods regularly. The frequent consumption of tea, coffee, alcoholic beverages, and sugary drinks also contributed to poor dietary practices (see Table 2). Similarly, studies from different regions have reported similar findings on the consumption of unhealthy snacks, sweets, and alcohol among adolescents (Alavi et al., 2013; Gamage & Jayawardana, 2018; Islam et al., 2019; Kassa & Grace, 2018; Menezes et al., 2023; Mirmiran et al., 2017).

The results also showed that a sizable portion of the subjects followed healthy eating habits by consuming whole-meal bread, potatoes, rice, pasta, fruits, vegetables, soups, sauces, and spreads. In contrast to the current study's findings, some earlier research found that few individuals consumed fruits and vegetables because they were perceived as the meals of sick people (Kassa & Grace, 2018; Gamage & Jayawardana, 2018). Other research, however, found that most teenagers eat one or more servings of fruits and vegetables each day (Agaba & Muhumuza, 2021; Alavi et al., 2013). The cultural differences, the teenagers' learnt behaviours, and their availability may account for the parallels between this research and others (Rodriguez, 2009).





*Figure 2: Overall nature of dietary practices among adolescents*

Analysis of all the nine components of dietary practices of the adolescents revealed that more than half had poor dietary practices. In a study by Hormenu (2022) among in-school adolescents, slightly more than half (50.1%) of the participants had poor dietary practices, which is consistent with the current study, where more than half similarly had poor dietary practices. The poor dietary practices reported among adolescents can be attributed to several factors with implications for the future development of NCDs and overall health. One factor is the high consumption of meat and fish, which often includes processed and fried options. According to Kassa and Grace (2018), this has been linked to a higher risk of obesity, cardiovascular diseases, and some cancers.

Furthermore, consuming dairy products and fats such as cheese, butter, and margarine on a regular basis contributes to the number of calories and saturated fat in the body, which increases the risk of weight gain and NCDs (Alavi et al., 2013).

Moreover, poor dietary practices observed in the study include the extreme consumption of sweets, snacks, and sugary drinks. This habit leads to a high intake of added sugars, which is linked to an increased risk of obesity and diabetes (Menezes et al., 2023). Alcohol consumption among adolescents, as observed in the study, is also considered a poor dietary practice, which is associated with various health risks, including the development of NCDs (Gamage & Jayawardana, 2018; Islam et al., 2019). The implications of these poor dietary practices are significant for future health outcomes. Unhealthy eating habits established during adolescence can persist into adulthood, increasing the risk of chronic disease (Barbosa, 2014; MOH, 2012). The consumption of high-calorie, nutrient-poor foods can contribute to the development of obesity and hypertension (Kassa & Grace, 2018). These factors collectively contribute to the rising burden of NCDs globally.

**Research Question 3: What is the Relationship between Gender and Hypertension, Diabetes, Cancer and Overweight/Obesity among Adolescents in Bekwai Municipality?**

Two-sample Wilcoxon rank-sum (Mann–Whitney) test was done to test the association between gender, BMI and NCDs among adolescents in Bekwai Municipal. The finding indicates that there is a statistical association between NCDs and BMI; however, there is an association between gender and BMI was not significant.

**Table 4: Association between Gender, BMI and NCDS**

Gender	Rank sum	P-value
<b>Gender and Body Mass Index (BMI)</b>		
Male	629544	0.00
Female	840211	
<b>BMI and Development of NCDs</b>		
Development of NCDs	Rank sum	P-value
No	1393242	0.3109
Yes	76513	

Field data (2021)

The findings indicate that boys and girls differ in their development of obesity and overweight. Nevertheless, females involved in the study are more obese and overweight than males. This finding contradicts a study that found males to be more obese and overweight (Gamage & Jayawardana, 2018). Supporting the current study is another study that found obesity and overweight to be more prevalent among girls (Wrottesley et al., 2023). The study's conclusions have several health-related ramifications. Gender and BMI are significantly correlated, suggesting that boys and girls experience obesity and overweight development in distinct ways. The higher risk of obesity and overweight observed in girls suggests a need for targeted interventions to address this health issue among adolescent females. This also highlights a potential disparity in health outcomes based on gender. Thus, strategies aimed at preventing and managing overweight and obesity should prioritize interventions tailored to girls. Furthermore, the study's 13% overweight and obese teenage population highlights how crucial it is to encourage healthy lifestyles and weight control in school settings. Putting into practice interventions that target risk factors for obesity and overweight, as found in

earlier research (Anto et al., 2020; Kumah et al., 2015; Sersar et al., 2023), can help lessen the burden of these conditions and the likelihood that NCDs will develop in the near future.

Although findings show no association between BMI and NCDs among adolescents, Twig et al. (2016) found a greater association between BMI and NCDs, such that an increase in BMI during adolescence was linked to an increase in NCD and all-cause mortality in later years. That is to say, there may be a complicated link between BMI and NCDs that varies based on a number of variables, including sample size, population under study, and other confounding variables. The study by Twig et al. (2016) emphasises the possible long-term repercussions of high BMI during adolescence on NCD risk and death, even if the current investigation did not detect a significant link. Furthermore, these results suggest that various populations and situations may have varied associations between BMI and NCDs. While the present study suggests that teenagers with lower BMIs have a decreased propensity to acquire NCDs, it is still important to encourage and maintain a healthy lifestyle that includes regular exercise, a balanced diet, and preventive healthcare in order to reduce the long-term risk of NCDs.

#### **Research Question 4: What is the Extent to which Boys and Girls in their Dietary Practices among Adolescents in Bekwai Municipality?**

A chi-square test analysis was done to ascertain the relationship between boys and girls in Bekwai Municipality on their dietary practices. The findings indicate that there are notable gender differences in the dietary choices of boys and girls concerning meat and fish ( $\chi^2=15.585$ ,  $p < 0.001$ ), bread and savoury ( $\chi^2=16.102$ ,  $p < 0.001$ ), dairy products and fats ( $\chi^2=8.237$ ,  $p < 0.001$ ), and drinks



( $\chi^2=4.684$ ,  $p = 0.03$ ). Conversely, no significant disparity in dietary habits between boys and girls was observed for Potatoes, Rice, Pasta ( $\chi^2=0.347$ ,  $p = 0.556$ ), Sweets and Snacks ( $\chi^2=2.428$ ,  $p = 0.118$ ), Soups, Sauce, and Spreads ( $\chi^2=0.199$ ,  $p = 0.566$ ), Fruits ( $\chi^2=1.409$ ,  $p = 0.235$ ), and Vegetables ( $\chi^2=2.024$ ,  $p = 0.155$ ).

**Table 5: Association between Gender and Dietary Practices**

Variable	Frequency (N=1714) (percentage (%))		X <sup>2</sup>	P-value
<b>Dietary Practice of Meat and Fish</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	424 (42.79)	379 (52.42)	15.585	<b>0.001</b>
Girls	567 (57.21)	344 (47.58)		
<b>Dietary Practices of bread and savory</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	326 (41.58)	477 (51.29)	16.102	<b>0.001</b>
Girls	458 (58.41)	453 (48.71)		
<b>Dietary Practice of Potatoes, Rice, Pasta</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	335 (47.72)	478 (46.27)	0.347	0.556
Girls	356 (52.28)	555 (53.73)		
<b>Dietary Practice of Dairy Product and Fats</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	288 (40.22)	515 (51.60)	8.237	<b>0.001</b>
Girls	428 (59.78)	483 (48.40)		
<b>Dietary Practice of Sweets and Snacks</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	99 (42.13)	704 (47.60)	2.428	0.118
Girls	136 (57.87)	775 (52.40)		
<b>Dietary Practice of Soups, Sauce and Spreads</b>				
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
Boys	109 (48.23)	694 (46.64)	0.199	0.655
Girls	117 (51.77)	794 (53.36)		

Variable	Frequency (N=1714) (percentage (%))	X <sup>2</sup>	P-value
<b>Dietary Practice of Drinks</b>			
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>	
Boys	492 (44.89)	311 (50.32)	4.684
Girls	604 (55.11)	307 (49.68)	<b>0.03</b>
<b>Dietary Practice of Fruits</b>			
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>	
Boys	86 (51.19)	717 (46.38)	1.409
Girls	82 (48.81)	829 (53.62)	0.235
<b>Dietary Practice of Vegetables</b>			
<b>Gender</b>	<b>Bad Practice</b>	<b>Good Practice</b>	
Boys	33 (55.93)	770(46.53)	2.024
Girls	26 (44.07)	885 (53.47)	0.155
<b>Summary of Dietary Practice Among Boys and Girls</b>			
<b>Gender</b>	<b>Bad Practice</b>	<b>Good practice</b>	
Boys	437 (54.42)	366 (45.58)	0.214
Girls	523 (57.40)	388 (42.59)	1.54

Source: Field data (2021)

The findings revealed that gender influences dietary practice, specifically on the intake of meat and fish, bread and savoury biscuits, dairy products and fats and drinks. Adolescents who engage in poor dietary habits in the category of meat and fish are disproportionately female (57%). Canadians between the ages of 13 and 18 consume a substantial portion of their daily caloric intake from processed meat, which includes beefburgers, pork, and sausages. Females make up 50% of this group and males, 53%, according to Amson et al. (2023), which runs counter to recent research showing poor dietary habits among females.

In addition, Qiu et al. (2023) observed that, in contrast to the present result, boys between the ages of 7 and 12 were more likely to show a preference for processed meats, quick meals, dairy foods, eggs, snacks, starchy staples, and

beans. More than half of the females in the present research also had worse dietary practices regarding beverages than the guys. Other studies have found a disproportionately high prevalence of NCD among boys (Azizi et al., 2009; Bradbury et al., 2020; Chhaya et al., 2015; Gamage & Jayawardana, 2018; Kassa & Grace, 2018; Menezes et al., 2023; Sajwani et al., 2009), so alcohol is not excluded from the current study. Kassa and Grace (2018), Menezes et al. (2023), and Negin et al. (2011) all point to alcohol as a causal factor in NCDs such as hypertension, diabetes, and cancer. Girls, on the other hand, are more likely to engage in healthy behaviours, such as the consumption of fruits and vegetables (Gamage & Jayawardana, 2018; Hormenu, 2022).

However, the present study found no significant difference in fruit and vegetable intake based on gender (Table 3). Girls are less likely to eat high-fat and high-sugar diets, according to research by Wrottesley et al. (2023). The present research did not find a statistically significant difference in sugar and candy intake between males and females; hence, this finding contradicts the study's findings. The two research' divergent findings might be explained by the fact that they were conducted in different geographic regions. Females were shown to have higher rates of bad dietary practices, including overconsumption of meat and fish, bread and savoury cookies, dairy products and fats, and beverages. The negative health effects of these eating habits include a higher risk of obesity, cardiovascular disease, and various cancers (Gamage & Jayawardana, 2018; Islam et al., 2019). Additionally, ultra-processed foods, which are high in added sugars, unhealthy fats, and low in nutritional value, have been associated with an increased risk of obesity, metabolic syndrome, and

other chronic diseases such as cancer (Bradbury et al., 2020; Clinton et al., 2020; Pan et al., 2013; Menezes et al., 2023).

The finding again is that boys prefer processed meats, fast food, and dairy products, foods that predominantly contribute to an imbalanced diet and an increased intake of unhealthy foods, which can lead to overweight/obesity, hypertension and poor overall nutrition (Anto et al., 2020; Bradbury et al., 2020; Dake et al., 2016).

**Research Question 5: What is the Extent to which Dietary Practices of Adolescents Influence their Development of Hypertension, Diabetes, Cancer, and Overweight/Obesity among Adolescents in Bekwai Municipality?**

A chi-square test was done to analyze the relationship among NCD, BMI, and Dietary Practice. Binary logistic regression was used to determine the association between dietary practices and the development of NCDs and overweight/Obesity. The results indicate a statistically significant relationship between NCD, BMI, and Dietary Practice. The association between NCD and dietary practice was  $\chi^2=0.055$ , with a p-value of 0.81. Also, the association between BMI and dietary practice was  $\chi^2=5.14$ , a p-value of 0.07 (Table 4). At a 95% confidence interval, the association between the various dietary practices, NCDs and BMI was found for meat and fish ( $\chi^2=0.82$ , p-value 0.18), bread and savoury biscuit ( $\chi^2=0.8$ , p-value 0.135), potatoes, rice, and pasta ( $\chi^2=0.92$ , p-Value =0.61), dairy products and fats ( $\chi^2=0.88$ , p-Value = 0.38), sweet and snacks ( $\chi^2= 0.91$ , p-Value 0.65), drinks ( $\chi^2=1.01$ , p-Value = 0.92), fruits ( $\chi^2= 0.58$ , p-Value 0.01) and vegetables ( $\chi^2=0.92$ , p-Value = 0.84). Only fruit had an association with NCDs and Obesity (Table 5).



**Table 6: Association between Dietary Practices and Development of NCDs and Obesity (N=1714)**

Variable	Frequency (percentage (%))		X <sup>2</sup>	p-value
<b>Dietary Practice</b>				
<b>Develop NCD</b>	<b>Bad Practice</b>	<b>Good Practice</b>		
No	914 (95.21)	716 (94.96)	0.055	0.81
Yes	46 (4.79)	38 (5.04)		
<b>Dietary Practice</b>				
<b>BMI</b>	<b>Bad Practice</b>	<b>Good Practice</b>	5.14	0.07
Underweight	138 (14.37)	126 (16.71)		
Normal	686 (71.46)	546 (72.41)		
Overweight/obese	136 (14.17)	82 (10.88)		

Source: Field data (2021)

**Table 7: Association between Dietary Practices and Development of NCDs and Obesity among Adolescents**

Variable	Odd ratio	P-value	95% confident Interval
Meat and fish	0.82	0.18	0.61-1.10
Bread and Savoury Biscuit	0.80	0.135	0.60-1.06
Potatoes, Rice and Pasta	0.92	0.61	0.69-1.23
Dairy products and Fats	0.88	0.38	0.66-1.17
Sweet and Snacks	0.91	0.65	0.60- 1.36
Drinks	1.01	0.92	0.75-1.36
Fruits	0.58	0.01	0.38-0.87
Vegetables	0.92	0.84	.43- 1.97

The results showed that eating well or poorly did not affect the probability of getting NCDs ( $\chi^2 = 0.055$ ,  $p = 0.81$ ). While 1 in 20 people with poor eating habits will acquire a chronic disease, that number drops to 1 in 19 people with healthy habits. This suggests that even adolescents with relatively good dietary practices might face an increased risk of developing non-communicable diseases (NCDs) like hypertension, diabetes, and cancers. This is contrary to most research, which links poor dietary habits with a higher risk

of NCDs (Popkin et al., 2012; Rauber et al., 2018). It is possible that many of these adolescents also engage in unhealthy dietary behaviours, which could undermine the positive effects of their good dietary practices. These results challenge the current understanding and underscore the need for more research and nuanced approaches to exploring the connection between dietary habits and NCDs.

Kumah et al. (2015) explored various factors contributing to weight gain and obesity, including dietary habits. Their study revealed that non-communicable diseases (NCDs) such as diabetes, hypertension, and cancer are not associated with being underweight, overweight, or obese. Approximately thirteen percent of the participants were identified as overweight or obese. The study suggests that adopting healthier eating habits could potentially decrease the prevalence of overweight or obesity from 14.17 percent to 10.88 percent (refer to Table 4). These results underscore the significance of encouraging healthy eating and weight management for improving overall health, even though weight status alone may not directly indicate the risk of NCDs.

Excess weight and obesity are strongly associated with a higher risk of non-communicable diseases (NCDs) such as cancer, vision problems, cardiovascular disease, liver dysfunction, diabetes, and other health issues (Ge et al., 2023; Gupta et al., 2019; Wang et al., 2011). Research has pinpointed poor dietary practices, including excessive consumption of processed meats like sausages, beef, sardines, cheese, and butter, as well as coffee, alcoholic beverages, fizzy drinks, tea, cereals, ice cream, toffees, and cakes. Regrettably, research has indicated that consuming these products may result in appreciable weight gain as well as a higher chance of getting NCDs, including diabetes,

hypertension, and cancer (Boakye et al., 2023; Bradbury et al., 2020; Chan et al., 2011; Menezes et al., 2023; Pan et al., 2013; Richi et al., 2015). The significance of encouraging healthy, balanced diets and minimising the intake of unhealthy foods and beverages, especially for teens, is highlighted by these results.

Obesity and overweight are linked to chronic conditions. The study highlights that current dietary habits among adolescents show that consuming various dietary products is associated with a lower risk of developing non-communicable diseases (NCDs) (refer to Table 5). Notably, fruit consumption was particularly significant (p-value 0.01); adolescents who ate more fruits had a 42% lower chance of developing NCDs (odds ratio 0.58, p-value 0.01). This supports earlier research connecting high fruit intake with a decreased risk of NCDs such as cancer and diabetes (Bradbury et al., 2020). Conversely, low fruit consumption is associated with a higher risk of NCDs (Anto et al., 2020; Dhungana et al., 2019). Therefore, promoting fruit consumption while reducing unhealthy foods and beverages can significantly lower NCD risk among adolescents.

**Research Question 6: What is the Extent to which Socio-demographic Variables of Adolescents Influence their Development of Hypertension, Diabetes, Cancer and Overweight/Obesity among Adolescents in Bekwai Municipality?**

A chi-square test was conducted to examine the connection between socio-demographic factors and the occurrence of non-communicable diseases (NCDs). The findings revealed no significant statistical relationship between these variables and NCD development, except for religion ( $\chi^2 = 21.27$ ,  $p = 0.001$ ). This suggests that Christians are developing NCDs at a higher rate

compared to individuals of other religions. Additionally, logistic regression analysis indicated that religion is linked to the development of NCDs.

**Table 8: Association between Socio-Demographic Variables of Adolescents and the Development**

Socio-demographic characteristics	Frequency (N=1714) (percentage (%))		X <sup>2</sup>	P-value
	No	Yes		
<b>Gender</b>			0.00	0.93
Male	764 (46.87)	39 (46.43)		
Female	866 (53.13)	45(53.57)		
<b>Age</b>			0.96	0.32
Adolescent	1459 (89.51)	78 (82.86)		
Adult	171 (10.49)	6 (7.14)		
<b>Religion</b>			21.27	0.001
Christian	1550 (95.09)	75 (89.29)		
Muslim	63 (3.87)	6 (7.14)		
Traditionalist	12 (0.74)	0 (0.00)		
Others	5 (0.31)	3 (3.57)		
<b>Educational status</b>			1.62	0.44
SHS 1	485(29.75)	23(27.38)		
SHS 2	645 (39.57)	39 (46.43)		
SHS 3	500 (30.67)	22 (26.19)		

Source: Field data (2021)

A chi-square test was conducted to examine the association between socio-demographic variables and BMI. The only significant relationship found was between gender and BMI ( $X^2=24.28$ ,  $P\text{-value}=0.001$ ), indicating that females tend to have higher obesity rates compared to males (see Table 8).



**Table 9: Association between Socio-Demographic Variables of Adolescents and the Development of Obesity**

Socio-demographic characteristics	Underweight	Normal	Overweigh t/Obesity	X <sup>2</sup>	P-value
<b>Gender</b>				24.28	0.001
Male	157 (59.47)	563 (45.70)	83 (38.07)		
Female	107 (40.53)	669 (54.30)	135 (61.93)		
<b>Age</b>				1.21	0.544
Adolescent	233 (88.26)	1111 (90.18)	193 (88.53)		
Adult	31 (11.74)	121 (9.82)	25 (11.47)		
<b>Religion</b>				4.39	0.623
Christian	252 (95.45)	1167 (94.72)	206 (94.50)		
Muslim	7 (2.65)	53 (4.30)	9 (4.13)		
Traditionalist	3 (1.14)	8 (0.65)	1 (0.46)		
Others	2 (0.76)	4 (0.32)	2 (0.92)		
<b>Educational</b>				8.40	0.07
SHS 1	65(24.62)	365 (29.63)	78 (35.78)		
SHS 2	118 (44.70)	483 (39.20)	83 (38.07)		
SHS 3	81 (30.68)	384 (31.17)	57 (26.15)		

Source: Field data (2021)

**Table 10: Relationship between Socio-demographics of Adolescents and Development of NCDs**

Variable	Odd ratio	P-value	95% Confident Interval
<b>Gender</b>			
Females	1.01	0.937	0.65-1.58
<b>Age</b>			
Adolescents	1.52	0.32	0.28-1.52
<b>Religion</b>			
Muslim	1.96	0.12	0.82-4.69
Traditionalist	12.4	0.00	2.90-52.86
<b>Educational Level</b>			
SHS 2	1.27	0.36	0.75-2.16
SHS 3	0.92	0.80	0.51

The finding showed that more than 90% of the participants were Christians, with Muslims, Traditionalists and other religions sharing a combined percentage of less than 5%. Furthermore, religion as a socio-demographic factor showed a relationship with the development of NCDs. Religion, just like culture, is a way of life for people. Cultural traditions have been observed to influence people's perceptions of modifiable risk factors for NCDs (Makamu-Beteck et al., 2022). Obviously, Christians may be seen to lead in the development of NCDs as the majority of participants suffering from NCDs are Christians (see Table 7). However, there is a strong association between developing NCDs and being a traditionalist (Table 8).

Adolescents who identified as traditionalists had a 12.4 times higher likelihood ( $p$ -value  $< 0.00$ ) of developing non-communicable diseases (NCDs). However, since traditionalists make up less than 1% of the sample (12 individuals), this higher association may be due to poor dietary habits among this small group (refer to Table 7). On the other hand, for those who identified

as Muslim, the odds ratio was 1.96 (p-value = 0.12), indicating a non-significant association. While Christians have an NCD rate of 4.8% (1 in 20), Muslims have a higher rate of 9.5% (1 in 10). Research by Wichaidit et al. (2014) suggests that Muslims consume more packaged snacks and fried foods regularly. Additionally, sedentary lifestyles linked to business occupations, such as shopkeeping, which are common among Muslims, have been associated with higher NCD rates in this group compared to others (Wandera et al., 2015).

Food plays a key role in the intricate web of risk factors affecting the onset of obesity and weight gain (Hormenu, 2022; Kumah et al., 2015). This issue impacts girls compared than boys. Although the relationship between gender and the development of non-communicable diseases (NCDs) was not statistically significant, it was observed that girls face a higher risk than boys. This is evidenced by an increasing odds ratio of 1.01 for females, as detailed in Table 8. Research conducted in Ghana also indicates that women are more likely to develop NCDs (Boakye et al., 2023).

Additionally, Dhungana et al. (2019) discovered that when educational attainment increases, the prevalence of overweight and obesity declines. Table 8 shows that in Senior High School (SHS) three, there are fewer obese or overweight pupils than in SHS two. This result is in line with other studies that indicate a greater prevalence of overweight and obesity among students in SHS two, the lower grade. Amugsi and Dimbuene's study from 2023 also showed that women with more educational attainment are more likely to become obese.

Furthermore, no significant relationship was found between educational attainment and the incidence of non-communicable diseases (NCDs), as illustrated in Table 8. When comparing students in SHS one to those in SHS

two, the likelihood of developing NCDs was higher for SHS two students (odds ratio = 1.27, p-value = 0.36) relative to those in SHS three. Wrottesley et al. (2023) have noted that higher levels of education are linked with a reduced probability of becoming overweight or obese. Conversely, research in Ghana indicates a positive association between higher education levels and increased obesity risk (Amugsi & Dimbuene, 2023). The current study did not find a correlation between age and NCD development, which could be due to the participants' narrow age range (14 to 20 years) and the minimal variation in educational levels, as all were in Senior High School (SHS). It is expected that adolescents' preventive behaviours regarding NCDs are shaped by their awareness of associated risk factors.

Religion and culture play a significant role in the development of non-communicable diseases (NCDs), especially among traditionalists with poor dietary habits. Muslims, in particular, show a higher prevalence of NCDs, which calls for targeted initiatives to improve their eating habits and encourage healthier lifestyles, including more physical activity. The research highlights a greater susceptibility to NCDs among females compared to males, emphasizing the need for gender-specific risk assessments and preventive measures, especially for teenage girls. The relationship between educational level and NCDs is complex. Early detection of risk factors for NCDs during adolescence is crucial, as behaviours formed in this period can have lasting health impacts. The findings underscore the necessity of health education and awareness programs aimed at teenagers, helping them understand NCD risk factors and make healthier lifestyle choices to potentially reduce long-term NCD risk.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study aimed to investigate the dietary practices and associated Non-Communicable Diseases (NCDs) among adolescents in Bekwai Municipal. This chapter comprises the summary and presents the main findings, conclusions and recommendations.

#### Summary

Non-communicable diseases are medical conditions that progress slowly without an infectious cause, often resulting in death if not detected and managed early (Nelson et al., 2015). Various elements, including genetics, metabolism, behaviour, and environment, exert effect on them. Unhealthy lifestyle behaviours, including inadequate diet, insufficient exercise, smoking, excessive alcohol use, excessive caffeine intake, and inadequate sleep, have been significantly linked to the occurrence of NCDs (Sajwani et al., 2009). The World Health Organisation (2019) identifies tobacco use, unhealthy diet, lack of exercise, and excessive alcohol consumption as the leading behavioural risk factors for NCDs. These habits can change one's biology and metabolism, increasing the likelihood of developing illnesses. Heart disease, cancer, chronic lung disease, and diabetes are the primary non-communicable diseases (NCDs) identified by the WHO in 2013. The worldwide burden of NCDs and premature mortality is greatly increased by a diet low in fruits and vegetables and rich in salt, saturated, and trans fats, together with a lack of physical exercise. It is thought that addressing these variables is essential for global initiatives. It is noteworthy, therefore, that studies conducted by Cecchini et al. (2010), Lachat et al. (2013), and Lim et al. (2012) have shown that the average consumption of

salt in many low- and middle-income nations surpasses the suggested upper limit.

Non-communicable diseases (NCDs) have become the predominant cause of death and illness globally, outpacing all other causes combined. In 2013, the World Health Organization (WHO) reported that NCDs were responsible for 71% (41 million) of the 57 million global deaths in 2016. The substantial medical costs related to NCDs greatly increase public healthcare expenses, resulting in higher government spending on medical services and treatments. This financial strain is especially severe in low- and middle-income countries (LMICs), exacerbating the poverty of already struggling populations (de Graft Aikins et al., 2012).

The impact of non-communicable diseases (NCDs) extends beyond healthcare expenses, influencing various aspects of individual lives and the economy. Early deaths from NCDs lead to lost income, missed investment chances, and hindered economic growth for both families and communities. Moreover, NCDs cause reduced quality of life, increased disability, lower productivity, and widespread discomfort. Addressing the prevention and management of NCDs is crucial not only to reducing financial strain but also to improving overall well-being and fostering sustainable economic development (Bhattacharjee et al., 2015; Chaker et al., 2015; Unwin & Alberti, 2006; WHO, 2010).

Ghana is among the African countries with a high mortality rate from non-communicable diseases (NCDs). The rapid pace of urbanization and industrialization in the country has intensified problems with NCDs, including hypertension (48%) and diabetes (9%) (Kraja et al., 2016; Peykari et al., 2017).

In response, Ghana's Ministry of Health launched the Regenerative Health and Nutrition Programme (RHNP) in 2006, aimed at encouraging healthy lifestyles, creating supportive environments, and providing health and nutrition services to combat NCDs (Christian et al., 2021). However, adherence to healthy living and dietary practices remains low. Research by Tachi et al. (2020) revealed that approximately 25% of older adults in Ghana had insufficient fruit and vegetable consumption and were consuming alcohol.

The prevalence of non-communicable diseases (NCDs) is increasing among adolescents. Conditions such as obesity, diabetes, hypertension, and cancer are becoming more common in various age groups. For example, in the 10-14 age bracket, the prevalence rates are 310 for obesity, 421 for diabetes, 368 for hypertension, and 697 for cancer. In the 15-17 age group, the rates rise to 185 for obesity, 790 for diabetes, 737 for hypertension, and 701 for cancer. For those aged 18-19, the prevalence rates are 182 for obesity, 2,298 for hypertension, 1,559 for diabetes, and 895 for cancer (DHIMS2). Families with children suffering from NCDs face significant financial and social challenges, particularly during hospital stays, often enduring substantial financial strain without sufficient support from friends and family (Anarfi et al., 2016).

The accumulation of avoidable risk factors, such as alcohol use, smoking, and inadequate physical exercise, considerably increases heart illnesses. This is especially true in low- and middle-income countries (LMICs) metropolitan regions, where the food, tobacco, and alcohol sectors are expanding at a rapid rate due to urbanisation (Unwin & Alberti, 2006). These lifestyle choices have a substantial impact on health later in life and frequently

start in infancy and adolescence and continue throughout adulthood (Barbosa, 2014; MOH, 2012).

A descriptive cross-sectional survey using a quantitative methodology was used in the study. Using simple random selection, four schools were chosen at random from eight Senior High Schools in Bekwai Municipality. Using stratified sampling, students were divided into SHS one, two, and three groups. 1,714 students participated in the study, with 50% of the participants coming from each group.

I adjusted a survey derived from the Food Frequency Questionnaire (FFQ) utilized by researchers for assessing dietary habits (Henn et al., 2010). My supervisors reviewed the instrument, and a pilot study was conducted to ensure its validity and reliability before field deployment. The data were analyzed using various statistical techniques, such as frequencies, percentages, means, standard deviations, chi-square tests, Mann-Whitney tests, and regression analysis.

### **Main Findings**

1. Most (65%) of the adolescents had inadequate knowledge about NCDs. 10% had no knowledge, and a quarter of the adolescents had adequate knowledge about cancers, hypertension and diabetes.
2. The majority of the adolescents (71.35%) have heard of cancers, hypertension and diabetes, and the main sources of information were social media (47.08%) and health personnel (36%). Other sources included parents, peers and relatives.



3. More than 50% of the adolescents had poor dietary practices due to excessive consumption of meat and fish, sweets and snacks, dairy products and fats, and drinks.
4. The consumption of fruits (90%) and vegetables (97%) was high among the adolescent.
5. Gender influences the consumption of meat and fish, bread and savoury biscuits, dairy products and fats and drinks, with girls prone to poor dietary practices than boys. Girls have a greater risk of developing obesity than boys, suggesting a need for targeted interventions to address this health issue among adolescent females.
6. The BMI of adolescents does not increase their risk of developing cancers, hypertension and diabetes in the future.
7. Poor dietary practice does not influence the development of both NCDs (p-Value 0.81) and obesity (p-Value 0.07) among adolescents. However, good dietary practices can help reduce overweight and obesity.
8. Adolescents who consume many fruits are 42% less likely to develop cancers, hypertension and diabetes.
9. Sociodemographic factors such as identifying as a Traditionalist or Muslim, being female and having a higher level of education are associated with an increased risk of adolescents developing conditions such as cancer, hypertension, diabetes, and obesity when compared to those who identify as Christian, are male, or have a lower educational level.

## Conclusions

1. Adolescents had insufficient knowledge about cancer, hypertension, diabetes, and obesity.
2. The nature of the dietary practices of more than half of the adolescents was poor.
3. The BMI of adolescents does not increase their risk of developing cancers, hypertension, diabetes and overweight/obesity in the future.
4. Boys and girls differ in their dietary practices, and adolescent girls engage in poor dietary practices than boys.
5. The overall dietary practices of an adolescent do not predict their development of cancers, hypertension, diabetes and overweight/obesity.
6. Sociodemographic variables like Muslim, being female, and higher education increase the risk of developing cancer, hypertension, diabetes, and overweight/obesity.

## Recommendations

1. The Ghana Education Service (GES) should modify the curriculum to include education on NCDs to improve the knowledge of adolescents on NCDs.
2. Ghana Education Service should prohibit the sale of sugar-sweetened beverages, alcohol and “junk food” in and around SHS to reduce access to them to promote good dietary practices among adolescents.
3. The GHS, headmasters and teachers in the various schools should educate the adolescents on the importance of maintaining a healthy weight to maintain their BMI to avert the development of NCDs.

4. To the GHS, Health promotion programs should focus on girls for healthy dietary practices, reducing processed meat, junk food, and sugar-sweetened beverages to prevent NCDs and obesity in the future.
5. Ghana Health Service (GHS), through the school health programme, should educate adolescents on the importance of good dietary habits, such as a high intake of fruits, to in the prevention of the development of NCDs
6. GHS should provide tailored intervention towards females, people with higher education, and religious people to promote healthy behaviours that reduce their risk of developing NCDs.

#### **Suggestions for Further Research**

1. Additional research is needed to explore the relationship between dietary practices, BMI, and NCDs in different populations to inform targeted interventions for effective prevention and management of NCDs.
2. A specific aspect of the dietary practices of adolescents in Bekwai Municipality needs to be studied.

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APPENDICES

**APPENDIX 1**  
**QUESTIONNAIRE**

**UNIVERSITY OF CAPE COAST**

**COLLEGE OF EDUCATION STUDIES**

**FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION**

**DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND**

**RECREATION**

This questionnaire is for academic research, and it aims to assess dietary practices and the development of certain Non-Communicable Diseases (NCDs) in the Ashanti region. Your responses will be treated confidentially, and all information will be reported as aggregated data. Hence, you are not required to write your name. There are no wrong or right answers. Kindly tick the appropriate spaces provided or write what you think in the open-ended questions. The questionnaires will take approximately 20 minutes at most to be completed.

***Instruction: Read each question carefully and tick (✓) or specify where necessary.***

**PART 1: SECTION A: DEMOGRAPHIC DATA**

1. Age: .....
2. Gender
  - a. Male [ ]
  - b. Female [ ]
  - c. Others [ ]
  - d. I don't want to answer [ ]

## 3. Religion

- a. Christian
- b. Muslim
- c. Traditionalist
- d. Other (specify).....

## 4. Educational level

- a. S.H. S 1
- b. S.H. S 2
- c. S.H. S 3

## 5. Do you have history of any of the following NCDs in your family?

(tick all that apply)

- a. Hypertension
- b. Diabetes (Mellitus)
- c. Cancer
- d. Others,  
specify.....

## 6. Are you suffering from any NCDs?

- a. Yes
- b. No
- c. Not sure

## 7. If answer to 6 is yes, which one of the NCDs are you suffering from?

- a. Hypertension
- b. Diabetes (Mellitus)
- c. Cancer

d. Others,

specify.....

8. Weight.....

9. Height.....

## SECTION B: DIETARY ASSESSMENT

Please estimate your average food use as best you can, and please answer every question, do not leave any lines blank. Please put a tick (✓).

### KNOWLEDGE ON NCD

**10.** Have you heard of non-communicable disease (NCDs)?

- a. Yes [ ]
- b. No [ ]
- c. Not sure [ ]

**11.** What is the source of your information?

- a. Health personnel [ ]
- b. Social media [ ]
- c. Multimedia [ ]
- d. Parent [ ]
- e. Peers [ ]
- f. Relatives [ ]

**12.** How do you understand non-communicable disease (NCDs)?

- a. A disease which comes suddenly and has no known cause [ ]
- b. A disease which develop gradually over a long period of time  
cause by microorganism [ ]

- c. A disease which develop gradually over a long period of time and has no known cause [ ]
- d. A disease which affect adults in society [ ]
- e. A disease of the rich people [ ]

13. Which of the following is (are) true about NCDs? Select all that applies

- a. They are caused by hereditary factors [ ]
- b. They are disease that run in the family [ ]
- c. They are sudden and cause death [ ]
- d. They develop gradually [ ]
- e. Physical activity can prevent the development of NCDs [ ]
- f. They can be to transmitted from one person to the other [ ]
- g. Eating an unhealthy diet can cause development of NCDs [ ]
- h. They are caused by a sedentary lifestyle [ ]
- i. Taking too much fruits and vegetables can cause NCDs [ ]
- j. Obesity is a risk factor for most NCDs [ ]

### **PART 2: SECTION C: DIETARY ASSESSMENT**

Please estimate your average food use as best you can, and please answer every question, and do not leave any lines blank. Please put a tick (✓). Each item has a positive and a negative pole with a scale of 1 to 4 ranging in between. The following numbers and codes have been assigned: 1=Always, 2=Usually, 3=Rarely, 4=Never.



FOODS AND AMOUNTS	Average use last year			
	Always	Usually	Rarely	Never
MEAT AND FISH (MEDIUM SERVING)				
Beef: roast, steak, mince, stew				
Beefburgers				
Pork: roast, chops or stew				
Chicken or other poultry e.g. turkey				
Corned beef				
Sausages				
Savoury pies, eg. Meat pie, pork pie, pasties, steak & kidney pie, sausages rolls				
Liver, liver pate, liver sausage				
Fried fish in batter, as in fish and chips				
Oily fish, fresh or canned, e.g. mackerel, kippers, tuna, salmon, sardines, herrings				
Shellfish, e.g. crab, prawns, muscles				

Please put a tick (✓) on every line

FOODS AND AMOUNTS	Average use last year			
	Always	Usually	Rarely	Never
BREAD AND SAVOURY BISCUITS (One slice or biscuit)				
White bread and rolls				
Brown bread and rolls				
Whole meal bread and rolls				
Cream crackers, cheese biscuits				
Crispbread, eg Ryvita				

CEREALS (ONE BOWL)				
Porridge, Readybrek				
Breakfast cereal such as cornflakes, muesli etc.				
POTATOES, RICE AND PASTA (medium serving)				
Chip				
Roast potatoes				
Potato salad				
White rice				
Brown rice				
White e.g. Spaghetti, macaroni, noodles				
Pizza				

Please put a tick (✓) on every line

FOODS AND AMOUNTS	Average use last year			
DAIRY PRODUCTS AND FATS	Always	Usually	Rarely	Never
Yogurt				
Cheese				
Eggs as boiled, fried, scrambled, etc (one)				
Salad cream, mayonnaise (tables spoon)				
The following are on bread or vegetables				
Butter (teaspoon)				
Other soft margarine, dairy spreads(tub), eg blue band, clover (teaspoon)				

Please put a tick (✓) on every line

FOODS AND AMOUNTS	Average use last year			
	Always	Usually	Rarely	Never
SWEETS AND SNACKS (medium serving)				
Sweet biscuits, chocolate, e.g. digestive (one)				
Sweet biscuits, plain, e.g. Nice, ginger (one)				
Cakes e.g. Fruit, sponge				
Pastries e.g. Croissants, doughnuts				
Fruit pies, tarts, crumbles, home baked				
Milk puddings, e.g. rice, custard, trifle				
Ice cream				
Chocolates				
Sweets, toffees, mints				
Sugar added to tea, coffee, cereal (teaspoon)				
Peanuts or other nuts				
SOUPS, SAUCES AND SPREADS				
Vegetables soups (bowl)				
Meat soups (bowl)				
Sauces e.g. cheese sauce, gravy (tablespoon)				
Jam, marmalade, honey (teaspoon)				
Peanut butter (teaspoon)				

Please put a tick (✓) on every line

FOODS AND AMOUNTS	Average use last year			
	Always	Usually	Rarely	Never
DRINKS				
Tea				
Coffee, instant or ground (cup)				
Coffee, decaffeinated (cup)				
Cocoa, hot chocolate (cup)				
Horlicks, ovaltine (cup)				
Wine (glass)				
Beer, lager or cider (half pint)				
Spirit, eg, gin, brandy, vodka (single)				
Fizzy soft drinks, eg coca cola, lemonade (glass)				
Pure fruit juice (100%) eg. Orange, apple juice (glass)				
FRUIT				
For seasonal fruit marked*, please estimate your average use when the fruit is in season				
Apples (1 fruit)				
Pears (1 fruit)				
Oranges, satsumas, mandarins (1 fruit)				
Grape fruit (half)				
Bananas (1 fruit)				
Grapes (medium serving)				

Melon ( 1 slice)				
*Mango(1 fruit)				
* Pear				

Please put a tick (✓) on every line

FOODS AND AMOUNTS	Average use last year			
	Always	Usually	Rarely	Never
VEGETABLES				
Fresh, frozen or tinned (medium serving)				
Carrots				
Cabbage				
Peas				
Green beans, broad beans, runner beans				
Onions				
Garlic				
Mushrooms				
Green salad, lettuce, cucumber, celery				
Tomatoes				
Avocado				
Baked beans				
Soya meat, Vegeburger				



## APPENDIX II

## CLEARANCE, INTRODUCTORY AND PERMISSION LETTERS

## UNIVERSITY OF CAPE COAST

## INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0568878309  
E-MAIL: [irba@ucc.edu.gh](mailto:irba@ucc.edu.gh)  
OUR REF: UCC/IRB/A/2016/1145  
YOUR REF:  
OMB NO: 0990-0279  
IORG #: IORG0009096

8<sup>TH</sup> NOVEMBER 2021

Mr. Philemon Adu Brempong  
Department of Health, Physical Education and Recreation  
University of Cape Coast

Dear Mr. Brempong,

**ETHICAL CLEARANCE – ID (UCCIRB/CES/2021/76)**

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research titled **Dietary Practices and Associated Non-Communicable Diseases among Adolescents in Bekwai Municipal**. This approval is valid from 8th November 2021 to 7<sup>th</sup> November, 2022. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Handwritten signature of Samuel Asiedu Owusu.

Samuel Asiedu Owusu, PhD  
UCCIRB Administrator

INSTITUTIONAL REVIEW BOARD  
UNIVERSITY OF CAPE COAST

UNIVERSITY OF CAPE COAST  
COLLEGE OF EDUCATION STUDIES  
FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION  
*DEPARTMENT OF HEALTH, PHYSICAL EDUCATION & RECREATION*

TELEPHONE: +233 - (0)206610931 / (0)543021384 /  
(0)268392819

EMAIL: [hper@ucc.edu.gh](mailto:hper@ucc.edu.gh)

TELEX: 2552, UCC, GH.

Cables & Telegrams:  
UNIVERSITY, CAPE COAST

Our Ref: ET/HLE/19/0007/4



12<sup>th</sup> March, 2021.

The Chairman  
Institutional Review Board  
University of Cape Coast  
Cape Coast

**INTRODUCTORY LETTER: PHILEMON ADU BREMPONG (ET/HLE/19/0007)**

The bearer of this letter, Philemon Adu Brempong, is an MPhil student of the above-named department. I support his application for ethical clearance from your outfit. He is conducting a research on the topic "**Dietary Practices and Associated Non-Communicable Diseases Among Adolescents in Bekwai Municipal.**" As part of the requirements for obtaining a Master of Philosophy degree in Health Education at the University of Cape Coast.

I am the Principal Supervisor of his work and he has satisfied the conditions for data collection. I shall be grateful if he is given the necessary assistance.

Counting on your usual co-operation.

Thank you.



Dr. Edward Wilson Ansah  
PRINCIPAL SUPERVISOR  
[edward.ansah@ucc.edu.gh](mailto:edward.ansah@ucc.edu.gh)

# GHANA EDUCATION SERVICE

*In case of reply the number and  
Date of this letter should be quoted*

Municipal Education Office  
P. O. Box 110  
Bekwai- Ashanti

O.1/VOL.III/135

Our Ref. No

Your Ref. No



28<sup>th</sup> June, 2021

**ALL HEADS OF SHS CONCERN  
BEKWAI MUNICIPAL**

## INTRODUCTORY LETTER

**NAME: MR. PHILEMON ADU BREMPONG**

The Municipal Directorate of Education wishes to introduce to you Mr. Philemon Adu Brempong, a graduate student at the University of Cape Coast.

He wants to conduct a research in your school titled "Dietary Practices and Associated Non-Communicable Diseases Among Adolescents in Bekwai Municipal".

We would be very grateful if he is accorded the necessary assistance.

Thank you.

LETICIA OBENG (MRS)  
(MUNICIPAL DIRECTOR)