

ENSIGN GLOBAL COLLEGE
KPONG-EASTERN REGION, GHANA

THE EFFECT OF NUTRITION EDUCATION ON OVERWEIGHT AND OBESITY
KNOWLEDGE IN A RURAL AREA IN GHANA

BY

JANE NYARKO BARNES

STUDENT ID: 227100217

A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH IN
THE DEPARTMENT OF PUBLIC HEALTH IN PARTIAL
FULFILMENT OF THE REQUIREMENT
FOR THE AWARD OF A
MASTERS DEGREE IN PUBLIC HEALTH

DECLARATION

I hereby certify that, except for reference to other works, which I have duly cited, this Project submitted to the Department of Community Health, Ensign Global College of Public Health, Kpong is the result of my investigation and has not been presented for any other degree elsewhere.

JANE NYARKO BARNES

(ID-227100217)

(Student)

Signature

Date

(Certified by)

DR. SANDRA BOATEMAA KUSHITOR

(Supervisor)

Signature

Date

(Certified by)

DR. STEPHEN MANORTEY

(Head of Academic Programme)

Signature

Date

DEDICATION

I, with so much gratitude, dedicate this work to the Almighty God for the profound grace and wisdom bestowed upon me throughout the composition of this thesis. Furthermore, I extend this contribution to my family, especially my dear children, Jason and Jael Tay, for their selflessness and sacrifice which has been my steadfast motivation throughout my study, and to my dear husband Mr. Ishmael Tay for the Love and support. Lastly, I dedicate this thesis to my dear self; it has been a journey worthwhile!

ACKNOWLEDGEMENT

I am profoundly grateful to Ensign Global College for their generous support, which played a pivotal role in making this thesis a reality. I extend my heartfelt appreciation to my dearest supervisor, Dr. Sandra Kushitor for her unwavering guidance, invaluable insights, and constant encouragement throughout this research. Her expertise and dedication have been instrumental in shaping the direction and quality of this work. I am indebted to the esteemed faculty members at Ensign Global College for their role in fostering a conducive academic environment. Their expertise, mentorship, and insightful discussions have been invaluable in shaping my understanding and refining my research. Lastly, I want to thank my Parents for their unwavering support, understanding, and patience during this journey. Your encouragement gave me the strength to persevere through the challenges and celebrate achievements.

FUNDING

This study is a follow-up of the LinkINg Up Initiative, which was funded by the International Development Research Centre, Ottawa, Canada. The Canadian Queen Elizabeth II Diamond Jubilee Scholarships (QES) is managed through a unique partnership of Universities in Canada, the Rideau Hall Foundation (RHF), the Community of Canada (CFC), and Canadian universities. The QESAS is made possible with financial support from IDRC and SSHRC.

This study was funded by the Ensign Global College, the Department of Community Health, Faculty Development Fund.

DEFINITION OF TERMS

NUTRITION EDUCATION

The process of teaching individuals or groups about healthy eating habits and the importance of nutrition for overall well-being.

OBESITY

Abnormal or excessive fat accumulation that presents a health risk.

OVERWEIGHT

Weight that is higher than what is considered healthy for a given height.

ABBREVIATION/ACRONYMS

DALYS	Disability-Adjusted Life Years
QALYS	Quality-Adjusted Life Years
FBO	Farmer-Based Organization
WIAD	Women in Agricultural Development
IOTF	International Obesity Taskforce
BMI	Body Mass Index
WHO	World Health Organization
ORK	Obesity Risk Scale
NE	Nutrition Education
NCD	Non-Communicable Diseases

ABSTRACT

Background: The prevalence of overweight and obesity is rising globally, including in low- and middle-income countries like Ghana. This study aims to assess the effectiveness of a nutrition education intervention in enhancing knowledge and promoting positive behaviors related to overweight and obesity in a rural area of the Eastern Region of Ghana.

Methods: The study employed a mixed-method approach of both quantitative and qualitative methods. A community-based intervention which involved nutrition education sessions, songs, food demonstrations, and community engagement was adopted for the study. Baseline and end-line surveys were conducted on socio-demographic characteristics and assessment of participants' knowledge, attitudes, and behaviors regarding overweight and obesity. The study lasted for a period of six months from December 2022 to June 2023. The intervention's impact on participants' knowledge and behaviors was analyzed using descriptive statistics.

Results: The study revealed that participants' awareness and knowledge about overweight and obesity varied, with some misconceptions present. The nutrition education intervention significantly improved participants' knowledge of obesity (mean change = 1.39, $p=0.001$). Positive behavioral changes were observed, including increased engagement in post-meal exercises, incorporating diverse foods into diets, and reduced late-night eating. The intervention also had a positive influence on family behaviors.

Conclusion: The nutrition education intervention effectively enhanced participants' knowledge and promoted positive behaviors related to overweight and obesity. The incorporation of culturally sensitive approaches and the involvement of families and community resources contributed to the success of the intervention. The findings emphasize the importance of comprehensive health

education programs in addressing the challenges posed by the increasing prevalence of overweight and obesity in rural settings.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENT	iii
FUNDING	iv
DEFINITION OF TERMS	v
ABBREVIATION/ACRONYMS.....	vi
ABSTRACT	vii
LIST OF FIGURES	xiii
LIST OF APPENDICES	xiv
CHAPTER ONE.....	1
1.0 INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PROBLEM STATEMENT	3
1.3 RATIONALE OF THE STUDY	5
1.4 CONCEPTUAL FRAMEWORK.....	5
1.5 RESEARCH QUESTIONS	7
1.6 GENERAL OBJECTIVE.....	8
1.6.1 SPECIFIC OBJECTIVES	8
1.7 PROFILE OF STUDY AREA	8
1.8 SCOPE OF STUDY	10
1.9. ORGANIZATION OF REPORT.....	11
CHAPTER TWO.....	13
LITERATURE REVIEW	13
2.0. INTRODUCTION	13
2.1. OVERWEIGHT AND OBESITY: PREVALENCE AND RISK FACTORS	14
2.1.1. IMPLICATIONS OF OVERWEIGHT AND OBESITY ON HEALTH	15
2.2. KNOWLEDGE OF OVERWEIGHT AND OBESITY.....	16
2.2.1. LEVELS OF KNOWLEDGE ON OVERWEIGHT AND OBESITY	16
2.3. SOURCES OF INFORMATION ON OVERWEIGHT AND OBESITY	17

2.4. NUTRITION EDUCATION	18
2.4.1 Forms of Nutrition Education	19
2.4.2 Effects of Nutrition Education On Overweight and Obesity	20
CHAPTER THREE	22
METHODOLOGY	22
3.1. RESEARCH METHOD AND DESIGN	22
3.2. DATA COLLECTION TECHNIQUES AND TOOLS.....	23
3.2.1 Baseline Data	24
3.2.2 Intervention	25
3.2.2 Endline Data.....	26
3.3. STUDY POPULATION	27
3.4. INCLUSION CRITERIA.....	28
3.5. STUDY VARIABLES.....	28
3.5.1 Knowledge About Overweight and Obesity	28
3.6. DATA HANDLING	29
3.7. DATA ANALYSIS.....	29
3.8. ETHICAL CONSIDERATION	31
3.9. LIMITATIONS OF THE STUDY.....	31
3.10. ASSUMPTIONS.....	31
CHAPTER FOUR	32
RESULTS	32
4.0. QUANTITATIVE RESULTS	32
4.1 Socio-demographic characteristics of respondents.....	32
4.2 Frequency of Attendance to Nutrition Education Sessions	35
4.3. ANALYSIS OF DIFFERENCES IN CHANGES IN NUTRITION EDUCATION.....	38
4.2 QUALITATIVE RESULTS	41
CHAPTER FIVE	49
5.0 DISCUSSION	49
5.1 INTRODUCTION	49

5.2. KNOWLEDGE AND AWARENESS ABOUT OVERWEIGHT AND OBESITY	49
5.3. BEHAVIORAL CHANGES	50
5.4 SOURCES OF KNOWLEDGE	51
5.5 LIMITATIONS	52
CHAPTER SIX.....	53
CONCLUSION AND RECOMMENDATIONS	53
6.1 INTRODUCTION	53
6.2 SUMMARY OF FINDINGS	53
6.3 IMPLICATIONS AND SIGNIFICANCE	53
6.4 CONCLUSION.....	54
6.5 RECOMMENDATIONS	54
REFERENCES	56
APPENDIX I	i
APPENDIX II: ETHICAL CLEARANCE.....	iii

LIST OF TABLES

Table 1: Distribution of Characteristics of Study Participants.....	34
Table 2: Lessons attended	35
Table 3: ORK-10 scores.....	40

LIST OF FIGURES

Figure 1: International Obesity Taskforce Framework for Overweight and Obesity Prevention....	7
Figure 2: Administrative Map of Lower Manya Krobo Municipality.	10
Figure 3: Study Phases	22

LIST OF APPENDICES

APPENDIX I.....	i
APPENDIX II: ETHICAL CLEARANCE.....	iii

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Global public health issues related to obesity and overweight exist (Charles *et al.*, 2015). In 2010, it was projected worldwide that, overweight and obesity contributed to 3.4 million deaths, 3.9% of years of life lost, and 3.8% of disability-adjusted life-years (DALYs) according to Ng *et al.*, 2014. Numerous demands have been made for continuous monitoring of changes in overweight and obesity prevalence across all populations due to the increasing obesity rates (Ng *et al.*, 2014). Obesity is a significant risk factor for several comorbidities, including type II diabetes, cancer, cardiovascular disease, and other illnesses that have high morbidity and mortality rates (Fruh, 2017). In addition to their negative effects on health, overweight and obesity have some associated financial implications. The estimated medical expenditures for overweight and obesity ranges from 54% to 59% when health-related comorbidities are considered (Dee *et al.*, 2014). Thus, overweight and obesity are the focus of many public health concerns regarding prevention, control, and the decrease in prevalence (Marques *et al.*, 2018). Due to the impression that these illnesses are more common in cities, the problem of overweight and obesity has long been linked to urbanization. Recent studies suggest that the worldwide obesity crisis may be mostly caused by weight gain in rural areas. People who live in rural locations are more likely to become obese than their urban counterparts, according to a 2019 study by Bixby *et al.* This is caused by several things, such as a lack of access to wholesome foods, fewer opportunities for exercise, and scarce healthcare services. In accordance with a study by Kirunda *et al.* (2015), the prevalence of overweight and obesity is a developing concern in Africa, with rates ranging from 20% to 50% in

urban regions and 7% to 30% in rural areas. These figures show a marked rise in the frequency of chronic diseases across the continent, which is partly attributable to changes in lifestyle, such as a move toward sedentary behavior and a diet high in calories but lacking in nutrients.

Reduced consumption of foods high in calories and other weight loss strategies are becoming increasingly well-liked and supported (Metzgar *et al.*, 2015). In Ghana, an estimated 50.6% of the adult population is either overweight or obese (Lartey *et al.*, 2019). Although the prevalence of overweight and obesity is high in Ghana's urban regions, it is progressively rising in the rural areas as well. There is however a very limited number of interventions available to address overweight and obesity in rural locations (Kushitor and Colecraft, 2023).

In a nation that is still fighting with numerous infectious and parasitic illnesses, the potential consequences on the current and future well-being of the population, the prevalence of chronic diseases, healthcare expenditures, and the overall economy could be substantial. To eradicate this epidemic, it is imperative to implement immediate public health preventative actions that are tailored to the Ghanaian context, culturally aware, cost-efficient, and enduring (Ofori-Asenso *et al.*, 2016).

It is widely recognized that, nutrition education is a crucial catalyst for nutrition effects in community, health, and food security programs. Prioritizing nutrition education is crucial for a financially viable, doable, and long-lasting intervention to combat the epidemic of overweight and obesity, particularly among rural populations; Nutrition education is the learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being (Contento, 2008). It is therefore evident that nutrition education is capable of improving dietary behavior and nutritional status (World Health Organization-Best Buys, 2017).

1.2 PROBLEM STATEMENT

According to WHO, the prevalence of overweight and obesity has nearly tripled globally since 1957. Over 1.9 billion adults aged 18 and above were categorized as overweight, with an additional 650 million falling into the obese category representing 39% and 13% respectively (WHO, 2016). The problem of overweight obesity has been present throughout human history, but the current epidemic of obesity is relatively a recent phenomenon. The prevalence of overweight and obesity has been increasing rapidly since the mid-20th century and has become a significant public health issue in numerous regions across the globe. In the United States, for example, the prevalence of obesity among adults has more than doubled since the 1980s (Flegal, *et al* 2013). Overweight and obesity are public health issues that affect people of all ages, genders, and ethnicities worldwide.

Overweight and obesity are more prevalent in high-income countries and among urban populations. Within these populations, overweight and obesity are more prevalent among women than men and among older age groups. In low and middle-income countries, the prevalence of overweight and obesity is increasing rapidly, particularly among urban populations (Popkin and Slining, 2013). Though overweight and obesity are high in urban settings, this public health menace seems to be increasing steadily among rural folks (Bixby *et al.*, 2019). This trend has been observed in many countries including Ghana. For example, a study conducted by Asenso *et al.* (2016) revealed that the prevalence of overweight and obesity is increasing in rural Ghana.

Specifically, the study found that in rural areas, the prevalence of overweight was 16% and the prevalence of obesity was 8.0%. Compared to urban areas, the prevalence of overweight was 27.2% and the prevalence of obesity was 20.6%. These results suggest that, overweight and obesity are becoming a growing concern in rural Ghana, driven by factors such as alterations in

dietary habits and levels of physical activity. Overweight and obesity are associated with reduced life expectancy and quality-adjusted life years (QALYS) in the Ghanaian population. While a Ghanaian woman with normal weight has 42.3 additional years, an overweight or obese woman has 40.8 or 38.9 additional years respectively, that of men were 37.1 for normal weight, 35.6 and 33.5 for overweight and obese respectively. Besides the reduced life expectancy and quality of life years, overweight and obesity are also associated with higher lifetime costs due to increased healthcare utilization and reduced productivity (Lartey *et al.*, 2020).

Though overweight and obesity are increasing steadily in rural settings and adding to the global chronic disease burden, limited research exists on the effectiveness of intervention in rural populations. There is therefore the need for more rigorous studies to evaluate the effectiveness of interventions to prevent and treat overweight and obesity in rural populations to bridge the gap of generalizability to other settings.

Again, nutrition education has been identified as one intervention for addressing overweight and obesity by improving knowledge about healthy eating habits (Pérez-Escamilla, 2017). However, there is a lack of research on the effectiveness of nutrition education programs in improving knowledge about overweight and obesity (Wang, 2015). This is a significant gap in the literature, as education is a key component of public health interventions for preventing and managing overweight and obesity (Malik *et al.*, 2013). There is therefore the need for research on the effects of nutrition education on overweight and obesity knowledge in adults to inform the development of effective public health interventions in this area and to add to the literature.

1.3 RATIONALE OF THE STUDY

The prevalence of overweight and obesity is increasing in urban areas and the rural areas as well. While the prevalence of overweight and obesity stands at 23.8 % in urban areas and 15.8 % in rural areas (Kirunda *et al.*, 2015), the prevalence of overweight and obesity in rural and urban Ghana is 24.7% and 47.8% respectively (Ofori-Asenso *et al.*, 2016). Overweight and obesity are major public health concerns that contribute to a range of chronic diseases and health problems. By improving knowledge about healthy eating habits and lifestyle choices in rural areas, nutrition education programs have the potential to significantly improve public health outcomes. There is however little to no literature about the effect of nutrition education in Ghana especially in the rural areas where overweight and obesity are increasing. This study therefore will add to the literature and close the gap that exists literature.

Additionally, there is currently no established overweight and obesity education program that has been evaluated in a rural setting in Ghana (Kushitor and Colecraft, 2023). This study, therefore, aims to use a facilitator guide developed through a multisectoral process with Nutrition and Women in Agricultural Development (WIAD) officers in the Lower Manya Krobo, Yilo Krobo, and Upper Manya Krobo Districts for nutrition education on overweight and obesity in a rural area in Lower Manya Krobo.

1.4 CONCEPTUAL FRAMEWORK

Figure 1.1 represents the International Obesity Taskforce (IOTF) Framework (Health Promotion to Prevent Obesity, Evidence, and Policy Needs). This is a comprehensive approach to addressing the global obesity epidemic through research, advocacy, and policy development. To better

understand the effectiveness of the IOTF Framework, the framework was based on four main constructs: questions, the evidence needed, issues, and outputs.

Questions: The IOTF Framework raises several critical questions about how to address obesity on a global scale. These questions include: How we accurately monitor and track the prevalence of obesity and related risk factors across different populations and countries, what are the most effective prevention and management strategies for obesity, and these be tailored to meet the needs of different cultural, social, and economic contexts. It also looks at the policies and interventions needed to promote healthy eating and physical activity and reduce the social and economic factors that contribute to obesity.

Evidence Needed: To effectively answer these questions, the IOTF Framework requires a compelling evidence base. This evidence is a comprehensive data on the prevalence of obesity and related risk factors, as well as trends over time. Rigorous evaluation of prevention and management strategies, analysis of the social, cultural, and economic factors that contribute to obesity, and the effectiveness of policies and interventions in addressing these factors.

Issues: The IOTF Framework addresses several critical issues related to obesity prevention and management. These issues can stem from a comprehensive and coordinated approach that involves collaboration between different sectors and stakeholders, the importance of tailoring interventions and policies to meet the needs of different populations and contexts, and the need for a focus on prevention, as well as treatment and management.

Outputs: The ultimate outputs of the IOTF Framework are improved obesity prevention and management outcomes which include but are not limited to; Reduced prevalence of obesity and related risk factors, improved health outcomes for individuals affected by obesity and related conditions, and reduced healthcare costs associated with obesity and related conditions.

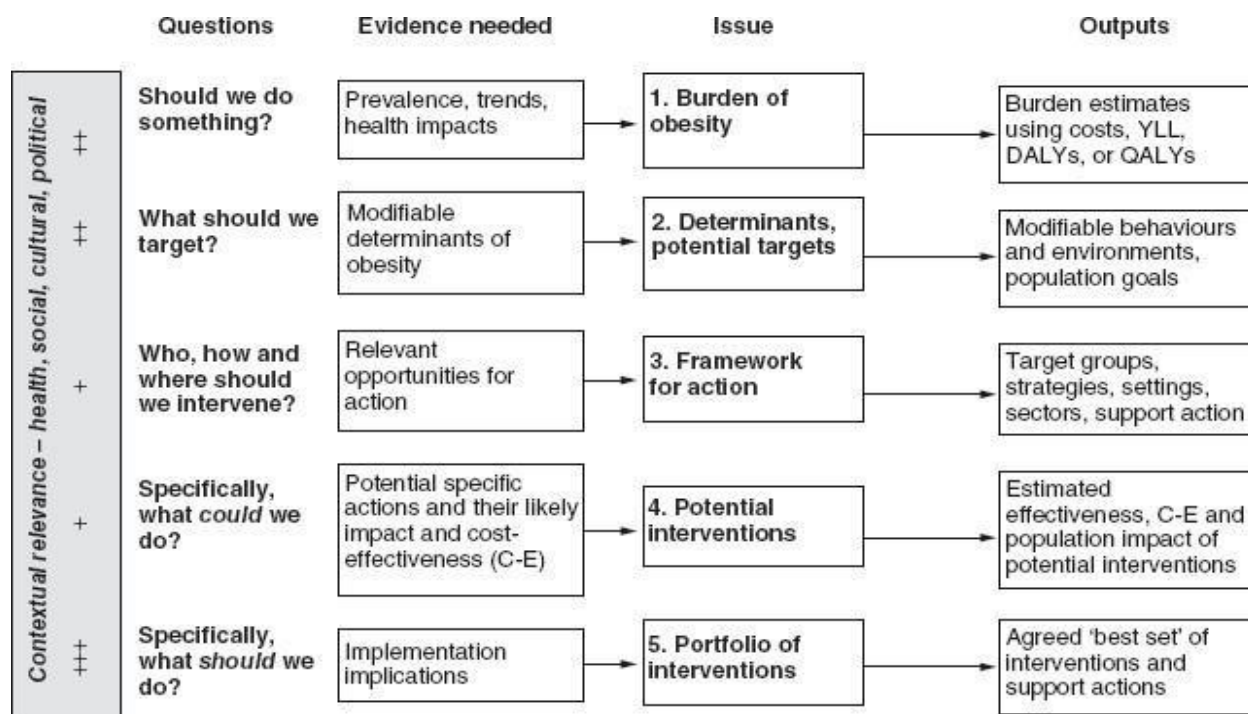


Figure 1: International Obesity Taskforce Framework for Overweight and Obesity Prevention.

Source: Health Promotion to Prevent Obesity, Evidence, and Policy Needs

The study focuses on the ‘What should we target?’ and ‘What could we do?’ components of the framework. Nutrition knowledge and behavior are established modifiable risk factors for overweight and obesity.

1.5 RESEARCH QUESTIONS

1. What is the level of knowledge on overweight and obesity among study participants?
2. How does the community get to know about overweight and obesity, its implications, and weight management?
3. What is the impact of nutrition education on overweight and obesity knowledge?

1.6 GENERAL OBJECTIVE

The study aims to examine the impact of nutrition education on overweight and obesity knowledge in a rural setting in Ghana.

1.6.1 SPECIFIC OBJECTIVES

To achieve the general objective, the study sets out these targets:

1. To assess the knowledge on overweight and obesity among study participants.
2. To implement a nutrition education program on overweight and obesity, its implications, and weight management.
3. To assess the impact of nutrition education on overweight and obesity knowledge.

1.7 PROFILE OF STUDY AREA

The Lower Manya Krobo Municipality is one of the 261 Metropolitan, Municipal, and District Assemblies (MMDAs) in Ghana, belonging to the Eastern Region, one of the thirty-three Municipalities and Districts in the region. It is situated between latitude 6.05S and 6.30N and longitude 0.08E and 0.20W, with its Administrative Capital in Odumase. Covering an area of 316 square kilometers, it constitutes approximately 8.1% of the total land area in the region, which is 18,310 square kilometers. The key towns within the district include Odumase township (comprising Atua, Agormanya, and Nuaso), Akuse, and Kpong in the Lower Manya area. The Municipality shares its boundaries with Upper Manya Krobo District to the north, Shai Osudoku District to the south, Yilo Krobo Municipal to the west, and Asuogyaman District to the east. According to the 2021 population and housing census, the population of the Municipality stands at 121,478, with 56,662 males and 64,816 females. The predominant ethnic group in Lower

Manya Krobo Municipal is the Krobos, but there are also Ewes, Akans, Hausas, and other ethnic groups living harmoniously. The Municipality is characterized by a diverse mix of cultures and religions, with the majority being Christians, while there are also Muslims and Traditionalists.

Lower Manya Krobo Municipality falls within the semi-equatorial climate zone and experiences a mean annual rainfall ranging from 900mm to 11,500 mm. Relative humidity is high during the wet season and low during the dry season. The Municipality has two main seasons: the wet season, with a double peak occurring from April to early August and from September to October, and the dry or harmattan season from November to March. Temperatures generally range from 26°C to 35°C.

The population of Lower Manya Krobo is primarily rural, with a strong dependence on subsistence agriculture. Approximately 32.5% of households in the Municipality are involved in agriculture, with the majority (86.7%) engaged in crop farming and a small fraction (2.8%) in tree planting. In the rural areas, a higher percentage of households (92.8%) are engaged in agriculture compared to 84.1% in urban areas. Livestock rearing is also more common in rural areas, with 72.9% of households involved, in contrast to 31.0% in urban areas. Chicken rearing is the dominant livestock activity, accounting for 66.8% of livestock in the Municipality.

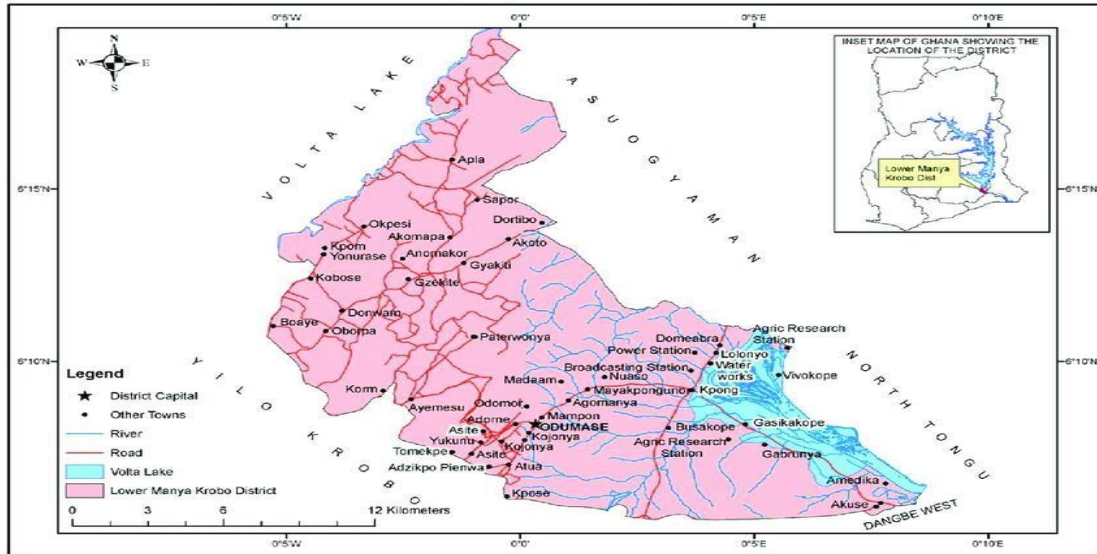


Figure 2: Administrative Map of Lower Manya Krobo Municipality.

Lower Manya Krobo Municipality is challenged with limited health resources, particularly in terms of healthcare facilities and healthcare resources. This results in disparities in access to healthcare and health outcomes within the municipality.

Source: (Mensah *et al.*, 2023)

1.8 SCOPE OF STUDY

This study sought to discover how nutrition education affects people's understanding of overweight and obesity in the Lower Manya Krobo Municipality of the Eastern Region of Ghana. To improve health outcomes in the Ghanaian community, the study aims to evaluate the effects of nutrition education interventions on participants' knowledge linked to overweight and obesity.

Participants from various ethnic, gender, and educational backgrounds from the Ayermesu Farmer Based Organization (FBO) in Lower Manya Krobo Municipality will be the subject of the study.

The study intends to acquire insights that are pertinent and useful to the local community, considering the distinctive socio-cultural aspects, eating patterns, and lifestyle habits common in the municipality.

1.9. ORGANIZATION OF REPORT

The study is introduced in the first chapter, which focuses on the context, importance, and goals of the investigation. A summary of the topic is given, highlighting the rising incidence of overweight and obesity in Ghana and the demand for successful solutions. The chapter also discusses the problems that need to be solved and why nutrition education should be a possible priority. The context for the study is established in the introduction, which also sets the stage for the following chapters.

The second chapter offers a thorough analysis of the body of research on obesity, overweight, and nutrition education with an emphasis on Ghana. A theoretical basis for the study is provided by the literature review, which also highlights gaps in the research. Additionally, it discusses significant ideas, elements, and measuring techniques from earlier studies, giving the research process a strong foundation.

The third chapter describes the study's research methods. It provides an overview of the data gathering methods, sample strategies, and study design. The chapter describes how participants were chosen, and how the questionnaire and anthropometric measurements were employed as data collection tools. In-depth discussion is given to ethical issues such as participant confidentiality and informed consent. The chapter also discusses the statistical analysis procedures and data interpretation strategies employed to guarantee the accuracy and dependability of the research results.

The study offers the findings from the data analysis in the fourth chapter. It presents and examines the conclusions drawn from the gathered information, which includes survey replies and anthropometric measures. Tables, graphs, and charts are used in the chapter to visually represent the findings. The investigation focuses on how nutrition education affects residents of the Lower Manya Krobo Municipality's understanding of overweight and obesity. It offers details about the knowledge levels, alterations in behavior, and effects of nutrition education on the health outcomes of the study participants.

A thorough explanation and analysis of the research findings are provided in the fifth chapter. It connects the findings to previously published research, theoretical frameworks, and the Ghanaian setting. The chapter evaluates the importance of the research findings, examines the ramifications of the findings, and highlights significant trends and patterns. It also discusses the study's shortcomings and offers ideas for future research topics to help Ghana's efforts to tackle obesity and overweight in the country.

The study's summary of the main findings and their implications finishes the final chapter. It covers the study questions and objectives while highlighting the research's contributions. Based on the study's findings, the chapter offers suggestions for influencing policy, educational initiatives, and management aimed at reducing overweight and obesity in the lower Manya Krobo Municipality. It highlights the significance of continuous work in public health and nutrition education programs to address this urgent issue.

CHAPTER TWO

LITERATURE REVIEW

2.0. INTRODUCTION

Obesity and overweight have evolved into global public health crises, posing significant challenges to individuals and societies alike (Ng *et al.*, 2014). These multifaceted issues arise from the intricate interplay of genetic predisposition, environmental factors, socioeconomic status, and lifestyle choices (Hruby *et al.*, 2016). As societies struggle with these challenges, there is a growing emphasis on developing effective strategies to address the escalating prevalence of obesity and overweight, particularly in marginalized populations, such as rural communities.

Globally, the prevalence of obesity and overweight has surged over the past few decades (NCD Risk Factor Collaboration, 2017). WHO emphasizes that these conditions have profound health implications, leading to an elevated susceptibility to chronic conditions such as cardiovascular disorders, diabetes, and certain cancers. The situation is no different in Ghana, where these health issues are growing rapidly. Ghana's rural areas, in particular, experience distinctive health disparities stemming from limited access to healthcare facilities, education, and resources (Ghana Statistical Service, 2018).

In response to the obesity epidemic, researchers and health practitioners are increasingly exploring nutrition education as a fundamental approach to mitigating its impacts (World Health Organization-Best buys, 2017). Nutrition education aims to empower individuals with knowledge and skills to make informed dietary choices, thereby fostering behavior change for healthier lifestyles. Although various studies have demonstrated the effectiveness of nutrition education in

diverse settings, it remains crucial to understand its adaptability and impact in specific contexts, especially within resource-constrained rural areas (Cecchini *et al.*, 2010).

2.1. OVERWEIGHT AND OBESITY: PREVALENCE AND RISK FACTORS

Due to their enormous effects on health outcomes, obesity and overweight are significant public health issues that have drawn attention on a global scale. Overweight and obesity are both classified by the World Health Organization as excessive fat buildup that may be harmful to health (WHO, 2020). Overweight and obesity are becoming more common in Ghana, with prevalence rates of 25.4% and 17.1%, respectively (Ofori-Asenso *et al.*, 2016b). Being overweight and obese are risk factors for chronic illnesses like diabetes, hypertension, cardiovascular disease, and several types of cancer, thus this rising trend is concerning.

A mix of genetic, environmental, and behavioral variables contribute to the multifactorial and complex causes of overweight and obesity. Risk factors for overweight and obesity include a sedentary lifestyle, poor food, genetic predisposition, and some medications. Being overweight and obese has profound consequences and can harm an individual, society, and the economy. Due to higher healthcare expenditures and decreased productivity, being overweight and obese has a considerable fiscal impact.

In Ghana, the incidence and causes of overweight and obesity have been the subject of numerous studies. Urbanization and socioeconomic position were linked to an increased incidence of overweight and obesity, according to a study by Agyemang *et al.* (2015). According to a different study by Sartorius *et al.* (2011), women, older persons, and people with greater levels of education were more inclined to experience overweight or obesity

2.1.1. IMPLICATIONS OF OVERWEIGHT AND OBESITY ON HEALTH

A study by Caleyachetty et al. (2017) found that obesity and overweight cause 4 million deaths globally each year. The study also discovered that being overweight and obese increases the risk of type 2 diabetes by 76%, coronary heart disease by 28%, and stroke by 21%. Consistently, obesity is identified as a risk factor for type 2 diabetes within the Ghanaian population. Numerous studies offer supporting evidence for this connection. Yorke and colleagues observed a noteworthy link between being overweight or obese and an elevated diabetes risk. Similarly, another study by Issaka et al., indicated that various measures of obesity, including BMI, waist circumference (WC), waist-to-height ratio (WtHR), and waist-hip ratio (WHR), were associated with an increased likelihood of type 2 diabetes. Asamoah-Boaheng et al. (2019) further illustrated that indicators of disadvantaged childhood socioeconomic status (SES) and early-life nutritional status were connected to an escalated risk of abdominal obesity and type 2 diabetes among Ghanaian adults. Another study affirmed a notable occurrence of diabetes-related lower limb amputations (LLA) in Ghana, with obesity emerging as one of the risk factors for LLA (Sarfo Kantanka *et al.*, 2019).

Being overweight and obese also has a considerable financial cost. The World Obesity Federation (2017) projected that the direct medical expenses related to overweight and obesity in Ghana totaled \$35.5 million in 2016. If current trends continue, it is predicted that this amount will rise to \$52.3 million by the year 2030. Overweight and obesity have been found to have a significant impact on life expectancy, quality-adjusted life years (QALYs), and total direct healthcare costs in the Ghanaian population (Lartey *et al.*, 2020). The study also revealed that overweight and obesity were associated with higher health service utilization and direct healthcare

costs, with individuals classified as overweight and obese bearing a considerably greater overall direct healthcare cost burden in comparison to those within a normal weight range.

In conclusion, overweight and obesity have significant effects on both personal and societal health. They come with a higher chance of developing chronic illnesses, a lower quality of life, and high financial consequences. Therefore, it is essential to create strategies for managing and preventing overweight and obesity.

2.2. KNOWLEDGE OF OVERWEIGHT AND OBESITY

In Ghana and other low-income nations, the prevalence of overweight and obesity has been rising quickly in recent years, raising serious public health concerns. To create efficient treatments to prevent and manage these disorders, it is essential to comprehend the population's level of knowledge regarding overweight and obesity. It will specifically look into how well the public comprehends what overweight and obesity are, why they occur, and what impact they have on health. The results of this investigation will shed light on the existing knowledge gaps and guide the creation of suitable nutrition education interventions to fill these gaps.

2.2.1. LEVELS OF KNOWLEDGE ON OVERWEIGHT AND OBESITY

Previous research has demonstrated that people and populations have different levels of knowledge about being overweight or obese. For instance, a study to assess weight reduction knowledge levels among overweight and obese adolescents showed that 33% of participants did not know weight reduction as a measure of obesity prevention and management (Sanjay Bhujbal, Baby and T., 2022). A further study among the undergraduate population in Nigeria revealed that 64% of the 178 participants had poor knowledge of obesity and dietary perception and behavior.

Education, socioeconomic background, and access to health information are just a few of the variables that might have an impact on a person's level of understanding about overweight and obesity. Higher education levels were linked to an improved understanding of the causes and effects of overweight and obesity among Ghanaian adults, according to a study by Nti and colleagues (2019). Another study by Brannon and colleagues (2014) discovered that college students in the United States had a greater understanding of overweight and obesity when they had access to nutrition education programs. These results imply that access to health information and education are crucial in raising awareness of overweight and obesity.

Increasing awareness of overweight and obesity is crucial for encouraging healthy habits and preventing diseases linked to obesity. According to some studies, people who are well-informed about overweight and obesity are more likely to practice healthy behaviors including regular exercise and good eating habits (Haidar et al., 2016; Wang et al., 2016). The risk of obesity-related disorders such as type 2 diabetes, hypertension, and cardiovascular disease can also be reduced with a better understanding of overweight and obesity (Adom et al., 2016; Oosterhoff et al., 2017). To create effective interventions to prevent and manage overweight and obesity, it is essential to evaluate the state of knowledge on these issues.

2.3. SOURCES OF INFORMATION ON OVERWEIGHT AND OBESITY

Information on overweight and obesity can be found in a variety of historical and contemporary sources. Community gatherings, religious authorities, and conventional healers are examples of traditional sources of information. People in the community frequently have faith in these informational resources since they have been used for many years. For example, a study by Abubakari et al. (2015) discovered that, people in Ghana frequently sought the counsel of

traditional healers regarding weight management. Religious authorities were also regarded as reliable sources of information on health issues, such as overweight and obesity, according to a study by Adom et al. (2017).

Media outlets like television, radio, newspapers, and magazines are some of the contemporary sources of information on overweight and obesity. These informational resources have grown in popularity due to their accessibility and broad reach. In Jordan, television was determined to be the most popular medium for learning about nutrition and health, according to a study by Bawadi et al. (2013).

In addition to these sources, healthcare professionals are also essential in spreading knowledge about overweight and obesity. Community health clinics and health centers in rural Ghana play a crucial role in disseminating information about overweight and obesity. These facilities often conduct awareness campaigns, workshops, and seminars to educate residents about the health risks associated with overweight and obesity. Moreover, they provide resources such as pamphlets, posters, and brochures that offer guidance on healthy eating habits, physical activity, and the significance of preserving a healthy weight (Ofori-Asenso *et al.*, 2016a)

2.4. NUTRITION EDUCATION

Nutrition education is the process of teaching individuals or groups about healthy eating habits and the importance of nutrition for overall well-being. It involves providing information and strategies to help people make informed food choices and develop healthy dietary behaviors. Nutrition education aims to promote long-term dietary habits, improve health status, and prevent nutrition-related health problems (Ray, Ball, and Laur, 2016). Nutrition education plays a crucial role in the initial training of nutritionist professionals, as it focuses on modifying eating behavior

and understanding the socio-cultural, economic, and demographic factors that influence food. Additionally, nutrition education is important for healthcare professionals, such as general practitioners, who can promote healthy dietary behaviors and provide appropriate nutritional interventions (Baute *et al.*, 2018).

Nutrition education is an effective strategy for increasing knowledge and promoting healthy lifestyles to prevent overweight and obesity. It has been shown to improve nutrition knowledge among children, leading to healthier lifestyle choices (Citra Palupi, Eka Putri and Sitoayu, 2020). Additionally, nutrition education interventions have been successful in achieving weight loss, modifying eating habits, and reducing fat intake among overweight and obese adults (Bharti, Kulshrestha, and Kushwaha, 2021). Overall, nutrition education plays a crucial role in preventing and managing overweight and obesity by providing individuals and communities with the knowledge and skills necessary for opting for nutritious food selections and participating in consistent physical activity. The usefulness of nutrition education in promoting healthy eating habits and lowering the prevalence of overweight and obesity has been demonstrated in numerous research. For instance, a study by Gatto *et al.* (2016) discovered that nutrition education interventions were successful in enhancing low-income populations' knowledge, attitudes, and behaviors linked to healthy eating.

2.4.1 Forms of Nutrition Education

Nutrition education takes on various forms and approaches to effectively convey information about healthy eating habits, dietary choices, and overall well-being. A study by Brown and colleagues (2019) demonstrated that school-based interventions help youngsters learn more about nutrition and develop healthy eating habits. Community-based and workplace-based interventions are some more forms of nutrition education.

Community-based interventions are actively involving local communities in the design, implementation, and evaluation of programs. This approach recognizes the importance of tailoring educational initiatives to the specific needs, preferences, and cultures of the community. Community engagement fosters a sense of ownership and sustainability in nutrition education efforts (Shrimpton and Vaidhyanathan, 2017). Individuals are also educated as part of community-based initiatives in places like churches, community centers, and markets. Group meetings, cooking demonstrations, and neighbourhood gatherings are all possible delivery methods for these interventions. In a study by Drehmer et al. (2016), it was discovered that community-based treatments were successful in enhancing participants' knowledge of and attitudes about healthy eating.

Interventions aimed at employees in a workplace setting are referred to as workplace-based interventions. These interventions can be given via conferences, workshops, and online learning environments. According to Anderson and colleagues (2016) systematic review, workplace-based interventions can be successful in encouraging employees to adopt healthy eating habits, which will decrease overweight and obesity.

2.4.2 Effects of Nutrition Education On Overweight and Obesity

One notable example of the effectiveness of nutrition education is the study conducted by López-Cevallos et al. (2017) among Mexican-American women. The research highlighted the effectiveness of culturally relevant nutrition education programs. Participants exposed to such programs experienced a substantial increase in their understanding of healthy eating and weight management. The incorporation of cultural relevance in nutrition education underscores the importance of tailoring educational initiatives to specific demographic groups, ensuring better receptivity and comprehension of the information.

Nutrition education's influence extends to different age groups, including school-aged children. Annan et al. (2021) conducted a study focusing on school-aged children in Ghana. Their findings indicated that, nutrition education had a positive impact on the knowledge levels of the children. Moreover, the study revealed improvements in the BMI-for-age of the participants. These results demonstrate the effectiveness of nutrition education in shaping the nutritional knowledge and health outcomes of younger populations, which is particularly critical in combating childhood obesity and its associated health risks.

The improvement in knowledge and attitudes resulting from nutrition education is instrumental in fostering better eating patterns. With a deeper understanding of the importance of balanced nutrition, individuals are better equipped to make informed food choices that align with their health and wellness goals. These informed choices lead to healthier eating patterns.

One of the primary objectives of nutrition education is to mitigate the prevalence of overweight and obesity, which are major public health concerns. García et al. (2017) underline the potential of nutrition education to reduce the incidence of these conditions. By equipping individuals with the knowledge and skills to make healthier dietary choices, nutrition education plays a crucial role in combatting overweight and obesity at the population level

CHAPTER THREE

METHODOLOGY

3.1. RESEARCH METHOD AND DESIGN

This study employed a pre-post experimental study design, combining both quantitative and qualitative methods, to assess the effect of nutrition education on overweight and obesity knowledge in a rural area in the Eastern Region of Ghana. The study was in three phases namely baseline, implementation (intervention and) endline phases.

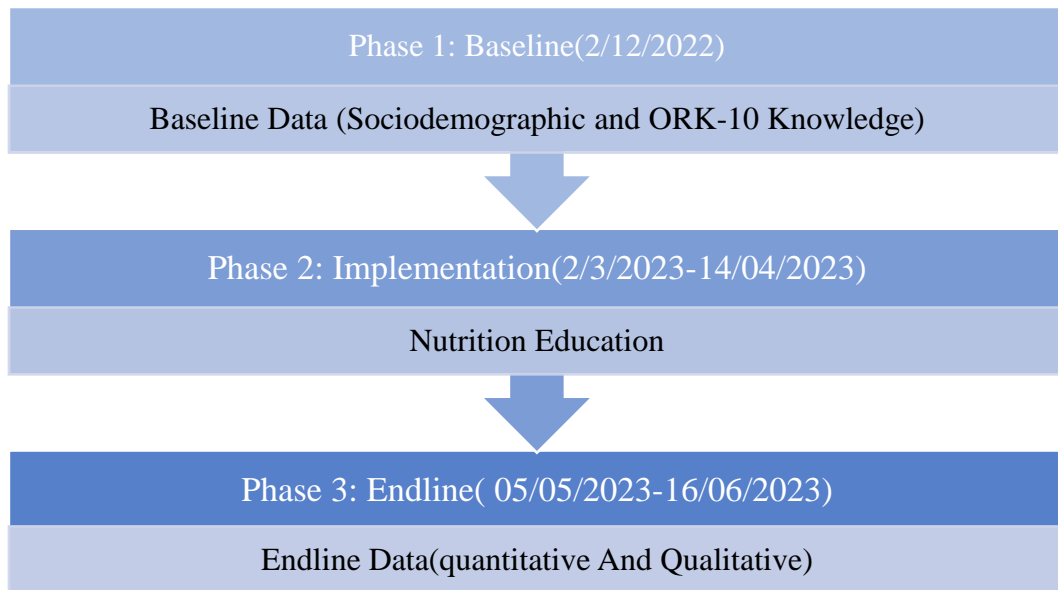


Figure 3: Study Phases

3.2 STUDY SETTING

Ayermesu is a rural community situated within the Lower Manya Krobo District of Ghana. The community has gained prominence due to a higher prevalence of overweight and obesity among women when compared to the national average. This regional disparity prompted the development of a specialized facilitator guide for overweight and obesity education. Significantly, this study was part of a broader initiative called LinkING Up Initiative, which involved six Farmer-Based Organizations (FBOs) within three district in the Eastern Region of which Lower Manya is a part of.

Ayermesu is a rural community characterized by lush vegetation and small-scale agriculture. The primary livelihood for the majority of the community members is subsistence farming, focusing on crops such as maize, cassava, and plantains. Socioeconomic conditions in the area are modest, with limited access to alternative employment opportunities. Ayermesu has a predominantly female population, a significant factor in addressing the challenge of overweight and obesity among women, which is prevalent in the rural community.

The provision of healthcare services in Ayermesu and the broader Lower Manya Krobo District is facilitated through local healthcare facilities such as CHPS, Health centers and district hospitals. However, the lack of specialized resources and education on overweight and obesity is a recognized gap that necessitated the development of the facilitator guide. This gap is particularly significant, given that Ayermesu was part of the LinkING up initiative, a collective effort among FBOs, highlighting the importance of addressing this issue at a community level.

The development and implementation of the facilitator guide for overweight and obesity education in Ayermesu and the Lower Manya Krobo District exemplify a community-driven approach to tackle a pressing public health concern. Leveraging the collective efforts of FBOs in the LinkING

Up initiative, this program is designed to empower women in Ayermesu with the knowledge and resources necessary to make informed decisions about their health and lifestyle, contributing to a healthier and more vibrant community.

3.3 DATA COLLECTION TECHNIQUES AND TOOLS

3.3.1 Baseline Data

Quantitative Data

Data was collected from 59 members of the farmer-based organization (FBO) in Ayermesu. Socio-demographic information such as age, sex, educational level, occupation, ethnicity, religion, and marital status was collected. Their knowledge of overweight and obesity including their understanding of the risk factors, consequences, and preventive strategies were also enquired using a validated questionnaire i.e., the Obesity Risk Knowledge Scale (ORK-10). The questionnaire was administered using the Kobo Collect tool. Additionally, data on participants' weight and height for BMI, and blood pressure were collected to provide a comprehensive assessment of their health status related to overweight and obesity. This approach allowed for the quantification and comparison of knowledge scores and health indicators pre-intervention and post-intervention.

To ensure the reliability and validity of the data collected, several measures were taken. Research assistants on the 2nd of December, 2022 were trained on the use of tablets to administer questionnaires using kobo collect after which survey items were pilot tested to ensure their clarity and comprehensibility. Surveys were conducted in a structured and consistent manner to reduce potential biases and increase the reliability of the data.

3.3.2 Intervention

Nutrition education is the intervention that was employed for this study. A guide; 'Facilitator Guide for Nutrition Education on Overweight and Obesity' developed by (Kushitor and Colecraft, 2023) was the foundation for the community nutrition education. The guide consisting of five lessons aimed at raising awareness about obesity and effective weight management was developed based on the Trans theoretical model of behavioral change.

Prior to the intervention, six Local officers from the Municipal health directorate were taken through a day's training on the use of the facilitator guide. This meeting was held on the 7th of February, 2023. The officers were made up of two (2) Nutrition officers, two (2) health promotion officers, A Midwife and a Mental Health Officer. The officers were taken through all five lessons and flashcards which were developed based on the guide to aid in the facilitation of the education sessions. Some agreed-upon keywords in the Krobo dialect were identified to aid in the training; these were 'mi joor mi', meaning bodyweight, and 'oklebenor' being obesity.

Participants were taken through the five lessons in a fortnightly education session from 2nd March, 2023 to 14th April 2023. Images from the guide were extracted and made into flashcards that served as visual aids for the lessons. It is worth mentioning that, local fruits like bananas, watermelon, and oranges were served as snacks during the intervention phase. This was as part of efforts to inculcate the habit of fruit consumption among the study population.

The local officers trained were the main facilitators for the intervention. The intervention was briefly introduced to the participants after a self-introduction was done by the facilitators. Other members including the researchers were also introduced duly to establish rapport between researchers, facilitators, and participants.

Lesson 1 which was taught during the first session defined overweight and obesity using ORK10 information sheet and Stunkard Figure Rating Scale, highlighting the prevalence and causes.

Lesson 2 explored body image preferences, cultural norms, and their connection to unhealthy behaviors.

Lesson 3 covered the consequences of overweight and obesity, including health, economic, and social impacts. Lessons 4 and 5 were combined and they focused on achieving food variety through the Ghana Health Service's four-star diet, providing recipes and food demonstrations as well as physical activity. Food demonstration sessions were also held to take participants through food preparation with locally available fruits that meet the four-star diet principle.

Lessons 3, 4, and 5 had songs that were taught during these sessions. A song on overweight and obesity, its causes, and consequences was taught during lesson 3. Lesson 4 had a song on 'the Four-star diet' while lesson 5's song was on physical activity. These songs though were initially composed in English, had the local officers translating them to Krobo. During the education sessions, a variety of fruits were served as snacks in each of the weeks as well as healthy local meals for lunch.

3.3.3 Endline Data

Quantitative data – A total of 23 participants were assessed at endline and this was because, of the 59 participants interviewed at baseline, only 23 participated in at least one of the sessions of the intervention. The survey was carried out between the 5th of May to the 16th of June to enable the team to get to all the participants that took part in the intervention. ORK-10 was again used to assess the knowledge levels of participants after the intervention. The method also involved the use of tablets as research instruments for administering the questionnaire. The questionnaire was

designed to collect quantitative data on the participants' knowledge and perceptions about overweight and obesity post-intervention. The questions were read to the respondents, and their answers were recorded by research assistants.

Qualitative data – Semi-structured interviews with a subset of 22 participants were conducted on the 5th of May, 2023. An interview guide containing a set of open-ended questions related to the research questions was used to facilitate detailed responses and capture in-depth insights into the participants' knowledge and experiences about overweight and obesity. This was structured into five sections; their awareness of the intervention program, content of the knowledge of the intervention, causes and consequences of overweight and obesity, prevention and management, source of knowledge, and willingness to share their knowledge. The interviews were face-to-face, lasted between 12 to 20 minutes, and were audio recorded, taped, and transcribed verbatim for analysis.

3.4 STUDY POPULATION

Members of a farmer-based group in Ayermesu, Yoyim, Ayermesu Arko, Kodiabe, and Mapi communities, make up the study population for this investigation. These primarily rural communities are found in Lower Manya Krobo Municipality in the Eastern Region of Ghana. Members of the farmer-based organization (FBO) in Ayermesu who are between the ages of 25 and 75 make up the study's population.

3.5 INCLUSION CRITERIA

This study employed a census sampling technique, which allowed for the use of all members of the Farmer-Based Organization (FBO) in Ayermesu in Lower Manya Krobo Municipality.

3.6. STUDY VARIABLES

The study assessed several key variables related to overweight and obesity among the study population. These variables include:

3.6.1 Knowledge About Overweight and Obesity

This variable describes people's knowledge and awareness of the factors that contribute to being overweight and obese, as well as their ability to prevent it. The questions addressed subjects like the value of leading a healthy lifestyle choice, the function of diet and exercise in managing weight, and the health hazards connected with being overweight and or obese.

Dietary patterns: This variable investigated the study population's eating patterns and food preferences. A nutritional questionnaire that collects data on the frequency and amount of consumption of different food groups, such as fruits, vegetables, whole grains, sugary beverages, processed meals, and fast foods, was used. The Diet Quality Questionnaire (DQQ) was the validated question used to assess the dietary patterns of participation at the end.

Physical activity level: This variable is concerned with how much and how intensely people exercise. A validated physical activity assessment tool, such as the General Practice Physical Activity Questionnaire (GPPAQ) was used to assess the physical activity levels. The questionnaire collected data on the length, regularity, and intensity of a variety of activities, including work-related, leisure-related, and movement-related physical activities.

3.7. DATA HANDLING

Quantitative Data

Following the completion of the data collection phase, data was sorted and placed into an electronic database that was password-protected. This action was necessary to guarantee data integrity, avoid data loss or manipulation, and enable effective data management. Data cleaning was then carried out. The data was then subjected to statistical analysis using STATA 17.

Qualitative Data

The transcribed interviews were then uploaded to a software tool designed for qualitative research; Dedoose after the data had been cleaned.

3.8. DATA ANALYSIS

Quantitative Data

Descriptive Statistics: First, descriptive statistics were computed to summarize the demographic characteristics of the participants. This included calculating measures such as means and percentages for variables such as age, sex, marital status, ethnicity, educational history, religion, and occupation.

Overweight and Obesity Knowledge: The responses to the ORK-10 questions were analyzed to assess the participants' knowledge about overweight and obesity pre and post-intervention. This was measured using a paired T-test. The percentage of correct answers for each question was calculated to determine the level of knowledge among the respondents. The means were also calculated with their p-values. The overall knowledge score was computed by summing the correct responses across all questions.

Qualitative Analysis: The analysis took place once all the interviews had been conducted, transcribed, and subjected to quality checks. The interviews were transcribed verbatim into English by a transcriber with a Krobo and English competence. Local officers from the Municipal Health Directorate were asked to listen to the audio files and read the transcripts concurrently. Secondly, the research team applied best practices such as developing a linguistic diary, discussing language issues, and reconciling conflicting narratives.

The data was analyzed by a team of five members at a project meeting using thematic analysis as outlined by Attride-Stirling, 2001. The analysis covered the personal history of the participants and their awareness of the intervention program and its content. The analysis was started by reading transcripts to understand the data and identify emerging codes and themes. The analytical framework was guided by inductive codes. The inductive codes were anticipated from the culturally specific contexts of the community. The second stage of the analysis involved identifying the linkages between codes, themes, and appropriate respondent quotes.

Code Development and saturation measurement

After analyzing all 22 interviews, a total of 123 codes were realized and had been applied to at least one transcript. Saturation was measured using the code frequency count (Guest, Bunce and Johnson, 2006). Of these codes, 34(27.6%) were identified from the first transcript. This transcript was coded by five project team members. These initial codes were applied to the next five transcripts by the five coders. A total of 103(83.7%) new codes were identified within the first six transcripts. The next set of five transcripts generated only 20 codes. The remaining seven transcripts added 4 codes making a cumulative total of 127. A total of 123 codes were realized after merging some of the codes. From there, it can be concluded that code saturation was realized after 15 transcripts at 96%.

3.9. ETHICAL CONSIDERATION

Participants' confidentiality and anonymity were maintained by assigning unique identifiers to the data and removing any personally identifiable information. The data obtained was kept strictly confidential and made available to only persons connected with the study. Administrative approval for the conduct of the study was obtained from the Municipal Health Directorate of Lower Manya Krobo and ethical approval obtained from the Ensign Global College Review Board.

3.10. LIMITATIONS OF THE STUDY

At baseline, 59 members of an FBO in the Lower Manya Krobo Municipality in the Eastern Region of Ghana had their data collected and their knowledge assessed. However, at endline, only 23 members had participated in the intervention which may limit the generalizability of the findings to a broader population. An in-depth interview was however conducted to solicit for more detailed information which will offer rich insights into the knowledge gained.

3.11. ASSUMPTIONS

It was assumed that participants would retain the knowledge gained from the nutrition education intervention over the study's timeframe. If participants experience a rapid decline in knowledge after the intervention, the sustainability of the intervention's effects could be questioned.

CHAPTER FOUR

RESULTS

The quantitative findings are first presented in this section, outlining the statistical results obtained from surveys and assessments conducted within the study population. Subsequently, we will delve into the qualitative insights derived from the interviews.

4.0. QUANTITATIVE RESULTS

4.1 Socio-demographic characteristics of respondents.

A total of 59 members of the FBO participated in the study during the baseline, 23 of these 59(38.9%) participated during the endline. Table 1. provides an overview of the age, sex, level of education, occupation, ethnicity and religion of participants at these two-time points. Age distribution among the participants was categorized into four groups: 24-29, 30-39, 40-49, and 50-76. At the baseline, the largest proportion of participants belonged to the 50-76 age group, accounting for 38.98% of the total. Following closely, the 30-39 age group constituted 33.9% of participants. As the study progressed to the end line, the dominance of the 50-76 age group persisted, with a notable increase to 52.17%. However, a decline was observed in the 24-29 age group, which decreased to 8.7% by the endline.

Gender distribution indicated that females were the majority among participants. During the baseline assessment, females accounted for 44.07% of participants, while males constituted 55.93%. At the endline, the proportion of female participants slightly decreased to 30.43%, while the percentage of male participants increased to 69.57%.

Education level, characterized as "None," "Primary," "Middle/JHS," "Secondary," and "Higher," demonstrated intriguing patterns. Initially, the middle/junior high school category held the largest share at the baseline, with 44.07% of participants falling into this group. In comparison, primary education accounted for 23.73%. By the endline, the distribution remained relatively consistent, with the middle/junior high school category maintaining its lead at 47.83%.

Occupation categories comprised "Farmer," "Skilled manual worker," "Trader," and "Unemployed." Among these, farmers comprised the largest portion at both baseline (35.59%) and endline (73.91%), indicating a significant increase in this occupation group. Contrarily, the skilled manual worker category saw a decrease from 10.17% at baseline to 0% at the endline. The trader category also experienced a decline, moving from 42.37% to 26.09%.

The ethnicity of the participants was grouped under "Akan", "Ewe" and "Krobo-Ga Dangme". At the baseline, 8.47% (5 participants) identified as Akan, 1.69% (1 participant) identified as Ewe, and 89.83% (53 participants) identified as Krobo-Ga Dangme while at endline, no participants identified as Akan and Ewe. All 23 participants (100%) identified as Krobo-Ga Dangme.

The religious background of participants was mainly Muslim and Christian. One participant (1.69) identified as Muslim and 98.31% (58 participants) identified as Christians at baseline while all 23 participants identified as Christians at endline.

Table 1: Distribution of Characteristics of Study Participants

	Quantitative Data		Qualitative Data
	Baseline	Endline	Endline
Age	n (%)	n (%)	n(%)
24-29	9(15.25)	2(8.7)	1(4.5)
30-39	20(33.9)	5(21.7)	4(18.2)
40-49	7(11.86)	4(17.39)	4(18.2)
50-76	23(38.89)	12(52.17)	13(59.1)
Gender			
Female	33(55.93)	16(30.43)	8(36.4)
Male	26(44.07)	7(69.57)	14(63.6)
Level of Education			
None	7(11.86)	4(17.39)	6(27.3)
Primary	14(23.73)	7(30.43)	6(27.3)
Middle/ JHS	26(44.07)	11(47.83)	8(36.4)
Secondary	8(13.50)	1(4.35)	1(4.5)
Higher	4(6.78)	0(0)	1(4.5)
Occupation			
Farmer	21(35.59)	17(73.91)	21
Skilled Manual Worker	6(10.17)	0(0)	0
Trader	25(42.37)	6(26.09)	1
Unemployed	7(11.86)	0(0)	
Ethnicity			
Akan	5(8.47)	0(0)	
Ewe	1(1.69)	0(0)	
Krobo-Ga Dangme	53(89.83)	23(100)	22(100)
Religion			
Moslem	1(1.69)	0(0)	
Christian	58(98.31)	23(100)	22(100)
Total	59(100)	23(100)	22(100)

4.2 Frequency of Attendance to Nutrition Education Sessions

Table 2. depicts the distribution of participants' attendance at the nutrition education intervention sessions. The findings shed light on the level of engagement and participation of the participants in the four scheduled sessions.

From the table, 8.7% of the participants attended only one out of the four nutrition education sessions. Approximately 17.39% of the participants attended two out of the four sessions. This suggests a moderate level of engagement, as these participants attended more than just the initial session, indicating some sustained interest. Five participants representing 21.74% of the participants attended three out of the four sessions. This indicates a higher level of commitment and interest, as these participants engaged with the content across multiple sessions. The majority of 12(52.17%) out of the 23 participants, attended all four nutrition education sessions. This group displayed the highest level of engagement and commitment to the intervention, attending each of the sessions offered.

In total, 23 participants took part in the nutrition education intervention.

Table 2: Lessons attended

Lessons attended	Frequency	Percentage (%)
1	2	8.7
2	4	17.39
3	5	21.74
4	12	52.17
Total	23	100



Plate 1: Participants looking at a flash card depicting the cost of obesity



Plate 2: Teaching of songs by facilitators



Plate 3: Some fruits served as snacks during the intervention



Plate 4: Food demonstration session during the intervention



Plate 5: Display of four-star diet using local foods from participants

4.3. ANALYSIS OF DIFFERENCES IN CHANGES IN NUTRITION EDUCATION

Comparing Differences in Nutrition Knowledge:

Table 2 shows that after four weeks of nutrition education, there were changes in the nutrition knowledge of the subjects. Among the 10 questions, it's evident that in most cases, the percentage of correct responses increased from pretest to posttest. There are however two questions that saw a decrease in correct answers from pretest to posttest. The increased rates are listed as follows from high to low followed by those that decreased: 'There is no major health benefit if an obese person who gets diabetes loses weight'. The correct rate increased from 57% to 100%(p=0.000). 'Obesity increases the risk of getting bowel cancer' had the correct answers increasing from 48% to 87% with a difference of 39%(p=0.001). 'Obesity increases the risk of getting breast cancer after menopause' the correct answer increased from 35% 39% (p= 0.009). 'It is better for a person's health to have fat around the hips and thighs than around the stomach and waist' correct

answers increased from 48% to 87% ($p= 0.001$). 'A person with a 'beer-belly' shaped stomach has an increased risk of getting diabetes' had the correct answers increased from 70% to 96% ($p=0.011$). 'Obesity does not increase the risk of developing high blood pressure' the correct rates increased from 52% to 70% ($p = 0.104$). 'Obese people can expect to live as long as non-obese people' had the correct answer rate increasing from 57% to 70% ($p=0.377$). 'Obesity increases the risk of getting a food allergy' correct rates increased from 43% to 52% ($p= 0.539$). 'Obesity is more of a risk to health for white people than it is for black people like Ghanaians' The correct answer rates decreased from 52% to 43% ($p = 0.575$) showing a difference of -9%. 'An obese person who gets diabetes needs to lose at least 40% of their body weight for clear health benefits' This decreased from 39% to 26% ($p= 0.492$).

Averagely, the ORK 10 score was high ($p=0.001$) with a mean difference of -1.39.

Table 3: ORK-10 scores

Obesity Knowledge		Obs	Correct Answers	%	Mean	P-value
1 A person with a ‘beer-belly’ shaped stomach has an increased risk of getting diabetes	Pretest	23	16	70%	0.74	0.011
	Posttest	23	22	96%	1.00	
	Diff		6	26%	0.26	
2 Obesity increases the risk of getting bowel cancer.	Pretest	23	11	48%	0.52	0.001
	Posttest	23	20	87%	0.91	
	Diff		9	39%	0.39	
3 An obese person who gets diabetes needs to lose at least 40% of their body weight for clear health benefits.	Pretest	23	9	39%	0.61	0.492
	Posttest	23	6	26%	0.70	
	Diff		-3	-13%	0.09	
4 Obese people can expect to live as long as non-obese people.	Pretest	23	13	57%	0.57	0.377
	Posttest	23	16	70%	0.70	
	Diff		3	13%	0.13	
5 Obesity increases the risk of getting breast cancer after the menopause.	Pretest	23	8	35%	0.35	0.009
	Posttest	23	17	74%	0.78	
	Diff		9	39%	0.43	
6 Obesity is more of a risk to health for white people than it is for black people like Ghanaians.	Pretest	23	12	52%	0.48	0.575
	Posttest	23	10	43%	0.39	
	Diff		-2	9%	-0.09	
7 There is no major health benefit if an obese person who gets diabetes loses weight.	Pretest	23	13	57%	0.52	0.00
	Posttest	23	23	100%	0.00	
	Diff		10	43%	-0.52	
8 Obesity does not increase the risk of developing high blood pressure.	Pretest	23	12	52%	0.52	
	Posttest	23	16	70%	0.70	
	Diff		4	17%	0.17	
9 It is better for a person’s health to have fat around the hips and thighs than around the stomach and waist.	Pretest	23	11	48%	0.48	0.001
	Posttest	23	20	87%	0.91	
	Diff		9	39%	-0.43	
10 Obesity increases the risk of getting a food allergy.	Pretest	23	10	43%	0.48	0.539
	Posttest	23	12	52%	0.57	
	Diff		2	9%	0.09	
ORK-10 SCORE	Pretest	23	11.5	50%	5.26	0.001
	Posttest	23	16.2	70%	6.65	
	Diff	23	1.4	20%	-1.39	

4.2 QUALITATIVE RESULTS

The findings of the study were grouped under four themes: 1) Awareness of project 2) Content of knowledge 3) Effects of intervention 4) Sources of knowledge. Included is the spread of views by indicating the number of participants that responded to the interview questions. In each section, the results are presented in order of dominating and consensual themes, followed by minority themes. Quotes that best capture shared or unique ideas are presented for illustration.

Respondents are identified by numbers, corresponding to the detailed respondent profiles.

Awareness of Project

Responses for this category fell under 6 groups; Knowledge about foods(n=4) Definition of obesity(n=1), Consequences of obesity(n=2), Causes of obesity(n=5), How to Prevention(n=1), and Personal perspective(n=1).

Knowledge About Foods

Two respondents know that, when an individual consumes more fatty foods, he or she is likely to become obese. According to some respondents, the consumption of green leafy vegetables like kontonmire (taro leaves) and turkey berries and moderate consumption of staples like plantain will not let one become obese(n=2).

“What I know about oklebenor is that, when we eat oily foods and meat, we become obese” [R18]

“Oh, what I know is that they said we should check how we eat and they taught us to eat more plantain and kontonmire because that will be good for our health” [R17]

Causes of Obesity

A respondent attributed overweight and obesity to two causes: unhealthy eating habits and physical inactivity. These were placed under one category as "Poor lifestyles"

Poor Lifestyle

Unhealthy eating habits and physical inactivity were said to be the causes of overweight and obesity(n=5). These were placed under an overarching category of 'poor lifestyles' because respondents referred to more than one theme. While some of the respondents said being overweight and obese were caused by both unhealthy eating habits (overeating and unmindful eating) and physical inactivity (n=3), One respondent said they were caused by physical inactivity and another said it was caused by unhealthy eating habits.

“Too much eating and sometimes the food we eat and the kind of work we do can make you overweight” [R18]

“All I can say about obesity is that when you eat and refuse to exercise, you can have a health complication like obesity. Knowing all these, we need to be mindful of what we eat so that we don't become obese or other health complications” [R13]

“Oh, when we eat and we sit at one place without exercising our bodies for the food to be absorbed, we will become obese or overweight” [R3]

Consequences of Obesity

Two respondents weighed their awareness of the project on their knowledge of the consequences of overweight and obesity. One respondent said being overweight or obese makes you unable to work which makes you “high tempered” all the time and one other respondent said overweight and obesity result in other health problems.

"Please were taught that, when you're obese, it brings the problem into our health status" [R7]

"It brings about quick-temperedness in a person because we won't be able to do the things we want to do" [R3]

How to Prevent Overweight and Obesity

Physical activity and not eating too late were attributed to ways of preventing overweight and obesity (n=1)

“We must practice that habit of exercising daily and making sure we don't eat too late in the night because it is not healthy” [R3]

Content of Knowledge on “oklebenor”

Respondents' general knowledge of the content of knowledge on overweight or obesity (“oklebenor”) project was explored with the question, "What can you tell me about overweight or obesity concerning the sessions that were held here some time ago"? Responses to this question were grouped under 1) Knowledge of obesity prevention and management (n=2), 2) Consequences of “Oklebenor” (n=1), 3) Causes of overweight and obesity (n=2) and 4) Songs learned (n=19).

The dominant content of knowledge on “oklebenor” was songs learned.

Causes of Overweight and Obesity

This theme delved into the causes of overweight and obesity as revealed through participants' responses. Their responses shed more light on the factors driving the prevalence of these health concerns within the study population. The theme was further placed under these categories based on the responses; Alcohol intake(n=3), Family history(n=2), intentional intake of drugs(n=2), physical inactivity(n=16), unhealthy foods, and eating habits (n=10).

Participants mentioned that alcohol consumption contributes to overweight and obesity which suggests that excessive alcohol intake may be linked to weight gain. Other statements suggested there is a genetic predisposition to overweight and obesity in that, people are likely to become overweight or obese if there is a family history of such. While a significant number of participants

highlighted the role of physical inactivity in causing overweight and obesity about two-thirds of the participants attributed overweight and obesity to unhealthy dietary choices and poor eating habits. Sedentary lifestyles and lack of exercise were commonly identified as factors contributing to weight-related problems. Therefore, poor diets, alcohol consumption, being physically inactive, intentional intake of weight gain drugs, and family history were proposed as causes of overweight or obesity.

"Sitting in one place for a long time too can make you obese . . . and also, drinking too much alcohol" [R17]

'I think it's from our eating lifestyle and also lack of physical activity, too much drinking of alcohol and also eating foods that do not contain four-star diets" [R15]

"When you're obese, walking becomes difficult and sometimes what brings about obesity is that, some people take drugs intentionally to become obese and sometimes too, it depends on the food we take in and some too are hereditary" [R16]

"Alcohol, too much drinking of alcoholic drinks can cause obesity" [R11]

"When we refuse to exercise ourselves daily or after eating, we become obese" [R14]

"One major cause of obesity is when we refuse to exercise after our diets and also when we don't eat a balanced diet, we become obese as well" [R5]

Obesity Prevention and Management

The question "How can we prevent or manage overweight or obesity in our lives?" was used to solicit responses on the prevention and management of obesity from participants. The consensual understanding was that following the advice from the nutrition education sections would help one prevent or manage obesity. Some of the advice included: (1) not eating too late; (2) exercising

(n=17); (3) avoiding alcohol(n=2) and (4) being mindful of what to eat(n=5). One respondent on the other hand mentioned that the prevention of overweight or obese was in God's hands.

“God will help us prevent them” [R18]

“When we eat carefully and stop taking too much alcohol, we won't become obese and we will be free from a lot of sicknesses.” [R17]

“Yea, we must be watchful of what we eat and also, exercise as individuals” [R1]

‘Oh, I need to make sure that, my family and I eat a balanced diet, exercise regularly, and also avoid eating late at night to avoid being obese” [R5]

“By indulging in regular physical exercise also by being sensitive about your lifestyle” [R14]

Songs Learned

Three songs were taught on Physical activity, the Cost of being overweight or obese, and a four-star diet. Nineteen respondents mentioned they could remember they were taught songs but only 7 could either sing one song(n=6) or two songs(n=1). None of the respondents could sing all three songs. The song sung most was the one about the consequences of being overweight or obese.

“The obesity song that talks about the obesity problems and the exercise song” [R21]

“Yes please, I can remember the oklebenor song and can sing itman sings and got stuck at the end” [R 16]

“Yes please.... respondent sang the oklebenor song well to the end” [R5]

“I can remember we being taught the oklebenor song.....” Oklebenor ha nyaagba

(woman sings....)” [R7]

“I can remember the Oklebenor song but I can't sing” [R9]

“I can remember the song on four-star diet.....lady sings and sings it well to the end...” [R15]

Effects of Intervention

Respondents related the effects of the intervention on the knowledge that, the community is now aware of overweight or obesity (n=3), made changes in their diets and that of their families(n=6), and changes in lifestyle; the fact that they now engage in some level of physical activity (n=11). These were categorized as positive changes the intervention has had on the community.

It is worthy to mention that, most of the respondents were observed to have been drinking alcohol during the intervention phase (Nutrition education on overweight and obesity) and so that topic was touched on as one of the causes of some cardiovascular disease. However, none of the respondents mentioned the avoidance or reduction of the consumption of alcohol as part of the lifestyle changes.

Community Awareness

Respondents believe that the intervention has had a great impact on the community. The songs are sung among themselves when they meet and have conversations about the positive change the intervention has brought to them.

"... as for me, I come from Djekiti and that's where I stay and I haven't noticed any changes at that place but I think there have been some changes here and the change is that everyone is now being mindful of what they take" [R2]

"I think that there is a change, usually when we see ourselves, we have been singing the song to remind ourselves of the problems obesity can bring. Yeah, so I think the community is positively influenced" [R20]

There was also a sub-theme of community level effect which had the respondents mention that the community no longer engages in late-night eating (n=4). Other respondents also said most of the

community members are now physically active(n=2). Two of the respondents however said they can't tell if there has been any change in the community.

Dietary Changes

The practice of dietary diversity dominated the dietary changes(n=10). Some respondents reported that, they now add beans to their stews and soups, take in more fruits and vegetables, and also add more stews or soups to their staple foods now than before. This reflected the topic of the four-star diet which was taught through songs and food demonstrations. The food demonstration had participants bring food items from their farms and homes to show them how they can diversify their foods with locally available foods.

Some other responses revealed that households now have healthy eating conversations in their homes(n=2), do not eat too much food(n=3), consume fruits(n=6), stop late-night eating(n=5), and are mindful of what they eat(n=5).

"It has changed me and now I do exercise after eating and also at first, we only eat one-way kind of food but now we try to get all the stars in our meals" [R3]

"Oh, for example, now when I am about to eat yam, I add pear to it as compared to previous."
[R3]

"Okay, one thing I have learned is that I no longer eat late at night and also after eating I try to exercise myself and also, I learned that we need to eat fruits, especially turkey berries because they are good for our health" [R2]

Physical Activity

This theme provided other insights into how participants responded to the incorporation of physical activity into their daily activities following their participation in the intervention program. The responses could further be categorized under; increased post-meal exercise(n=8)

and family engagement in physical activity(n=3). Several participants noted that there is a change in their behavior toward physical activity. One participant reported "I no longer sit at one place after my meals, I try to engage in exercise and I see my family do the same nowadays" This was echoed in several other ways by other participants.

"Oh... I learned that we should not overeat and exercise after eating" [R3]

'It has changed me and now I do exercise after eating and also at first, we only eat one-way kind of food but now we try to get all the star in our meals" [R3]

Sources of Overweight and Obesity Knowledge

The dominant sources of knowledge on overweight and obesity were the "oklebenor project" (Nutrition education) cited by 21 respondents, the mass media (cited by 3), and community health nurses (cited by 2). Other sources of information were the church (n=2), health facility(n=1), and school (n=1)

"Every good student learns from their teachers when taught and practice it so that's what I did from the lesson you people took us through" [R19]

"I learned these from your team" [R14]

"Oh, it's only your team madam, I haven't heard this from anywhere else" [R5]

"I learned these from the oklebenor team, from the community nurses and sometimes I do hear some teachings on the radio" [R2]

CHAPTER FIVE

5.0 DISCUSSION

5.1 INTRODUCTION

This study was aimed at assessing the effectiveness of nutrition education on overweight and obesity knowledge in a rural setting in the Eastern Region of Ghana. The findings presented in this study throw light on various aspects of knowledge related to overweight and obesity within the study population. This chapter also delves into the implications of these findings, contextualizes them within the broader literature, and highlights potential strategies for addressing the challenges posed by the increasing prevalence of overweight and obesity in the region.

5.2. KNOWLEDGE AND AWARENESS ABOUT OVERWEIGHT AND OBESITY

Nutrition education is crucial to the attainment of healthy dietary and physical activity behaviour and subsequently better nutrition and health status of individuals. The results of our study showed that the nutrition education intervention produced significant improvements in nutrition knowledge (mean change = 1.39, $p=0.001$). The improved knowledge about nutrition is consistent with other studies. For instance, a study conducted among low-income HIV-infected adults showed that nutrition education improved knowledge of nutrition and dietary diversity among adults (Ezenwosu and Ezenwosu, 2023). In another study that aimed to review the benefits of nutrition education in the consumption of fruits and vegetables, it was revealed that a well-planned and behavior-focused nutrition education intervention can significantly improve behavior and health indicators (Pem and Jeewon, 2015).

The participants in this study displayed varying levels of awareness and knowledge about overweight and obesity. The recognition of fatty foods as contributors to obesity highlights the

importance of nutritional knowledge in influencing dietary choices. The mention of specific local foods like "kontonmire" and "plantain" to prevent obesity underlines the cultural relevance of dietary recommendations. Furthermore, the incorporation of songs and food demonstrations during the intervention contributed to disseminating knowledge about obesity prevention and healthy eating habits.

These findings resonate with the concept of nutrition education as an effective tool for enhancing awareness and understanding of health issues. Various studies have emphasized the significance of health education in influencing behavior change among diverse populations (Ray *et al.*, 2016; Baute *et al.*, 2018). The utilization of songs that were translated into Krobo and local foods in the intervention aligns with the assertion that culturally sensitive approaches are more likely to resonate with the target audience and elicit positive responses (Popkin *et al.*, 2013; PerezEscamilla, 2017).

5.3. BEHAVIORAL CHANGES

The positive behavioral changes observed among the participants after the intervention are encouraging. The participants reported engaging in post-meal exercises and incorporating diverse foods into their diets. This suggests that the intervention not only increased knowledge but also translated into practical actions. Increased physical activity is crucial for obesity prevention, as highlighted by previous studies (Hruby *et al.*, 2016; Fruh, 2017). The reported shift from late-night eating and increased consumption of fruits underscores the potential of health education in fostering healthier habits.

Moreover, the influence of the intervention on family behaviors is noteworthy. Reports of family engagement in physical activity indicate the potential for interventions to trigger a ripple effect

within households. The family unit can act as a support system, reinforcing healthy behaviors and fostering a conducive environment for change. This aligns with the findings of similar studies that emphasize the role of family dynamics in influencing lifestyle modifications (Metzgar et al., 2015; Malik et al., 2013).

5.4 SOURCES OF KNOWLEDGE

The "Oklebenor Project," cited by 21 respondents as a primary source of knowledge on overweight and obesity, demonstrates the project's significant impact on community education. Community-based nutrition education programs like the Oklebenor Project have been shown to be effective in improving knowledge and behavior related to obesity and dietary habits (Hoelscher, Sharma and Byrd-Williams, 2018). Such programs often employ a holistic approach, providing participants with practical skills and knowledge to make healthier choices in their daily lives.

Mass media, cited by 3 respondents, remains a noteworthy source of information. The influence of mass media on public health knowledge is well-established. For example, a study found that, Television, radio, and digital media platforms play a pivotal role in disseminating health information to the public (Raudenská *et al.*, 2020). This influence can extend to obesity-related topics, as media campaigns have been used to raise awareness and promote healthy behaviors (Wakefield, Loken and Hornik, 2010).

The mention of community health nurses by 2 respondents highlights the role of healthcare professionals in disseminating knowledge about obesity. Healthcare providers, including nurses, are trusted sources of health information, and their involvement in education and counseling can have a positive impact on individuals' understanding and management of obesity (van Dillen *et al.*, 2014), Schauer et al. (2014) in their study however found that, healthcare providers are more

likely to consider providing weight counselling to clients when they have had enough training in that area and have an existing provider-patient relationship with the clients.

The church, health facility, and school, each cited by a small number of respondents, demonstrate the diversity of sources contributing to knowledge on overweight and obesity. These findings align with the idea that various sectors can contribute to health education in the community.

5.5 LIMITATIONS

This study has some limitations that warrant consideration. The reliance on self-reporting might introduce response biases, leading to the overestimation of positive changes. Additionally, the study focused on a specific population within the Eastern Region of Ghana, limiting the generalizability of the findings to other contexts. Future research could involve a broader sample and longitudinal designs to assess the sustainability of behavioral changes over time.

In conclusion, this study highlights the effectiveness of a nutrition education intervention in enhancing knowledge, promoting positive behaviors, and fostering community engagement. The findings underscore the importance of culturally sensitive approaches, family involvement, and multiple sources of information dissemination in tackling the challenges of overweight and obesity. Health interventions that integrate educational components can play a pivotal role in curbing the obesity epidemic and improving overall public health.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

In this study, we explored the knowledge, attitudes, and behaviors related to overweight and obesity among residents of a rural area in the Eastern Region of Ghana. The findings provide valuable insights into the factors that contribute to the rising prevalence of overweight and obesity in the region and underscore the importance of health education interventions in addressing this pressing public health issue.

6.2 SUMMARY OF FINDINGS

The study revealed that participants exhibited varying levels of awareness and knowledge about overweight and obesity. While some had a clear understanding of the role of fatty foods in obesity, others demonstrated misconceptions about the causes and preventive measures. The nutrition education intervention, involving songs, food demonstrations, and community engagement, led to significant improvements in participants' knowledge and behaviors. Positive behavioral changes included increased engagement in physical activity, incorporation of diverse foods into diets, and a shift away from late-night eating.

6.3 IMPLICATIONS AND SIGNIFICANCE

The study's findings hold several implications for public health efforts to combat overweight and obesity. Firstly, they underscore the value of culturally sensitive approaches in health education interventions. The incorporation of local foods and traditions in the intervention resonated with

participants and facilitated behavior change. Secondly, the study highlights the role of family engagement in promoting healthy behaviors. Participants reported that changes in their behaviors influenced their families, suggesting that health interventions can have a multiplier effect within households.

6.4 CONCLUSION

In conclusion, the findings of this study emphasize the importance of health education interventions in addressing the rising prevalence of overweight and obesity. By enhancing knowledge, promoting positive behaviors, and fostering community engagement, these interventions can contribute to improved public health outcomes. The recommendations provided offer a roadmap for designing and implementing effective strategies that tackle overweight and obesity within the unique context of the Eastern Region of Ghana. We hope that these efforts will contribute to a healthier and more informed population, ultimately reducing the burden of overweight and obesity-related health issues.

6.5 RECOMMENDATIONS

Based on the study's findings, several recommendations can be made to guide future efforts aimed at addressing overweight and obesity in the Eastern Region of Ghana:

1. Training institutions of health professionals must be trained to provide information on nutrition (overweight and obesity) to communities to avoid misinformation.

2. Also, MOH, GHS and researchers are to ensure interventions are culturally tailored to the local context, incorporating familiar foods, traditions, and beliefs. This approach ensures that health messages are relatable and resonate with the target population.

3. The success of the nutrition education intervention in this study underscores the importance of implementing sustainable health education programs. There should be collaborative efforts between community health professionals, educators, and local leaders to ensure the continuity of such initiatives.

REFERENCES

- Attride-Stirling, J., 2001. Thematic networks: an analytic tool for qualitative research. *Qualitative research*, 1(3), pp.385-405.
- Annan, R.A., Apprey, C., Agyemang, G.O., Tuekpe, D.M., Asamoah-Boakye, O., Okonogi, S., Yamauchi, T. and Sakurai, T., 2021. Nutrition education improves knowledge and BMI-for-age in Ghanaian school-aged children. *African health sciences*, 21(2), pp.927-941.
- Asamoah-Boaheng, M., Sarfo-Kantanka, O., Tuffour, A.B., Eghan, B., & Mbanya, J.C. (2019). Prevalence and risk factors for diabetes mellitus among adults in Ghana: a systematic review and meta-analysis. *International Health*, 11(2), 83-92.
- Charles, A., Boatemaa, S., Frempong, G., & de-Graft Aikinset, A. (2015). Obesity in Sub-Saharan Africa Obesity in Sub-Saharan Africa. *Metabolic Syndrome*(January), 1-13.
- Dee, A., Kearns, K., O'Neill, C., Sharp, L., Staines, A., O'Dwyer, V., Fitzgerald, S., & Perry, I.J. (2014). The direct and indirect costs of both overweight and obesity: A systematic review. *BMC Research Notes*, 7(1), 1-9.
- Flegal, K.M., Kit, B.K., & Orpana, H. (2013). Association of All-Cause Mortality. 309(1), 71-82.
- Fruh, S.M. (2017). Obesity: Risk factors, complications, and strategies for sustainable long-term weight management. *Journal of the American Association of Nurse Practitioners*, 29, S3-S14. [Online] Available at: <https://doi.org/10.1002/2327-6924.12510>
- Hoelscher, D.M., Sharma, S. V and Byrd-Williams, C.E. (2018) 'Prevention of Obesity in Early Childhood: What Are the Next Steps?', *American journal of public health*. United States, pp. 1585–1587. doi:10.2105/AJPH.2018.304779.

- Kirunda, B.E., Fadness, L.T., Wamani, H., Van den Broeck, J. & Tylleskar T. (2015). Population-based survey of overweight and obesity and the associated factors in peri-urban and rural Eastern Uganda Chronic Disease epidemiology. *BMC Public Health*, 15(1), 1-11. [Online] Available at: <https://doi.org/10.1186/s12889-015-2506-7>
- Kushitor, S.B., & Colecraft, E.K. (2023). Development of a Facilitator Guide for Nutrition Education on Overweight and Obesity in the Eastern Region of Ghana. *African Journal of Food, Agriculture, Nutrition and Development*, 23(1), 22276-22293. [Online] Available at: <https://doi.org/10.18697/ajfand.116.23010>
- Lartey, S., Si, L., Lung, T., Magnussen, C.G., Boateng G.O., Minicuci, N., Kowal, P., Hayes, A., de Graaff, B., Blizzard L., Palmer, A. (2020). Impact of overweight and obesity on life expectancy, quality-adjusted life years and lifetime costs in the adult population of Ghana. *BMJ Global Health*, 5(9). [Online] Available at: <https://doi.org/10.1136/bmjgh-2020-003332>
- Lartey, S., Si, L., Magnussen, C.G., Boateng G.O., Minicuci, N., Kowal, P., de Graaff, B., Biritwum, R., Blizzard L., & Palmer, A. (2019). Rapidly increasing prevalence of overweight and obesity in older Ghanaian adults from 2007-2015: Evidence from Who-sage waves 1 & 2. *PLoS ONE*, 14(8), 1-16. [Online] Available at: <https://doi.org/10.1371/journal.pone.0215045>
- Malik, V.S., Pan, A., Willet, C.W., & Hu, F.B. (2013). Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. *American Journal of Clinical Nutrition*, 1084-1102. [Online] Available at: <https://doi.org/10.3945/ajcn.113.058362>

- Marques, A., Peralta, M., Naia, A., Lourciro, N., & Gasper de Matos M. (2018). Prevalence of adult overweight and obesity in 20 European countries, 2014. *European Journal of Public Health*, 28(2), 295-300. [Online] Available at: <https://doi.org/10.1093/eurpub/ckx143>
- Mensah, G., Ayeh-Kumi, P.F., Annang., A.K., Owusu-Frimpong, I., Niampoma, S., & Brown G.A. (2023). Molecular epidemiology of *Cryptosporidium* species in Kpong and its environs, Ghana. *PloS one*, 18, e0281216. [Online] Available at: <https://doi.org/10.1371/journal.pone.0281216>
- Metzgar, C.J., Preston, A.G., Miller, D.L., & Nickolas-Richardson, S.M. (2015). Facilitators and barriers to weight loss and weight loss maintenance: A qualitative exploration. *Journal of Human Nutrition and Dietetics*, 28(6), 593-603. [Online] Available at: <https://doi.org/10.1111/jhn.12273>
- Needs, P. Health Promotion to Prevent Obesity, 125-150.
- Ng, M., Fleming T., Robinson, M., Thomson, B., Graetz, N., & Margono, C. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, 766-781. [Online] Available at: [https://doi.org/10.1016/S0140-6736\(14\)60460-8](https://doi.org/10.1016/S0140-6736(14)60460-8)
- Ofori-Asenso, R., Agyeman, A., Laar, A., & Boateng D.C. (2016). Overweight and obesity epidemic in Ghana - A systematic review and meta-analysis. *BMC Public Health*, 16(1). [Online] Available at: <https://doi.org/10.1186/s12889-016-3901-4>

- Pérez-Escamilla, R. (2017). Food security and the 2015-2030 sustainable development goals: From human to planetary health. *Current Developments in Nutrition*. [Online] Available at: <https://doi.org/10.3945/cdn.117.000513>
- Popkin, B.M., & Slining, M.M. (2013). New dynamics in global obesity facing low- and middle-income countries. *Obesity Reviews*, 14(S2), 11-20. [Online] Available at: <https://doi.org/https://doi.org/10.1111/obr.12102>
- Sanjay Bhujbal, A., Baby, B. and T., P.D. (2022) 'Knowledge, Attitude and Practice of Weight Reduction Among Overweight and Obese Adolescent Students', *International Journal of Life Science and Pharma Research*, 12(4), pp. 114–122. doi:10.22376/ijpbs/lpr.2022.12.4.1114-122.
- Van Dillen, S.M.E., Noordman, J., Van Dulmen, S. and Hiddink, G.J., 2014. Examining the content of weight, nutrition and physical activity advices provided by Dutch practice nurses in primary care: analysis of videotaped consultations. *European Journal of Clinical Nutrition*, 68(1), pp.50-56.
- Wakefield, M.A., Loken, B. and Hornik, R.C. (2010) 'Use of mass media campaigns to change health behaviour.', *Lancet* (London, England), 376(9748), pp. 1261–1271. doi:10.1016/S0140-6736(10)60809-4.
- Wang, W. (2015). Integrated hazard assessment of Cirenmaco glacial lake in.
- World Health Organization. (2017). "Best buys" and other recommended interventions for the prevention and control of non-communicable diseases. *World Health Organisation*, 17(9),

28. [Online] Available at: <http://apps.who.int/iris/bitstream/10665/259232/1/WHONMH-NVI-17.9-eng.pdf?ua=1>

World Health Organization. (2020). Obesity and overweight: Key facts. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

APPENDICES

APPENDIX I

COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	26
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	28
Occupation	3	What was their occupation at the time of the study?	26
Gender	4	Was the researcher male or female?	28
Experience and training	5	What experience or training did the researcher have?	26
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	29
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	25
Sample size	12	How many participants were in the study?	25
Non-participation	13	How many people refused to participate or dropped out? Reasons?	27
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	10,25
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	34
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	26
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	28
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	28
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	31
Description of the coding tree	25	Did authors provide a description of the coding tree?	31
Derivation of themes	26	Were themes identified in advance or derived from the data?	32
Software	27	What software, if applicable, was used to manage the data?	30
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	41
Data and findings consistent	30	Was there consistency between the data presented and the findings?	40
Clarity of major themes	31	Were major themes clearly presented in the findings?	41
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	40

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

APPENDIX II: ETHICAL CLEARANCE



OUR REF: ENSIGN/IRB/EL/SN-217
YOUR REF:

May 8, 2023.

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Jane Nyarko Barnes
Ensign Global College
Kpong

Dear Jane,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Friday, May 5, 2023, your research proposal entitled "**Effects of Nutrition Education on Overweight and Obesity. Knowledge in the Lower Manya Krobo Municipality**" was considered.

You have been granted Ethical Clearance to collect data for the said research under academic supervision within the IRB's specified frameworks and guidelines.

We wish you all the best.

Sincerely

A handwritten signature in black ink, appearing to read "Rebecca Acquah-Arhin", with a stylized flourish at the end.

Dr. (Mrs.) Rebecca Acquah-Arhin
IRB Chairperson