University of Ghana http://ugspace.ug.edu.gh

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

ASSESSMENT OF ADHERENCE TO LIFESTYLE MODIFICATION PLANS AND MEDICATIONS AMONG PATIENTS WITH CARDIO-METABOLIC DISEASES IN CAPE COAST TEACHING HOSPITAL

BY

ESTHER GORDON

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE

NOVEMBER 2024

University of Ghana http://ugspace.ug.edu.gh

DECLARATION

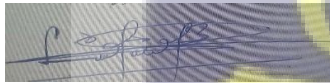
I, Esther Gordon, hereby declare that; this research work "Assessment of adherence to lifestyle and medication plans and medications among patients with cardio-metabolic diseases in Cape Coast Teaching Hospital" is my original work except for references duly acknowledged. This research work was done under the supervision of Dr. Leonard Baatiema at the Department of Health Policy, Planning and Management in the School of Public Health of the College of Health Sciences at the University of Ghana. This work has not been presented for any other degree in the University or elsewhere in whole or part. I am fully responsible for the views expressed and the content accuracy of this dissertation.

Signature:

Date: 07/11/2024

ESTHER GORDON

(STUDENT)

Signature: 

Date: 11/15/24

DR LEONARD BAATIEMA

(SUPERVISOR)

University of Ghana http://ugspace.ug.edu.gh

DEDICATION

This dissertation is dedicated to my dearest husband, Joseph Atsu Wemegah, and my children, Lois Mawuena Wemegah and William Selorm Wemegah for their immense support throughout the MPH program.

I also dedicate this thesis to my lovely mum Grace Gordon for her immense love, patient and support throughout the program.

I also dedicate this thesis to all patients living with Cardio-Metabolic Diseases.

University of Ghana http://ugspace.ug.edu.gh

ACKNOWLEDGEMENT

I thank the Almighty God for granting me traveling mercies throughout the MPH program. The journey to this degree was a daunting one but I am grateful to God for the completion of my dissertation.

My sincere appreciation goes to my supervisor Dr. Leonard Baatiema of the Department of health Policy, Planning and Management for his time and supervisory role in developing this dissertation.

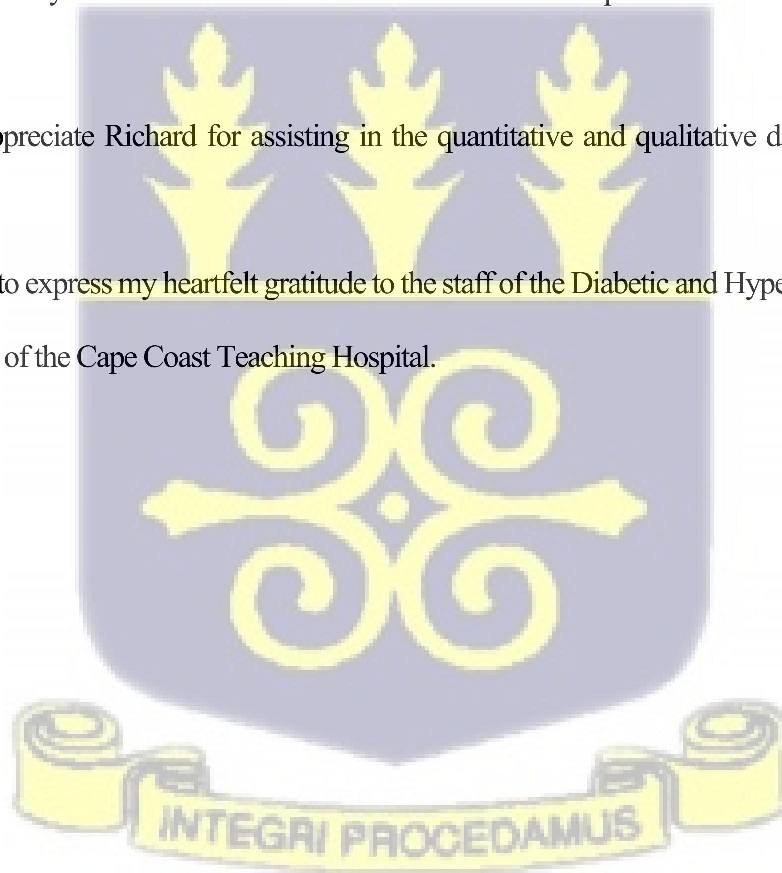
I am very grateful to my husband, Joseph Atsu Wemegah for his financial support towards the completion of this dissertation.

I acknowledge the support of my mum, Grace Gordon and my sister for their encouragement throughout the process.

I acknowledge all my research assistants whose assistance in the quantitative data collection of this dissertation.

I also want to appreciate Richard for assisting in the quantitative and qualitative data analysis of this dissertation.

I would also like to express my heartfelt gratitude to the staff of the Diabetic and Hypertensive Clinic and the Cardio Clinic of the Cape Coast Teaching Hospital.



University of Ghana http://ugspace.ug.edu.gh

ABSTRACT

Background: Cardiovascular diseases (CVDs) are a leading cause of morbidity and mortality globally. In Ghana, limited data on lifestyle changes and treatment adherence among CVD patients hinders effective intervention, with only 5% achieving blood pressure control.

Aim: To assess adherence to lifestyle modifications (diet, exercise, alcohol/smoking cessation, stress management) and medication among CVD patients.

Method: A convergent mixed-methods research design was used. The study gathered data from a diverse sample of 419 CVD patients at Cape Coast Teaching Hospital. Quantitative surveys collected demographic, medical, and adherence information, while qualitative insights were derived from 15 in-depth interviews and one focus group discussion.

Results: Most participants avoided smoking (98.8%) and alcohol (70%) and exercised regularly (66.8%). However, only 28.4% restricted salt, 8.3% controlled glucose, and 5.5% maintained blood pressure. Knowledge of hypertension was low (27%), though medication adherence was relatively high (70%). Major challenges included financial constraints (66.4%) and limited knowledge (46.3%). Comorbidity was associated with lower odds of medication adherence (OR = 0.54, 95% CI: 0.35–0.85, p = .007) and normal fasting glucose (OR = 0.45, 95% CI: 0.21–0.99, p = .047). Increasing age was linked to a higher likelihood of uncontrolled blood pressure (OR = 1.75, 95% CI: 1.22–2.51, p = .002). Integrated findings showed high medication adherence but limited adoption of full lifestyle modification. While most patients practiced healthy behaviors, adherence to salt restriction and structured exercise remained low. Financial hardship, cultural dietary habits, and limited counseling constrained sustained change. Education and provider engagement emerged as facilitators, yet health-system resource gaps persisted. Comorbidity, older age, and longer disease duration predicted poorer adherence and clinical control. Overall, meta-inference indicated that motivation alone is insufficient; sustainable adherence requires culturally tailored and system-supported interventions.

Conclusion: These findings highlight the need for personalized, comprehensive interventions addressing financial, motivational, and educational barriers to improve adherence and health outcomes in CVD management.

University of Ghana http://ugspace.ug.edu.gh

TABLE OF CONTENTS

DECLARATION i
DEDICATION ii
ACKNOWLEDGEMENT iii
ABSTRACT iv
TABLE OF CONTENTS v
LIST OF TABLES ix
LIST OF FIGURES x
LIST OF ABBREVIATIONS xi
DEFINITION OF CONCEPTS xiii
CHAPTER ONE 1
INTRODUCTION 1
1.1 Background and Context 1
1.2 Problem Statement 5
1.3 Research Questions 7
1.4 General objectives7
1.5. Specific Objectives 8
1.5 Significance of the study 8
CHAPTER TWO 11
LITERATURE REVIEW 11
2.1 Overview 11
2.2 Introduction 12
2.3 Cardiovascular-disease and its burden 13
2.4 Burden of cardiovascular diseases in Ghana 15
2.5 Concept of healthy lifestyle Risk Factors Contributing to CVD in Ghana 16
2.6 Factors Affecting Adherence 17
2.6.1 Health systems challenges in Addressing the CVD Burden 17
2.6.3 Lifestyle Modification/Medication Factors 18
2.6.4 Societal-Related Factors 18
2.6.5 Patient Related Factors 18
2.6.6 Cardiometabolic Related Diseases Factors 19
2.7 Theories 20
2. 8 Theoretical Framework 21

University of Ghana http://ugspace.ug.edu.gh

2.9 Key Experimental studies........23
2.9 Key Debates and Controversies on adherence and its managements........24
2.9 Gaps in Existing Knowledge........27
CHAPTER THREE........29
METHODOLOGY........29
3.1 Introduction........29
3.2 Study Setting........29
3.3 Study Design........31
3.4 Study Population/Participant........32
3.4.1 Inclusion criteria and exclusion criteria........32
3.5.1 Independent Variables........33
3.5.2 Dependent Variable........33
3.6 Sample Size Determination........33
3.7 Sampling technique / Recruitment procedures........34
3.8 Data collection tools and measurement........35
3.8.2 Qualitative data collection tools and measurement........36
3.9 Quality Assurance........37
CHAPTER FOUR........39
RESULTS........39
4.1.1 Background characteristics........39
4.1.3 Adherence to medication........40
4.1.5 Healthy lifestyle modification........42
4.1.6 Clinical healthy lifestyle modification........43
4.1.7 Prevalence of behavioral and clinical healthy lifestyle modification by demographic........44
4.1.8 Knowledge on hypertension........47
4.1.9 Overall knowledge on hypertension........50
4.1.10 Social Support Assessment........50
4.1.11 Strategies and interventions adopted for healthy lifestyle adherence........53
4.1.12 Barriers and challenges affecting adherence to recommended lifestyle modifications........55
4.1.14 Exploring the Role of Age and Clinical Characteristics in Predicting Uncontrolled *Blood Pressure*........57
4.2.1 Qualitative results........60
4.2.2 Background of participants........60

University of Ghana http://ugspace.ug.edu.gh

4.2.3 Qualitative themes and sub-themes descriptions....61
4.2.4 Dietary Consistent and Resistance 61
4.2.4 Cultural Impacts on Health....62
4.2.5 Consistent Health Education....62
4.2.6 Limited Valued Exercise....63
4.2.7 Modified healthy strategies....63
4.2.8 Perceived support....64
4.2.9 Perceived challenges....65
4.3.1 Experiences of healthcare providers in supporting people diagnosed with CVD....69
4.3.2 Health worker challenges in recommending healthy lifestyle....69
4.3.4 Health worker resources required to improve patient adherence to healthy lifestyle 70
Table 10. 72
Joint Display of Integrated Quantitative and Qualitative Findings....72
CHAPTER FIVE....85
DISCUSSION....85
5.0 Introduction....85
5.1 Overview of the Results....85
5.2 Findings Compared with Previous Studies....89
Adherence to Healthy lifestyle modifications among people living with CVD....89
Adherence to medication and recommended healthy lifestyle among patients....89
Strategies and interventions adopted by patient to promote adherence to healthy lifestyle 90
Barriers and challenges affecting adherence to recommended healthy lifestyle....91
Experience of healthcare providers in managing patients with CVD....93
5.7 Limitations of the study....94
CHAPTER SIX....96
CONCLUSION....96
6.1 Introduction....96
6.2 Implication of the study....97
6.3 Recommendations to healthcare management....101
REFERENCES....103
APPENDICES....132
APPENDIX A: INFORMATION SHEET....132
APPENDIX B: CONSENT FORM....135
APPENDIX C: DATA COLLECTION TOOLS....136

University of Ghana http://ugspace.ug.edu.gh

Statements 141
1 141
2 141
3 141
4 141
5 141
APPENDIX D: ETHICS APPROVAL LETTER 146

University of Ghana http://ugspace.ug.edu.gh

LIST OF TABLES

Table 1: Demographic of participants......39
Table 2: Demographic of health workers......40
Table 3: MARS-10 adherence indicators......41
Table 4: Prevalence of behavioral and clinical lifestyle modification......46
Table 5 Knowledge indicators of participants on hypertension (HeLM Scale)......48
Table 6: Social support among participants......51
Table 7: Strategies and interventions used in promoting adherence to healthy lifestyle and effectiveness......54
Table 8 Background of qualitative participants......60
Table 9: Description of themes, sub-themes and example quotations from patients......66

University of Ghana http://ugspace.ug.edu.gh

LIST OF FIGURES

Figure 1. Conceptual framework of the study 20

Figure 2: Map of Central Region https://lgs.gov.gh/central/ 31

Figure 3: Location of Cape Coast Teaching Hospital Source: (Sampah et al., 2023) 31

Figure 4: Overall adherence to medication 42

Figure 5: Behavioral health lifestyle modification among patients 43

Figure 6: Overall knowledge on hypertension 50

Figure 7: Participation in educational programs by participants 53

Figure 8: Barriers and challenges affecting adherence to recommended lifestyle modifications 55

Figure 9: Recommended lifestyle modification by health workers 69

Figure 10: Health worker challenges in recommending healthy lifestyle 70

Figure 11: Resources required to improve patient adherence to healthy lifestyle 71

University of Ghana http://ugspace.ug.edu.gh

LIST OF ABBREVIATIONS

1. **CVD** - Cardiovascular diseases
2. **BP** - Blood Pressure
3. **FBG** - Fasting Blood Glucose
4. **HTN** - Hypertension
5. **CM** - Cardiometabolic
6. **NCD** - Non-Communicable Diseases
7. **UHC** - Universal Health Coverage
8. **WHO** - World Health Organization
9. **BMI** - Body Mass Index
10. **HRQoL** - Health-Related Quality of Life
11. **PA** - Physical Activity
12. **DM** - Diabetes Mellitus
13. **LDL** - Low-Density Lipoprotein (often referred to as "bad" cholesterol)
14. **HDL** - High-Density Lipoprotein (often referred to as "good" cholesterol)
15. **RCT** - Randomized Controlled Trial
16. **QOL** - Quality of Life
17. **SES** - Socioeconomic Status
18. **CHD** - Coronary Heart Disease
19. **CAD** - Coronary Artery Disease
20. **DASH** - Dietary Approaches to Stop Hypertension

University of Ghana http://ugspace.ug.edu.gh

21. **HELM Scale** - Hypertension Evaluation of Lifestyle and Management Scale
22. **SSA** - Sub-Saharan Africa
23. **HIV/AIDS** - Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
24. **HHD** - Hypertensive Heart Disease
25. **DALY** - Disability-Adjusted Life Years

University of Ghana http://ugspace.ug.edu.gh

DEFINITION OF CONCEPTS

Assessment: Assessment refers to the systematic evaluation of participants' health behaviors, knowledge, and clinical outcomes like blood pressure and glucose levels to understand their health status, adherence to prescribed interventions, and potential barriers. In this study, assessment includes evaluating participants' lifestyle choices, clinical indicators, and the factors influencing their adherence to health recommendations.

Adherence: Adherence is the extent to which participants follow prescribed health behaviors and treatment recommendations, such as medication regimens, lifestyle changes, and dietary restrictions. In this context, adherence relates to the participants' commitment to engaging in healthy behaviors and taking medications as advised to manage their health.

Adherence Level: Adherence level refers to the degree or extent to which participants consistently follow the recommended health behaviors and treatment plans. Higher adherence levels indicate a strong commitment to these guidelines, while lower adherence levels suggest challenges or barriers in maintaining these behaviors.

Lifestyle Modification: Lifestyle modification involves making changes to daily habits and behaviors to improve health and manage chronic conditions. In the study, lifestyle modifications include abstaining from smoking and alcohol, engaging in physical activity, practicing dietary restrictions (like DIET Approach and salt reduction), and stress management all intended to support health outcomes.

Cardiometabolic Diseases: Cardiometabolic diseases are a group of related health conditions that increase the risk of cardiovascular disease and metabolic disorders, such as diabetes, hypertension, and obesity. These conditions are influenced by lifestyle factors and are often interconnected, contributing to the overall burden of chronic illness.

University of Ghana http://ugspace.ug.edu.gh

Non-Adherence: Non-adherence is the failure or unwillingness of participants to consistently follow recommended health behaviors, medication regimens, or lifestyle modifications. In the study, non-adherence could include not taking prescribed medications regularly, failing to maintain dietary restrictions, or engaging in behaviors counterproductive to managing chronic conditions.

Cardiovascular Diseases (CVD): Cardiovascular diseases refer to a group of disorders affecting the heart and blood vessels. These include conditions such as hypertension (high blood pressure), coronary artery disease, heart failure, and stroke. CVDs are often associated with risk factors like high blood pressure, high blood sugar, obesity, and unhealthy lifestyle behaviors (such as smoking and poor diet). Managing CVDs typically requires a combination of lifestyle modifications, medication adherence, and regular monitoring to prevent complications.

Adherence to lifestyle modifications: Participants adhering to advice on diet, exercise, and recommendations regarding smoking and alcohol consumption.

Co-morbidities: Participants with one or more additional medical conditions alongside hypertension.

DASH: A dietary pattern characterized by high intake of fruits, vegetables, low sodium, and reduced saturated and total fat.

Diet-related adherence: In this study, respondents consistently following a diet rich in vegetables, grains, and fruits; seldom using salt; and infrequently consuming foods high in spices and saturated fat were considered adherent.

INTEGRI PROCEDAMUS

University of Ghana http://ugspace.ug.edu.gh

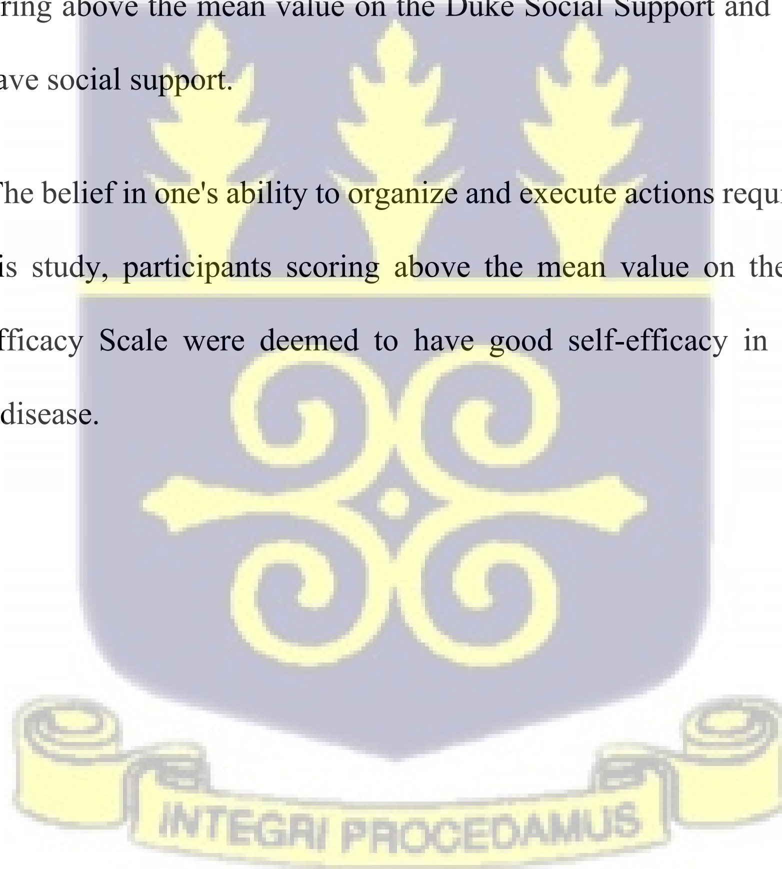
Exercise-related adherence: Participants reporting engagement in exercise for more than 30 minutes per day, at least three times per week.

Knowledge about hypertension: Participants scoring above the mean value on the hypertension evaluation of lifestyle and management scale were considered to have good knowledge about hypertension.

Smoking-related adherence: Participants who either never smoked or have discontinued smoking.

Social support: Support received from family and non-family members. In this study, participants scoring above the mean value on the Duke Social Support and Stress scale were considered to have social support.

Self-efficacy: The belief in one's ability to organize and execute actions required for a specific outcome. In this study, participants scoring above the mean value on the 6-item Chronic Disease Self-Efficacy Scale were deemed to have good self-efficacy in coping with and managing their disease.



University of Ghana http://ugspace.ug.edu.gh

CHAPTER ONE

INTRODUCTION

1.1 Background and Context

The WHO has identified Cardiovascular diseases (CVDs) as one of the top two causes of death in Ghana after diarrheal illnesses (Lloyd-Jones et al., 2010). CVDs are increasingly common in the world. It was reported that their prevalence in adults over the age of 20 was 49.2% (126.9 million) in 2018, and are often associated age in both men and women (Irani et al., 2021). Globally, the leading cause of death is attributed to CVDs with an estimated death of 17.9 million in 2019, constituting 32% of all global deaths (World Health Organization, 2021). CVDs are associated with increased morbidity and mortality with a significant burden to the health-care system and leading cause of hospitalization among adults and the elderly (Roth et al., 2018a). In the USA, the total medical costs for patients with heart failure are expected to rise from US$20.9 billion in 2012 to $53.1 billion by 2030(Abate, 2000a), Though the primary causes of Heart Failure vary according to sex, age, ethnicity, comorbidities, and environment, most cases remain preventable (Roth et al., 2018a). Several studies have proven how lifestyle poses significant impacts on our health outcomes and how the mediators of most CVD mostly hypertension, type 2 diabetes, dyslipidaemia and obesity are the direct effects of behavioural risk factors(Mozaffarian et al., 2008a; Roth et al., 2018b; World Health Organisation. Adherence to Long-Term, 2021). About 70% of total cardiovascular events, 80% of coronary heart disease (CHD) events, and 90% of new cases of diabetes mellitus are attributed to lifestyle factors(Abate, 2000b; Ding et al., 2015; Kende, 2001). The best possible cardiovascular health, based on a concept well supported in the literature, is defined by the presence of both ideal health behaviours (non-smoking, body mass index <25 kg/m^2, physical activity at goal levels, and pursuit of a diet consistent with current guideline recommendations) and ideal health

University of Ghana http://ugspace.ug.edu.gh

factors (untreated total cholesterol <200 mg/dL, untreated blood pressure <120/<80 mm Hg, and fasting blood glucose <100 mg/dL) (Muniz et al., 2018).

Non-communicable diseases (NCDs), in particular CVDs in Africa have seen an unprecedented rise (Minja et al., 2022). The highest age-standardized disability-adjusted life years (DALYs) due to hypertensive heart disease (HHD) were recorded in Africa(Minja et al., 2022). As cited by Minja et al, (2022), CVD jumped from the 6th to the 2nd leading cause of death in sub-Saharan Africa (SSA) between 1990 and 2019, exceeding HIV/AIDS, malaria, and other enteric infections in the top 10 causes of death (VizHub - GBD Compare, 2023). In Africa, CVDs form the largest of the total NCD burden, accounting for 38.3% of NCD deaths and 22.9 million DALYs(Gouda et al., 2019; Mensah et al., 2015.). While many high-income countries (HIC) have recorded reductions in cardiovascular deaths (Sacco et al., 2016), Africa has close a 50% increase in the CVD burden within the last three decades (Gouda et al., 2019; VizHub - GBD Compare, 2023).

The underlying causes have been outrageous increases in major risk factors, such as hypertension and diabetes(Yusuf et al., 2004). In Africa, CVDs form the largest of the total NCD burden, accounting for 38.3% of NCD deaths and 22.9 million DALYs(Gouda et al., 2019; Mensah et al., 2015.). Aside from increases in major risk factors, this increase in CVD burden on the continent has been attributed to population growth and aging, demonstrated by a general downward trend in age-standardized mortality rates(Gouda et al., 2019; Sacco et al., 2016).

Adherence to a healthy lifestyle has been associated with a lower risk of CVD events and all-cause mortality in diabetics and hypertensives, hence the promotion of a healthy lifestyle is paramount in reducing the increasing healthcare burden of CVDs(Li et al., 2021).

University of Ghana http://ugspace.ug.edu.gh

Despite many theoretical and interventional guidelines to achieve good cardiovascular health, suboptimal and non-adherence continue to be on the rise globally(Schulz et al., 2006) and the prevalence of cardiovascular-related diseases continues to be on the rise (Jørgensen et al., 2006; Ziaeian & Fonarow, 2016).

Compared to other continents, CVD and its risk factors are highly prevalent in Africa, but the continent also displays a low-level of knowledge and awareness of CVD, and poor perception of its risk factors(Tulu et al., 2021). Not much research has been done on the connection between the daily lived experiences of African people and the high prevalence of CVD and its risk factors on the African continent(Tulu et al., 2021). A meta-synthesis conducted by Tulu et al, (2021) reported a recurring disconnection among Africans in linking cardiovascular disease (CVD) to its severity and chronic nature, contrasting with their perceptions of the subtle signs and symptoms during the initial stages of the illness. The gap between traditional healers and healthcare professionals in Africa further makes the issue worse (Tulu et al., 2021). The exposure of patients with cardiovascular diseases to cardiovascular risk factors, despite being under medical management in Africa is primarily high predicting more non-adherence to healthy lifestyle modification calling for more sensitization programs and additional interventions in the management of CVDs(Roman et al., 2019).

Current evidence suggests that South Saharan Africa (SSA) is now at an epidemiological transition with a double burden of disease from NCDs and communicable diseases (Ziaeian & Fonarow, 2016). In SSA, cardiovascular diseases (CVDs) are the most frequent causes of NCD deaths, responsible for approximately 13% of all deaths and 37% of all NCD deaths(Ziaeian & Fonarow, 2016). The probability of CVD occurring two decades earlier in SSA populations, compared to high-income countries (HIC) due to insufficient health care systems and infrastructure, scarcity of cardiac professionals, skewed budget allocation on NCDs, high cost

University of Ghana http://ugspace.ug.edu.gh

of cardiac treatments coupled with inefficient state of health insurance systems (Ziaeian & Fonarow, 2016) is relatively high.

In a 5-year (2006-2010) review of autopsy cases recorded by the Department of Pathology of the Korle-Bu Teaching Hospital (KBTH), Ghana's premier healthcare facility, it was identified that among 19,289 autopsy cases completed, deaths due to CVDs accounted for about one fifth (22.5%) (Sanuade et al., 2014.). In coronary artery disease (CAD) patients, ≥6 months after hospital discharge, 42% still had a blood pressure (BP) ≥140/90 mmHg, 71% still had low-density lipoprotein cholesterol ≥1.8 mmol/L (≥70 mg/dL), and 29% had insufficiently controlled disease(Nieuwlaat et al., 2013). An important determinant of the eminent prevention and improvement of cardiovascular diseases is optimal patient adherence to a healthy lifestyle (Pedretti et al., 2013).

Achieving an optimal adherence to lifestyle guidance and measures is however a great challenge to both client and their healthcare givers (Pedretti et al., 2013). Globally nutrition and physical activity have been the common components in comprehensive lifestyle-modification interventions. In the public health interest, more attention is given to the modification of lifestyles of the public of all nations to reduce obesity and increase physical activity. At the clinical level, individual patients with metabolic syndrome need to be identified so that their multiple risk factors, including lifestyle risk factors, can be reduced(Alberti et al., 2009). In addition to conventional educational approaches to promote adherence, the development and implementation of more patient-oriented approaches such as patient-centred clinical communication skills, counselling using motivational strategies, decision-making by patient empowerment, and a multi-disciplinary team approach has been suggested(Ihm et al., 2022).

The objectives of the Ghana NCD Policy 2011 include reducing the unhealthy lifestyles that contribute to NCDs; reducing morbidity associated with NCDs and improving the overall

University of Ghana http://ugspace.ug.edu.gh

quality of life in persons with NCDs (Government of Ghana, 1994). The need to assess the level of adherence to a healthy lifestyle and the associated factors among patients with cardiovascular-related diseases is imperative to achieving this national agenda. Assessing the level of adherence will facilitate the development of adherence improvement interventions tailored to suit the individual, the community, and the country in preventing and improving cardiovascular diseases, inform health policy development targeting the policing of healthy behaviours and reduce healthcare burden.

1.2 Problem Statement

In 2008, CVDs were the most prevalent contributor to mortality in Ghana among all NCDs as well as the leading cause of institutional deaths accounting for 14.5% of reported total deaths in the country compared to 13.4% deaths from malaria(Bosu, 2022). In Ghana's capital, Accra, CVDs rose from being the seventh and tenth cause of death in 1953 and 1966 respectively to becoming the leading cause of death in 1991 and 2001(Agyei-Mensah & De-Graft Aikins, 2010). Between 1988 and 2007, the number of reported new cases of hypertension in the country's outpatient public health facilities increased by more than 1,000 percent(Bosu, 2010). Epidemiological data continue to indicate a rising prevalence of CVDs, including hypertension, coronary artery disease, stroke and heart failure, contributing significantly to the country's morbidity and mortality rates (World Health Organisation, 2021). The burden of CVDs in Ghana is exacerbated by various factors such as lifestyle changes, urbanization, and an aging population(Addo et al., 2007). The impact of treating and managing cardiovascular diseases strains the already resource-constrained health system in Ghana, affecting both the availability and affordability of healthcare services(Agyei-Mensah & De-Graft Aikins, 2010).

Sedentary lifestyles, poor dietary habits, obesity, stress, alcohol and substance use, and limited access to preventive healthcare services have been examined to contribute to the high

University of Ghana http://ugspace.ug.edu.gh

prevalence of CVD in Ghana (Ofori-Asenso & Garcia, 2016). The increasing prevalence of CVD and unachieved treatment target demands more assessment on healthy lifestyle adoption especially among patients with cardiovascular diseases. However, comprehensive, and holistic data on adherence and associated barriers and facilitators in vital statistics are lacking, hindering the development of targeted adherence interventions and policy formulation (Dalal et al., 2011). Additionally, there is a lack of tailored interventions and culturally sensitive health promotion strategies that consider the unique socio-cultural context of Ghana (Ofori-Asenso & Garcia, 2016) making adherence difficult for ordinary Ghanaians.

Studies have demonstrated that good adherence to healthy lifestyle modification in patients with cardiovascular diseases is essential to improve the patient's quality of life, prevent hospital admission, and reduce mortality and morbidity (Deka et al., 2017; Ruppar et al., 2016). Nevertheless, poor adherence to healthy lifestyle recommendations remains an extensive problem for patients with cardiovascular \diseases (McDonagh et al., 2021). Ghana has existing structures in the health care system to reduce the burden of CVD however, studies have highlighted the increasing devastation caused by cardiovascular diseases (Doku et al., 2023). (Baymot et al., 2022) indicated less than 10% (5%) control of blood pressure after one year of management. This indicates a possible non-adherence to the national guidelines on the management of cardiovascular diseases at the individual, community, national and healthcare delivery levels. Wornyo 2020 reported adherence to dietary recommendations was 26.7% among patients with type two 2 diabetes. However, there is little known about the proportion of good adherence to both medication and lifestyle among patients with CVD in Ghana.

Therefore, this research aims to assess the level of adherence to medication and healthy lifestyle among individuals diagnosed with cardiovascular diseases, identify individual, community and healthcare barriers and facilitators to adherence, and explore potential personalised interventions to improve adherence rates. Understanding the adherence patterns in this

University of Ghana http://ugspace.ug.edu.gh

population is essential for designing effective strategies to reduce CVD-related complications and improve overall patient outcomes. Ghana needs to have access to how well its citizens (especially those with established CVDs) adhere to lifestyle modifications and treatment and know the sensitive barriers and facilitators to develop robust interventions to tackle the ever-increasing burden of cardiovascular-related diseases.

1.3 Research Questions

1. What is the current level of adherence to healthy lifestyle (including diet, exercise, smoking cessation, and stress management) and medication among patients diagnosed with cardiovascular diseases in Cape Coast Teaching Hospital?
2. What lifestyle modifications are often adopted by people living with or diagnosed with CVD?
3. What strategies and interventions have been used to promote adherence to a healthy lifestyle among patients with cardiovascular diseases, and what has been their perceived effectiveness by patient?
4. What are the main barriers and challenges that patients with cardiovascular diseases face in adhering to recommended healthy lifestyle modifications in Ghana?
5. What are the experiences of healthcare providers in supporting people diagnosed with CVD to adhere to a healthy lifestyle in managing cardiovascular diseases?

1.4 General objectives

The primary aim of this research is to comprehensively assess the adherence of patients diagnosed with cardiovascular diseases to a healthy lifestyle, with a focus on factors influencing adherence levels. The study aims to provide insights into the current state of adherence, barriers, and facilitators, and potential interventions for improving adherence among this population.

University of Ghana http://ugspace.ug.edu.gh

1.5. Specific Objectives

1. Assess the current level of adherence to recommended healthy lifestyle (including diet, exercise, smoking cessation, and stress management) among patients diagnosed with cardiovascular diseases in Ghana.
2. Identify lifestyle modifications that are often adopted by people living with or diagnosed with CVD.
3. Examine strategies and interventions that have been used to promote adherence to a healthy lifestyle among patients with cardiovascular diseases, and their effectiveness.
4. Assess the main barriers and challenges that patients with cardiovascular diseases face in adhering to recommended healthy lifestyle modifications in Ghana.
5. Assess the experiences of healthcare providers in supporting people diagnosed with CVD to adhere to a healthy lifestyle in managing cardiovascular diseases.

1.5 Significance of the study

This research aims to provide a comprehensive understanding of adherence to a healthy lifestyle among patients with cardiovascular diseases, thereby contributing to the development of effective interventions and strategies that can ultimately improve patient outcomes and reduce the burden of cardiovascular diseases on both individuals and healthcare systems. Understanding the factors affecting adherence to medication and the adoption of healthy lifestyles among clients with CVDs is essential for developing targeted interventions, reducing the burden of CVDs, and improving patient outcomes.

INTEGRI PROCEDAMUS

Cardiovascular diseases are the leading cause of global mortality, accounting for a substantial burden on healthcare systems and society. Understanding the adherence patterns to a healthy lifestyle among individuals with cardiovascular diseases is critical for public health, as it can

University of Ghana http://ugspace.ug.edu.gh

inform preventive and management strategies to reduce the overall impact of these diseases on the population.

Adherence to a healthy lifestyle is closely linked to improved patient outcomes. Patients who successfully adhere to recommended lifestyle modifications often experience reduced disease progression, lower rates of hospitalization, and improved quality of life. By investigating adherence levels, this study can potentially pave the way for interventions that enhance patient well-being and health outcomes.

Healthcare resources are limited, and efficient resource allocation is essential. Identifying the factors that influence adherence can help healthcare systems allocate resources effectively. For instance, targeting interventions towards specific patient groups or barriers to adherence can optimize resource utilization and enhance patient care. Cardiovascular diseases are associated with substantial healthcare costs. Improved adherence to a healthy lifestyle can potentially lead to cost savings in terms of fewer hospitalizations and medical interventions. This study can shed light on the economic implications of adherence and guide decisions on healthcare resource allocation.

The Findings from this research can guide the development of personalized interventions and treatment plans. Understanding the demographic, cultural, and comorbidity-related factors influencing adherence can help healthcare providers tailor their advice and support to individual patient needs. In the era of digital health, identifying the role of technology-based interventions in promoting adherence is crucial. The study can inform the development of innovative tools and applications to help patients manage their cardiovascular health more effectively. The study's results can influence healthcare policies, guidelines, and recommendations related to cardiovascular disease management. Policymakers can use the

University of Ghana http://ugspace.ug.edu.gh

data to improve existing guidelines and develop new policies that promote adherence to a healthy lifestyle and ultimately reduce the burden of cardiovascular diseases.

Research on adherence to healthy lifestyle in the context of cardiovascular diseases contributes to the broader field of health behaviour and patient-centered care. It can stimulate further research and exploration of effective interventions, contributing to the advancement of medical knowledge.

This study's significance lies in its potential to improve patient outcomes, reduce healthcare costs, inform policies, and advance research in the critical area of cardiovascular disease management. The findings have the potential to benefit both individual patients and society reducing the impact of cardiovascular diseases and improving overall health and well-being.

University of Ghana http://ugspace.ug.edu.gh

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

The assessment of adherence to a healthy lifestyle among patients with cardiovascular diseases is a critical research area, as it is directly linked to the prevention and management of CVD (Ferdinand et al., 2017). This literature review explores cardiovascular disease and its burden internationally and nationally, key concepts in healthy lifestyle, theories, and key studies that have contributed to our understanding of adherence to a healthy lifestyle in this population. Cardiovascular diseases (CVDs) stand as a leading cause of mortality and morbidity worldwide, imposing a substantial burden on healthcare systems and individual well-being (Lv et al., 2017). In the ongoing quest to mitigate the impact of CVDs, a growing body of research has emerged focusing on the assessment of adherence to a healthy lifestyle among patients living with these conditions ("European Guidelines on Cardiovascular Disease Prevention in Clinical Practice (Version 2012)," 2012a). This review delves into the complicated terrain of adherence to a healthy lifestyle within the context of cardiovascular diseases, exploring the key theoretical frameworks, factors influencing patient behaviour, and the practical implications that have emerged from the empirical area of study. The assessment of adherence to such a lifestyle among individuals with CVD represents a dynamic intersection of healthcare practice, behavioural psychology, and public health policy. Assessing adherence and its factors helps to Identify sustainable ways to work with patient and their communities to take action to prevent and control modifiable risk factors for heart disease and reduce the global burden of heart disease. It explains the determinants of patient adherence and informs the development of interventions aimed at promoting healthier behaviours. Additionally, this research contributes to the foundation for patient-centred care, acknowledging the patient's perspectives, attitudes, and beliefs as crucial factors in the management of CVDs.

University of Ghana http://ugspace.ug.edu.gh

This literature review delves into the theoretical underpinnings of health behaviour change, exploring established models such as the Health Belief Model, the Theory of Planned Behavior, social cognitive theory, and the Trans theoretical Model in the context of cardiovascular health. It then progresses to investigate the intricate web of factors affecting adherence to a healthy lifestyle, encompassing psychological, social, and environmental elements to form the conceptual framework of this study.

The review emphasizes the practical implications of this research, particularly in terms of its influence on clinical practice, healthcare policy, and interventions tailored to individual patient needs. By analyzing the existing literature, we aim to contribute to the ongoing discourse on the critical importance of promoting adherence to a healthy lifestyle among individuals with cardiovascular diseases and advocate for the development of more effective, patient-centred strategies to combat this global health challenge.

2.2 Introduction

Adherence to a healthy lifestyle, in the context of cardiovascular diseases, encompasses a range of behaviours, including maintaining a balanced diet, engaging in regular physical activity, quitting smoking, and managing stress effectively (Sanches Machado d'Almeida et al., 2018). The term "adherence" reflects the extent to which patients follow these recommendations as prescribed by healthcare professionals (Bissonnette et al., 2008). According to the WHO, to improve adherence, a systematic approach starting with strategies to improve medical service quality and reimbursement for medical practice dispensed to solve various difficulties faced by both patients and their families is needed (World Health Organization, 2003). Cardiovascular diseases include a broad spectrum of conditions affecting the heart and blood vessels (Buja et al., 2019.) and understanding the barriers and facilitators of adherence to healthy lifestyle recommendations among patients with these conditions is essential. Barriers may include lack

University of Ghana http://ugspace.ug.edu.gh

of motivation, financial constraints, and lack of social support, while facilitators may involve healthcare provider guidance, patient education, and access to resources (Correa et al., 2020).

2.3 Cardiovascular-disease and its burden

Cardiovascular diseases, encompassing conditions such as coronary heart disease (CHD), stroke, heart failure, hypertensive urgency and others, have been intricately linked to modifiable risk factors, including poor dietary habits, physical inactivity, stress, smoking, and harmful alcohol consumption and these behavioural risk factors results in several intermediate risk factors for CVD presenting as raised blood pressure, raised blood glucose, raised blood lipids, and overweight. These "intermediate risks factors" increase the risk of heart attack, stroke, heart failure, CHD, and other complications(World Health Organization, 2021). Research has unequivocally demonstrated that adopting a healthy lifestyle characterized by proper nutrition, regular physical activity, stress management smoking cessation, and alcohol moderation can significantly reduce the risk of CVDs and improve the prognosis for those already afflicted (Aggarwal et al., 2018; Laddu et al., 2019; Lechner et al., 2020). Preventing cardiovascular disease (CVD) is largely within our control, yet it continues to be the leading global cause of death. Collaboration among healthcare professionals is essential to prioritize HL behaviours adherence among patients, a collective effort is required, involving various experts such as physicians, clinical exercise physiologists, nurses, nutritionists, and health behaviour specialists(Kaminsky et al., 2022). Healthcare systems should emphasize incorporating healthy lifestyle (HL) behaviours into routine patient and client communications, encouraging regular physical activity to enhance cardiorespiratory fitness, promoting healthy eating, discouraging smoking, fostering good sleep habits, and managing weight can significantly contribute to reducing CVD incidence(Kaminsky et al., 2022). Other major underlying determinants of CVDs include poverty, population ageing, culture, forces driving

University of Ghana http://ugspace.ug.edu.gh

social, economic and cultural change – globalization, urbanization and hereditary factors(Kreatsoulas & Anand, 2010).

In 2015, there were an estimated 422.7 million cases of CVD and 17.92 million CVD deaths with ischaemic heart disease and stroke leading (Roth et al., 2017) whereas hypertension, high cholesterol, dietary risks, and air pollution are among the leading causes of CVD globally(Lindstrom et al., 2022). The global CVD incidence, prevalence, death, and disability-adjusted life year (DALY) rates generally decreased; however, the current burden remains high in parts of Sub-Saharan Africa (SSA)(Qu et al., 2023). At least three-quarters of the world's deaths from CVDs occur in low- and middle-income countries and People living in low- and middle-income countries often do not have the benefit of primary health care programmes for early detection and treatment of people with risk factors for CVDs and those that have primary health services mostly have less access to effective and equitable health care services which respond to their needs(World Health Organization, 2021). As a result, for many people in these countries detection is often late in the course of the disease and people die at a younger age from CVDs and other noncommunicable diseases, often in their most productive years(World Health Organization, 2021).

A systematic review conducted by (Einarson et al., 2018) indicates that globally, CVD has a substantial impact on direct medical costs at both the patient and population levels. At the household level, evidence is emerging that CVDs and other noncommunicable diseases contribute to poverty due to catastrophic health spending and high out-of-pocket expenditure. At the macro-economic level, CVDs place a heavy burden on the economies of low- and middle-income countries(World Health Organization, 2021).

University of Ghana http://ugspace.ug.edu.gh

2.4 Burden of cardiovascular diseases in Ghana

Stroke is the most common form of ASCVD in Ghana and a significant cause of morbidity and mortality. A retrospective analysis of 30-year trends of stroke admissions in Komfo Anokye Teaching Hospital (KATH) showed a 26.0% increase in stroke admissions from 1983 to 2013(Sarfo et al., 2015). A prospective cohort multicenter study which enrolled participants with diabetes and/or hypertension showed the highest incidence of stroke among those having both hypertension and diabetes as reported by(Sarfo et al., 2018) at 16.64 events per 1000 person-years, followed by hypertension alone with an incidence of 13.77 events per 1000 person-years, and those with diabetes alone who had a stroke incidence of 9.81 events per 1000 person-years. As reported by Appiah and colleagues, analysis of a 10-year retrospective data on the trends of cardiovascular admissions indicated a staggering 25% rise in coronary artery disease prevalence which was once rare from 2005 to 2015(Appiah et al., 2017). Cardiac disease admissions and mortality have increased progressively over the past decade, with heart failure (HF) as the most common cause of admission(Appiah et al., 2017). Peripheral artery diseases (PAD) are common in Ghana and its prevalence is increasing(Hayfron-Benjamin et al., 2020). A longitudinal study to estimate the trends in the incidence of the diabetic foot and determine predictors in an adult Ghanaian diabetes cohort demonstrated an increase in the incidence of diabetic foot ranging from 3.25% in 2005% to 12.57% in 2016 and although the most common cause of diabetic foot disorders was neuropathic, peripheral artery disease and gangrene represented more than a quarter (25.6%) of the foot disorders(Sarfo-Kantanka et al., 2018).

Despite Ghana being traditionally associated with high-income countries, CVD has emerged as a major public health concern. Ghana has witnessed a notable rise in the prevalence of cardiovascular diseases over the past few decades. Agyemang et al. (2013) reported CVD accounts for a substantial proportion of morbidity and mortality in the country, with coronary

University of Ghana http://ugspace.ug.edu.gh

heart disease and stroke being prominent contributors. Ghana has been witnessing an epidemiological transition characterized by a shift from communicable to non-communicable diseases, making CVD a focal point for public health interventions. High blood pressure, a well-established precursor to CVD, is significantly prevalent among the Ghanaian population in both urban and rural areas. As life expectancies are gradually rising in Ghana due to economic development, CVD prevalence is increasing, presenting new pressure on already struggling health systems with hypertension, diabetes and obesity being the major risk conditions for CVDs as reported by (Hamid et al., 2019) which soon may constitute heavy social and economic burden. However, CVDs and associated risk conditions are remarkably neglected on the public health policy agendas in these countries with more attention given to infectious diseases. The absence of reliable information on CVDs trends and limited health policies might make it difficult for decision-makers to appreciate the prevalence of CVDs(De-Graft Aikins et al., 2014). In addition, health professionals in these countries are poorly trained in CVD diagnosis and management, and health facilities lack appropriate diagnosing, monitoring, and treatment equipment(De-Graft Aikins et al., 2014) hence, reorientation and adjustment of the healthcare system to the increased prevalence of CVDs is required.

2.5 Concept of healthy lifestyle Risk Factors Contributing to CVD in Ghana

Unhealthy lifestyle behaviors, such as poor dietary habits, lack of physical activity, and smoking, also play a crucial role in the rise of CVD. The adoption of Westernized diets, characterized by increased consumption of processed foods and reduced physical activity, has contributed to the obesity epidemic observed in the country, further escalating the risk of cardiovascular diseases (Addo et al., 2014).

University of Ghana http://ugspace.ug.edu.gh

2.6 Factors Affecting Adherence

2.6.1 Health systems challenges in Addressing the CVD Burden

Despite the growing burden of cardiovascular disease, Ghana faces challenges in implementing effective prevention and management strategies. Limited healthcare infrastructure, inadequate funding, and a shortage of healthcare professionals with expertise in cardiovascular care pose significant obstacles (Plange-Rhule et al., 2013). Additionally, health education and awareness programs are essential but are often hindered by resource constraints. Poor insurance systems, over worked staff, absence of regular and effective medical services evaluation further compound effective care.

2.6.2 The Role of Healthcare Professionals

Addressing the burden of CVD in Ghana requires a collaborative effort among healthcare professionals. Physicians, as primary healthcare providers, play a crucial role in initiating preventive approaches. However, a multidisciplinary approach is essential, involving clinical exercise physiologists, nurses, pharmacist, nutritionists, and health behaviour specialists. Collaboration can enhance the implementation of holistic interventions that encompass lifestyle modifications, medication management, and patient education. The unavailability of reliable information on CVDs trends and limited health policies makes it difficult for decision-makers to appreciate the prevalence of CVDs(De-Graft Aikins et al., 2014). Health professionals in these countries are not trained enough in CVD diagnosis and management, do not have enough patient provider interactions and health facilities lack appropriate medical technologies(De-Graft Aikins et al., 2014) hence, reorientation and adjustment of the healthcare system to the increased prevalence of CVDs is required.

University of Ghana http://ugspace.ug.edu.gh

2.6.3 Lifestyle Modification/Medication Factors

Lifestyle modifications and medications play important roles in the management of cardiometabolic diseases (American Heart Association, 2020). The complexity of recommended lifestyle changes can impact adherence negatively(Li et al., 2021) . Tailoring interventions to individual preferences and capabilities has shown promise in enhancing adherence(Kreyenbuhl et al., 2016) . Medication-related factors, such as side effects and perceived necessity, influence adherence (Horne et al., 2013). Strategies like simplifying regimens and involving patients in shared decision-making have proven effective in improving medication adherence (Bosworth et al., 2011).

2.6.4 Societal-Related Factors

Societal factors significantly shape individual behaviours and adherence to health recommendations (L. F. Berkman et al., 2000). Strong social support positively correlates with adherence (DiMatteo, 2004). Interventions that involve family and community support have demonstrated efficacy in improving adherence (Barrera et al., 2002). Socioeconomic status affects adherence through barriers such as medication costs. Targeted interventions, including financial assistance programs, aiming to mitigate economic disparities improves adherence (Barrera et al., 2002).

2.6.5 Patient Related Factors

Understanding individual characteristics and psychological factors is essential for designing patient-centered interventions (Horne et al., 2013). Low health literacy is associated with poor adherence (Berkman et al., 2011). Interventions focusing on clear communication and educational tools have shown promise in improving health literacy and adherence (Berkman et al., 2011). Psychological factors like depression and perceived stress can also impact adherence negatively (Grenard et al., 2011). Integrated care models addressing mental health

INTEGRI PROCEDAMUS

University of Ghana http://ugspace.ug.edu.gh

alongside cardiometabolic care prove valuable in improving overall adherence (Johnson et al., 2012).

2.6.6 Cardiometabolic Related Diseases Factors

The nature of cardiometabolic diseases presents unique challenges to adherence. Managing multiple comorbidities in conditions like hypertension and diabetes demands tailored approaches. Integrated care models and technology-driven solutions are explored to streamline disease management and improve adherence (Alowais et al., 2023). The presence of complications and symptom burden can adversely affect adherence hence, a holistic management approach addressing symptoms and complications associated with disease, alongside adherence support demonstrates the potential to improve overall patient outcomes(Ghobadi et al., 2022). The mild, no symptoms and slow progression of these disease in the initial stages also affect adherence.

University of Ghana http://ugspace.ug.edu.gh

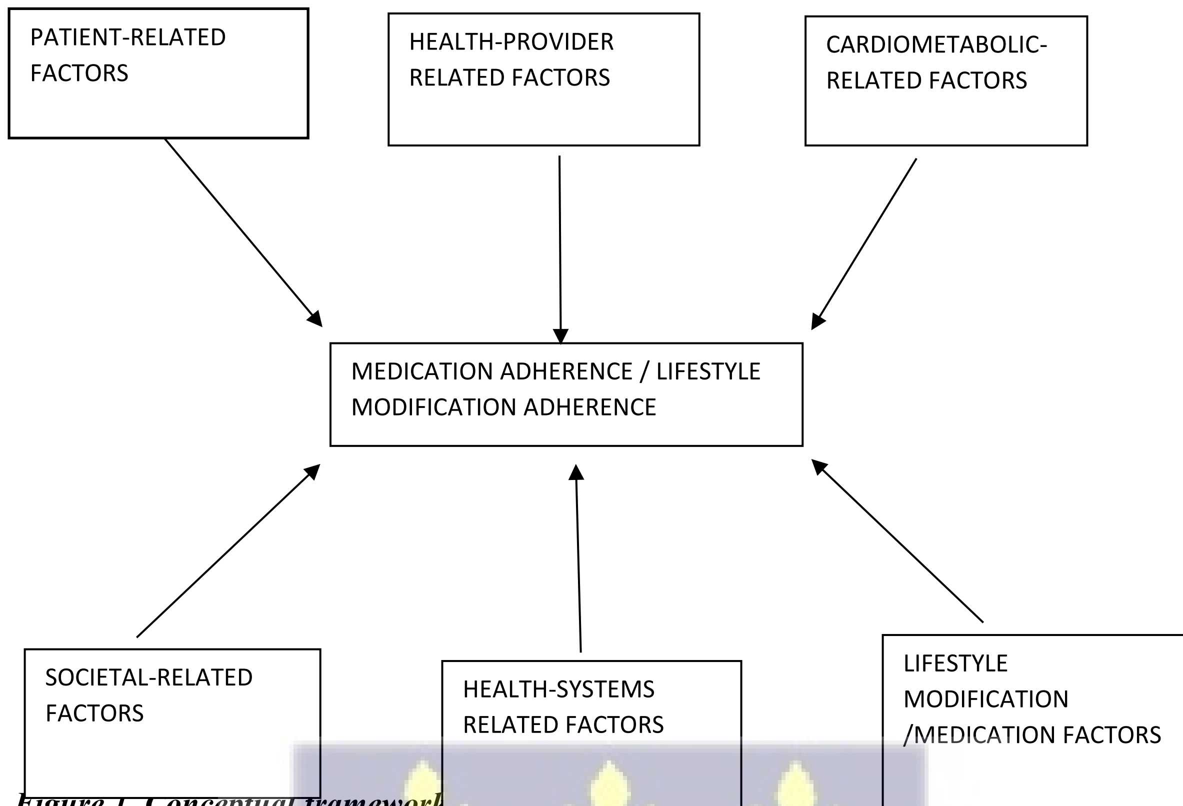


Figure 1. Conceptual framework of the study

Modified from (Jaam et al., 2018))

2.7 Theories

The Health Belief Model developed by Irwin Rosenstock in 1966 suggest that an individual's likelihood of adhering to a recommended health behaviour, such as a healthy lifestyle, is influenced by their perceived susceptibility to a disease, perceived severity of the condition, perceived benefits of adherence, perceived barriers, and cues to action (Al-Ganmi et al., 2018.; Janz & Becker, 1984). Studies applying this model have helped identify factors influencing adherence among patients with cardiovascular diseases (Al-Ganmi et al., 2018; Mishra et al., 2021).

The Theory of Planned Behaviour developed from the theory of reasoned behaviour by Martin Fishbein and Icek Ajzen in 1975 emphasizes the role of attitudes, subjective norms, and perceived behavioural control in predicting an individual's intention to engage in a specific

University of Ghana http://ugspace.ug.edu.gh

behavior (Ajzen & Madden, 1986; Armitage et al., 2001). Research applying the Theory of Planned Behavior has shed light on the psychological determinants of adherence to a healthy lifestyle (Banerjee et al., 2020; Rich et al., 2015).

Social Cognitive Theory by Bandura in 1989 also emphasizes the role of self-efficacy, observational learning, and self-regulation in health behaviour change. In the context of cardiovascular disease, it has been used to investigate how patients learn and maintain healthy lifestyle behaviours and how social influences can impact adherence (Schwarzer et al., 2008).

The Transtheoretical model or the stages of change model as developed by James Prochaska and Carlo DiClemente in the late 1970s tries to understand and explain how people change their behavior over time, particularly in the context of health-related behaviors. The theory incorporates cognitive and behavioral processes of change, offering strategies and techniques for individuals at different stages of readiness. The theory has been used to Set realistic and achievable goals that aligns with the individual's readiness and promotes successful behavior change.

2. 8 Theoretical Framework

The pursuit of healthy lifestyles and medication adherence involves conscious efforts to modify behaviours, and adherence to such modifications plays a role in achieving sustained positive cardiovascular health outcomes. This theoretical framework integrates Health Belief Theory (HBT), Social Cognitive Theory (SCT), Theory of Planned Behaviour (TPB), and Transtheoretical Theory (TTM) to comprehensively understand and enhance adherence to lifestyle modifications.

University of Ghana http://ugspace.ug.edu.gh

HBT depicts that health-related behaviours are influenced by perceived susceptibility, severity, benefits, and barriers. Individuals are then more likely to adhere to lifestyle modifications if they perceive the modification as addressing a health threat, realizing significant benefits, and overcoming manageable barriers. Understanding individuals' perceptions of susceptibility to health issues, severity of potential consequences, and perceived efficacy of lifestyle modifications helps tailor interventions to enhance adherence.

SCT emphasizes the role of observational learning, self-efficacy, and social influences in behavior change. Individuals learn from role models, and their confidence in their ability to make lifestyle changes (self-efficacy) is crucial for adherence. Utilizing positive role models, fostering supportive social environments, and enhancing self-efficacy through mastery experiences and social persuasion can positively impact adherence to lifestyle modifications. TPB also displays that attitudes, subjective norms, and perceived behavioural control influence behavioural intentions and subsequent behaviours. Adherence is more likely when individuals have positive attitudes, perceive social approval, and have a sense of control over the modification. Identifying and addressing attitudinal barriers, promoting positive social norms, and enhancing perceived behavioural control through skill-building can improve adherence. TTM describes stages of change (precontemplation, contemplation, preparation, action, maintenance) and the processes individuals go through during behavior change. Adherence is influenced by the readiness to change and the application of specific processes at different stages. Tailoring interventions to individuals' specific stages of change, providing appropriate resources and support during each stage, and recognizing and addressing potential relapses can enhance adherence.

Combining these theories provides a holistic understanding of factors influencing adherence to lifestyle modifications. For instance, addressing cognitive factors (HBT), social influences

University of Ghana http://ugspace.ug.edu.gh

(SCT), motivational factors (TPB), and recognizing stages of change (TTM) can create a comprehensive intervention strategy. Adherence to lifestyle modifications is a complex process influenced by cognitive, social, and motivational factors. Integrating all these factors in assessing adherence ensures a multi-faceted approach that enhances our understanding and effectiveness in promoting sustained behaviour change.

2.9 Key Experimental studies

The DASH Diet Trials: The Dietary Approaches to Stop Hypertension (DASH) diet trials have demonstrated the effectiveness of dietary interventions in reducing blood pressure and improving cardiovascular health (Sacks et al., 2001; Yusuf et al., 2004). These trials highlight the importance of dietary adherence in managing cardiovascular diseases.

The INTERHEART study revealed the significance of lifestyle factors, such as a healthy diet(Buttar et al., 2005), regular exercise, and smoking cessation, in preventing heart attacks globally (Buttar et al., 2005.; Yusuf et al., 2004). This study emphasizes the role of adherence to a healthy lifestyle in reducing cardiovascular risk.

The PREDIMED trial investigated the Mediterranean diet's impact on cardiovascular outcomes (Guasch-Ferré et al., 2017; Martínez-González et al., 2015). It highlighted the role of dietary adherence and the potential benefits of culturally tailored interventions in promoting heart-healthy habits.

mHealth Interventions: Research on mobile health (mHealth) interventions has examined the use of smartphone apps and wearable devices to promote adherence to a healthy lifestyle among patients with cardiovascular diseases (Gandhi et al., 2017; MacKinnon et al., n.d.). Studies in this area have shown promising results in improving adherence and patient outcomes.

University of Ghana http://ugspace.ug.edu.gh

Sociodemographic Studies: Several studies have explored the influence of demographic factors, such as age, gender, and socioeconomic status, on adherence to a healthy lifestyle among patients with cardiovascular diseases (Chan et al., 2008; Clark et al., 2009a). These studies highlight socioeconomic disparities in adherence rates and the need for socioeconomic-tailored interventions. Theories such as the Health Belief Model, Theory of Planned Behavior, and Social Cognitive Theory, have provided insights into the psychological and social determinants of adherence.

Key studies have demonstrated the effectiveness of dietary and lifestyle interventions and underscored the global importance of lifestyle factors in cardiovascular disease prevention. Additionally, the role of technology-based interventions in improving adherence is a burgeoning area of research. Understanding these concepts, theories, and studies is essential for informing the research and interventions aimed at promoting healthier lifestyles and reducing the burden of cardiovascular diseases.

2.9 Key Debates and Controversies on adherence and its managements

While research on the assessment of adherence to a healthy lifestyle among patients with cardiovascular diseases has made significant progress, several key debates and controversies continue to shape this field. These debates revolve around various aspects of adherence, treatment strategies, and the effectiveness of interventions. The central debates and controversies in this area includes: Adherence measurement methods**:** One of the primary debates' centres on the most accurate and reliable methods for assessing adherence to a healthy lifestyle. Various measurement tools, such as self-report questionnaires, objective biomarkers, and electronic monitoring devices, have been employed. Controversies surround the validity and feasibility of each method and whether combining multiple approaches provides a more comprehensive understanding of adherence(Creswell, 2011).

University of Ghana http://ugspace.ug.edu.gh

Individualised verses standardized interventions: Researchers and healthcare providers grapple with the question of whether interventions to improve adherence should be standardized or tailored to individual patient needs (Glasgow et al., 2003; Martin et al., 2010). Standardized interventions offer consistency and ease of implementation but may not address the unique barriers and facilitators that different patients encounter. Tailored interventions, on the other hand, aim to address individualized factors but may be resource-intensive and challenging to scale.

The role of patient education: The extent to which patient education influences adherence remains a contentious issue (Jin et al., 2008; Jr et al., 2009). While education is a common component of interventions, the debate centres on whether simply providing the information is sufficient or if more interactive and behaviour-change-oriented educational approaches are needed. Some argue that patients may already have the necessary knowledge but lack the skills and motivation to make lasting lifestyle changes (Coventry et al., 2014; Fumagalli et al., 2015).

Cultural sensitivity: The impact of cultural factors on adherence is a multifaceted debate. It revolves around whether interventions should be culturally sensitive, considering the diverse backgrounds of patients, or whether universal approaches are more practical (Lim, 2015, Sabaté, 2003). Striking a balance between cultural relevance and generalizability is challenging but needed for behavioural change. Digital interventions: The rising use of digital health interventions, such as mobile apps and wearable devices, to improve adherence introduces questions about their effectiveness and ethical considerations (Ienca et al., 2021; Khan et al., 2017; Solomon et al., 2020). Controversies exist regarding data privacy, potential over-reliance on technology, and disparities in access to and acceptance of digital solutions among different patient and cultural groups.

University of Ghana http://ugspace.ug.edu.gh

Medication verses lifestyle interventions: A long-standing debate concerns the relative importance of medication and lifestyle interventions in managing cardiovascular diseases ("European Guidelines on Cardiovascular Disease Prevention in Clinical Practice (Version 2012)," 2012b; Hivert et al., 2016). Some argue that pharmacological treatments are the primary focus, while lifestyle modifications are viewed as secondary (Grundy, 2006; Paulweber et al., 2010). Others emphasize the central role of lifestyle changes and advocate for a more holistic approach (Haenfler et al., 2012).

Physician patient communication: The quality and effectiveness of physician-patient communication regarding lifestyle modifications and adherence is a major issue (Clark et al., 2009b; Jolles et al., 2012). While some assert that better communication can significantly enhance adherence, others question whether healthcare providers have the necessary training and time to engage in such discussions effectively (Zolnierek et al., 2009.). Short-term versus long-term adherence: There is an ongoing debate regarding the duration of adherence assessments. Some studies focus on short-term adherence, while others consider long-term adherence. The choice between short-term and long-term assessments may affect the interpretation of results and recommendations for interventions (Dunn et al., 1998; Suggate, 2016).

The debates and controversies within the field of assessing adherence to a healthy lifestyle among patients with cardiovascular diseases reflect the complex nature of this topic. Researchers, clinicians, and policymakers continue to examine with questions surrounding measurement methods, intervention strategies, the role of patient education, cultural sensitivity, digital health, the balance between medication and lifestyle interventions, physician-patient communication, and the duration of adherence assessments. These debates provide a key

University of Ghana http://ugspace.ug.edu.gh

background for this research, fostering innovation and exploration of diverse perspectives to enhance our understanding of adherence and interventions for adherence in healthcare context.

2.9 Gaps in Existing Knowledge

Many studies primarily focus on short-term adherence to lifestyle modifications, offering insights into initial behaviour change but often falling short in understanding long-term adherence patterns. The research project aims to address this gap by incorporating both short-term and long-term adherence assessments, providing a more comprehensive view of patient behaviour over time. The literature reveals a lack of consensus on the best method for measuring adherence, leading to a wide range of measures employed in different studies. The research project will contribute by applying a multimodal approach to adherence measurement, combining self-report questionnaires, objective biomarkers, and electronic monitoring, to gain a more robust understanding of adherence levels.

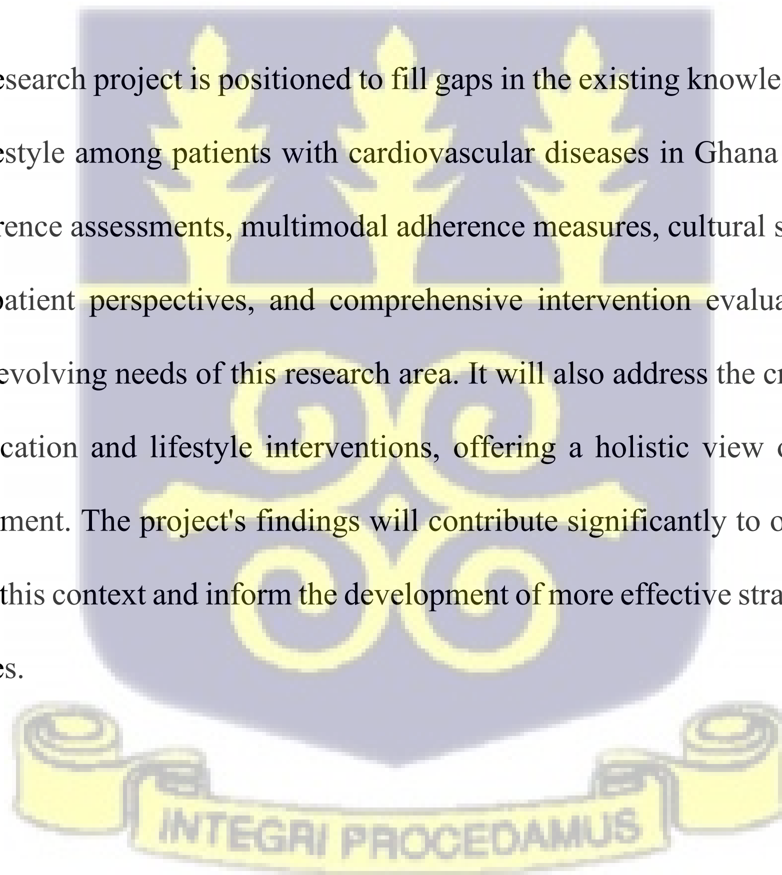
Cultural sensitivity in interventions and adherence assessment has been underrepresented in the existing literature. The proposed research project recognizes the importance of cultural relevance and aims to assess how cultural factors influence adherence while designing interventions that are sensitive to the diverse backgrounds of patients. Despite the growing importance of digital health solutions, there is a need for more research on the effectiveness, ethical considerations, and access disparities of technology-based interventions in promoting adherence. The research project will delve into the role of mobile apps and wearable devices in improving adherence and explore their impact on patient outcomes.

INTEGRI PROCEDAMUS

Existing studies often focus on healthcare provider perspectives, leaving gaps in our understanding of how patients perceive the importance of adherence to a healthy lifestyle and the quality of communication between patients and healthcare providers. The research project

University of Ghana http://ugspace.ug.edu.gh

seeks to bridge this gap by capturing the perspectives of both patients and providers, shedding light on the patient-provider dynamics in promoting adherence. While previous studies have assessed various intervention strategies to improve adherence, there is a need for a more comprehensive evaluation of existing interventions. The research project will review and analyze previous interventions and explore their effectiveness to inform the development of future evidence-based interventions. The interplay between medication and lifestyle interventions in cardiovascular disease management remains a relatively underexplored area in the literature. The research project will examine how these two components can work synergistically to enhance adherence and patient outcomes, addressing the question of whether one should take precedence over the other.



The proposed research project is positioned to fill gaps in the existing knowledge on adherence to a healthy lifestyle among patients with cardiovascular diseases in Ghana by incorporating long-term adherence assessments, multimodal adherence measures, cultural sensitivity, digital interventions, patient perspectives, and comprehensive intervention evaluation, the project aligns with the evolving needs of this research area. It will also address the critical question of balancing medication and lifestyle interventions, offering a holistic view of cardiovascular disease management. The project's findings will contribute significantly to our understanding of adherence in this context and inform the development of more effective strategies to improve patient outcomes.

University of Ghana http://ugspace.ug.edu.gh

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This portion provides an overview of the approaches employed for conducting this research. It entails the study's design, the geographical and demographic scope, as well as the methodologies for sampling and data collection. Additionally, it describes the procedures for data analysis and management, along with a discussion on ethical considerations.

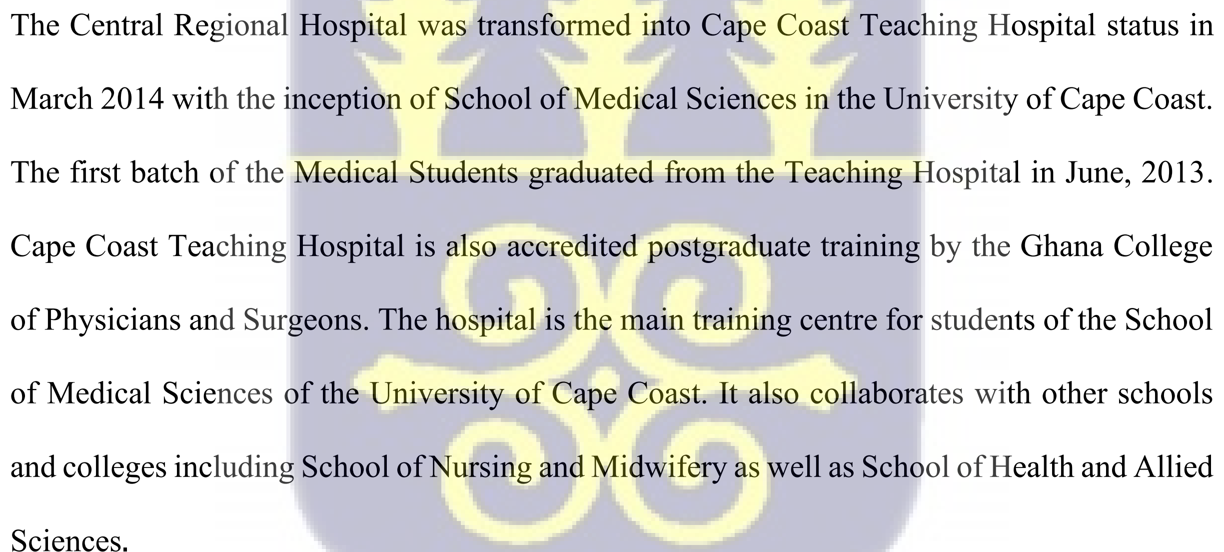
3.2 Study Setting

The research was conducted at Cape Coast Teaching Hospital, located in the Cape Coast Metropolis of the Central Region of Ghana. This hospital, which operates under the Ministry of Health, is currently a 450-bed capacity referral hospital situated in the northern part of Cape Coast. It is surrounded by Abura Township to the north, Pedu Estate, 4th Ridge to the south, Nkanfua to the east, and Abura/Pedu Estate to the west.

The Hospital, which was the first of a series of ultra-modern Regional Hospitals established by the Ministry of Health to serve as the regional hospital started full operations on 12th August 1998 and was adjudged the best Regional Hospital in the year 2003. The Central Region covers an expanse of 9,826 square kilometers, constituting approximately 6.6% of Ghana's total land area. It is bordered to the south by the Gulf of Guinea, to the west by the Western Region, to the east by the Greater Accra Region, and to the north and northeast by the Ashanti and Eastern Regions, respectively. Comprising 22 administrative districts, the capital city is the historic Cape Coast. Rural areas account for about 63% of the region's landscape, with a predominantly Akan population, the majority being Fantes. As of 2020, the estimated population stands at 2,605,490, experiencing a growth rate of 3.1%, resulting in a population density of approximately 215 inhabitants per square kilometer. Noteworthy demographic figures include 521,098 individuals under 5 years old and 625,318 women in fertility age.

University of Ghana http://ugspace.ug.edu.gh

Characterized by two distinct rainy seasons annually, the region's vegetation consists of a dry coastal savannah extending approximately 15 km inland and a tropical rainforest covering hinterland areas. Kakum National Park, situated roughly 25 km from Cape Coast, serves as the sole forest reserve, drawing both national and international tourists. The region boasts vibrant cultural events such as the Aboakyer, Fetu Afahye, Bakatue festivals, and the Pan African Historical Theatre Festival (PANAFEST), held biennially. Additionally, historic landmarks, including castles and forts, attract tourists from both local and international spheres. In terms of economic activities, agriculture takes the forefront, constituting 52.3% of the region's predominant industry, while manufacturing contributes 10.5%. Agriculture, inclusive of fishing, serves as the primary occupation, employing over two-thirds of the region's workforce (GHS 2023).


INTEGRI PROCEDAMUS

The Central Regional Hospital was transformed into Cape Coast Teaching Hospital status in March 2014 with the inception of School of Medical Sciences in the University of Cape Coast. The first batch of the Medical Students graduated from the Teaching Hospital in June, 2013. Cape Coast Teaching Hospital is also accredited postgraduate training by the Ghana College of Physicians and Surgeons. The hospital is the main training centre for students of the School of Medical Sciences of the University of Cape Coast. It also collaborates with other schools and colleges including School of Nursing and Midwifery as well as School of Health and Allied Sciences.

The choice of the study area is based on the significant patient turnout at the specialized unit and its extensive coverage area as it serves the central region and other regions in the country. The presence of a diverse patient demographic and geographical population in this region and various regions such as the Western and Western North and others would enhance the external validity of the study's findings. Again, the healthcare practices, and disease prevalence in the

University of Ghana http://ugspace.ug.edu.gh

teaching hospital are reflective of other hospitals and regions in Ghana will reflect the study's validity externally. This is attributed to the chance to include individuals from various groups experiencing cardiometabolic diseases, thereby contributing to a more comprehensive and representative sample of the region, Ghana and beyond. The data will be collected from June 2024 to July 2024.

Figure 2: Map of Central Region https://lgs.gov.gh/central/

Figure 3: Location of Cape Coast Teaching Hospital Source: (Sampah et al., 2023)

3.3 Study Design

A mixed-methods research design was appropriate for this research topic. This study combined quantitative and qualitative data collection. In the quantitative phase, a cross-sectional study design was employed. The primary objective was to assess the current level of adherence to a healthy lifestyle among patients with cardiovascular diseases, identify potential factors associated with adherence, and quantify the prevalence of adherence and barriers. The qualitative phase provided a deeper understanding of the quantitative findings, explored patient

University of Ghana http://ugspace.ug.edu.gh

perspectives on adherence, and uncovered nuanced factors affecting adherence to a healthy lifestyle.

3.4 Study Population/Participant

The target population were patients diagnosed with cardiovascular diseases attending the specialist clinic at CCTH. The study population comprised patients diagnosed with cardiometabolic syndrome (hypertension, type 2 diabetes or hyperlipidemia), diseases related to cardiovascular disorders such as heart failure, CVA, who have been seen for more than three (3) months in the Hypertension, Diabetes and the Cardio clinics.

3.4.1 Inclusion criteria and exclusion criteria

I. The inclusion criteria for the study were individuals aged 18 years or older, possessing intact cognitive and hearing capacities, both male and female, diagnosed with cardiovascular diseases, holding clinical records at the hospital, undergoing regular monitoring at the selected hospital for a minimum of three (3) months, and expressing consent to participate in the study.

II. On the other hand, the exclusion criteria were patients with gestational diabetes, gestational hypertension, or type 1 diabetes. The inclusion of healthcare providers for this study were healthcare providers (Physicians, physician assistants, nurses, dieticians, nutritionists) who have worked at the specialist clinic for six(6) months or more.

INTEGRI PROCEDAMUS

3.5 Study Variables

Within this context, there were two types of variables: independent and dependent. The dependent variable and primary interest in this study are the adherence levels to the lifestyle modification plan and medication, while the independent variables were factors that are

University of Ghana http://ugspace.ug.edu.gh

deemed to have an impact on the dependent variable (Creswell, 2013). The study incorporated both independent and dependent variables, serving as essential components to address the research questions.

3.5.1 Independent Variables

The effect of certain factors which may influence adherence levels to lifestyle modification plan and medications was explored in this study. Socio-demographic factors, lifestyle modification / medication factors, patient-related factors, cardiovascular disease-related factors, health provider-related factors and health systems-related factors were studied.

3.5.2 Dependent Variable

The dependent variable (outcome of interest to the study) was the level of adherence to lifestyle modification plan (exercise, dietary, stress reduction, no to moderate alcohol, and smoking cessations) recommendations and medications. This was measured using treatment adherence scale.

3.6 Sample Size Determination

3.6.1 Quantitative sample size

The study was conducted from May 2024 to July 2024. A single proportion formula was used to calculate the sample size for this study by assuming 50% for the proportion of adherence to lifestyle modification, a 5% marginal error tolerated, and a 95% confidence level (CL). Therefore, a total of 384 was estimated, adding a nonresponse rate of 10%, the final sample size was 419 adult patients with cardiovascular diseases who are on follow-up visits participated in this study.

Study Assumptions:

Proportion P=0.50 (50% adherence to lifestyle modification)

University of Ghana http://ugspace.ug.edu.gh

Marginal error E=0.05 (5% tolerance for error)

Confidence level = 95%, so the corresponding Z-score is 1.96 (from the Z table for a two-tailed 95% confidence interval)

n=(1.96^2*0.50*(1-0.50))/(0.05^2)

n=(3.8416*0.50*0.50)/0.0025

n=(3.8416*0.25)/0.0025

n = 0.9604 / 0.0025 = 384.16

N=384

Adjusting for a 10% nonresponse rate:

N final = n / (1 - nonresponse rate)

N final = 384 / (1 - 0.10) = 384 / 0.90 = 427

N final = 427

Total number of patients sampled = 419

Total of **10** eligible health providers who worked at the hypertension and diabetes and clinic were censored and included in this study.

3.6.2 Qualitative Sample Size

Respondents satisfying the inclusion criteria were sampled for structured in-depth interviews and a focus group discussion. Fifteen (N=15) respondents were purposively selected from the HPT/DM clinic from May 2024 to July 2024.

3.7 Sampling technique / Recruitment procedures

A simple random sampling was used to recruits participants from the diabetes and hypertension and the cardio clinic. Participants were approached in the waiting area and invited to participate

University of Ghana http://ugspace.ug.edu.gh

in the study. A subsample of participants from the quantitative phase were selected purposefully for qualitative interviews. This included individuals who demonstrated a range of adherence levels and diverse characteristics, ensuring representation. Health care providers who work at the diabetes and hypertension clinic were randomly recruited for this study.

3.8 Data collection tools and measurement

3.8.1 Quantitative Data collection tools and measurement

Structured surveys and validated questionnaires were administered to participants to assess adherence to a healthy lifestyle, gather sociodemographic information, and identify potential barriers to adherence. Objective measures such as biomarkers (e.g., blood pressure, and glucose levels) were recorded. Data on comorbid conditions, medication regimens, and lifestyle practices were collected. Each participant was interviewed by either the researcher or reseaech assistants who explained the contents of the questionnaire to their understanding. This method of questionnaire administration eliminated biases involved in self-administered questionnaires where participants do not understand some of the questions. The method also eliminated incomplete filling-in of the questionnaires by participants.

Respondents were requested to consent either verbally, signing or thumb printing. Before and during the interview, respondents who do not understand any item on the questionnaire were allowed to ask questions for clarification. For patients who could not read, items on the questionnaire were read out to them in languages they understood, and their responses recorded. The questionnaire, derived from various reviewed sources due to the absence of standardized tools for assessing overall adherence to lifestyle modifications, was initially prepared in English. Subsequently, it was translated into the local languages Fante and Twi, with the Fanti and Twi versions used during interviews. To ensure consistency, bilingual

University of Ghana http://ugspace.ug.edu.gh

experts retranslated the responses back into English. On average, each interview took approximately 20 minutes.

The questionnaire encompasses details on socio-demographics, personal information, social support, knowledge, behavioral variables, and lifestyle modification factors, including adherence to the DASH diet, low sodium diet, regular exercise, moderation of alcohol consumption, smoking cessation, and stress reduction. The questionnaire had eight(8) sections; section one(1) collected the socio-demographic characteristics, section two (2) collected health characteristics, section three (30) collected data on medication adherence(MARS -10), section four(4) collected data on adherence to lifestyle modifications, section five(5) collected data on social support using a modified The Duke Social Support and Stress Scale, section six(6) collected data on the participants knowledge level using The Helm Knowledge Scale. Section seven(7) collected data on the effectiveness and challenges of lifestyle modifications from patients perspective and the section eight(8) collected data on patients self-managements skills.

Healthcare providers were assessed on their experiences caring for patients with cardiovascular-related diseases using a structured questionnaire.

3.8.2 Qualitative data collection tools and measurement

Out of the 419 patients, 15 in-depth interviews and one (1) focus group discussion were conducted. The time and site for the interview was decided by researcher and participants. All the 15 respondents preferred the hospital site. Meetings were conducted in the patient's waiting area to ensure patients were comfortable and assumes a natural environment and mood. At the interview, participants were welcomed and researcher introduced herself to each participant. Participant information sheet was read to each participant and consent was obtained before the interview commenced. The interviews lasted for between 30 minutes maximum and 15 Minutes. The focal group discussion was conducted at the patient waiting area as well. The

University of Ghana http://ugspace.ug.edu.gh

discussion had 12 participants and lasted for seventy (75) minutes. Interview guide was used to direct the conversations. Note-taking and audio recording were used to capture information for data analysis after consent was obtained. Interviews were conducted till all the relevant themes were captured. The information recorded from respondents was password encrypted and kept safe. The thematic network analysis procedure as outlined by Attride-Stirling (Attride-Stirling, 2001), was used to analyse the data.

3.9 Quality Assurance

3.9.1 Pre-Test of Instruments

The study tools are the questionnaire and the adherence rating scales. The questions were both be open-ended and close-ended. The tools were pre-tested at the Cape Coast Teaching Hospital and patients with similar characteristics. The selected participant was not part of the main study. Each research assistant was given five questionnaires to test. Corrections and modifications were made and the final questionnaire and other tools prepared.

3.9.2 Data Analysis

The quantitative data was analyzed using Stata18 statistical software. Descriptive statistics were employed to summarize, organize, and interpret data. Chi square text of associations were used to determine relationships between participants demographic characteristics and adherence and clinical outcomes. Multiple logistic regression analysis were used to test associations and predict adherence to medications and lifestyle modification among patients with cardiovascular (heart failure, hypertension and diabetes). Qualitative data from in-depth interviews were analyzed using conventional content analysis to identify recurring themes related to adherence, patient experiences, facilitators, and barriers to adherence. Quantitative data offered a broad overview of adherence levels and potential associations, while the qualitative data provided depth and context to these findings. Integration was conducted during the interpretation phase using a joint display matrix that aligned quantitative results with

University of Ghana http://ugspace.ug.edu.gh

corresponding qualitative themes across research questions. This allowed for systematic comparison and the generation of meta-inferences, highlighting areas of convergence, expansion (e.g., culturally rooted dietary practices), and divergence (e.g., self-reported physical activity vs. qualitative descriptions of sedentary routines). The integrated findings provided a comprehensive and contextually grounded understanding of adherence behaviors among CVD patients in CCTH.

University of Ghana http://ugspace.ug.edu.gh

CHAPTER FOUR

RESULTS

4.1.1 Background characteristics

In total 419 patients participated in the survey. Of these, 305 (72.8%) were females. The mean age was 60 years (SD±12.33) and most 147 (35.1%) were aged between 60 – 69 years and married 269 (64.2%). The majority 303 (72.3%) are living with heart disease for less than 10 years and less than half 176 (42%) had other conditions (Table 1).

Table 1: Demographic of participants

Characteristics	Frequency/Number N = [419]	Percentage (%)
Age Group		
20 – 29	7	1.7
30 – 39	25	5.9
40 – 49	38	9.1
50 – 59	98	23.4
60 – 69	147	35.1
70 +	104	24.8
Mean(±SD)	**60.6(±12.33)**	
Sex		
Male	114	27.2
Female	305	72.8
Marital status		
Single	29	6.9
Married	269	64.2
Divorced	34	8.1
Widowed	87	20.8
Duration of heart diseases, HTP or DM2		
<10	303	72.3
>10	115	27.7
Commodity		
Yes	176	42.0
No	243	58.0

University of Ghana http://ugspace.ug.edu.gh

4.1.2 Background characteristics of health workers

Overall, ten (10) health workers participated in study. Most of the health workers 6 (60%) were aged more than 30 years; majority were males 6 (60%); half were nutritionist 5 (50%); and most had 1 – 5 years in service 6 (60%).

Table 2: Demographic of health workers

Characteristics	Frequency N = [10]	Percentage %
Age		
<30	4	40.0
≥30	6	60.0
Sex		
Male	6	60.0
Female	4	40.0
Professional role		
Nurse	3	30.0
Nutritionist	5	50.0
Physician	2	20.0
Years in service (In years)		
1 – 5	6	60.0
6 +	4	40.0

4.1.3 Adherence to medication

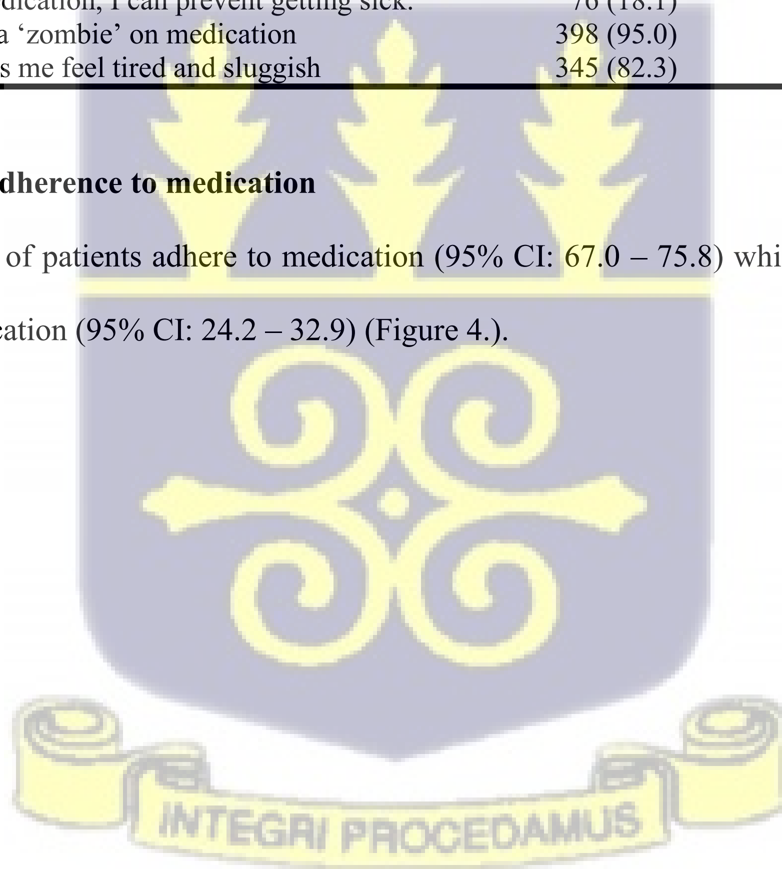
The MARS-10 scale was used to assess adherence to medication among participants. In all 132 (31.5%) forget to take medication and few 54 (12.9%) were "careless" in taking medication. Less than a quarter 50 (11.9%) sometimes stop taking their medication when they feel better and 32 (7.6%) only take medication when they are sick. Majority 361 (86.2%) had clear thoughts on medication and agreed that by staying on medication, they can prevent sickness

University of Ghana http://ugspace.ug.edu.gh

343 (81.9%). Further, majority do not "feel weird, like a 'zombie' on medication" 398 (95%) and do not feel tired and sluggish when taking medication 345 (82.3%) (Table 3).

Table 3: MARS-10 adherence indicators

Indicators	No	Yes
	n (%)	
Forget to take medication	287 (68.5)	132 (31.5)
Careless at times about taking medication	365 (87.1)	54 (12.9)
I sometimes stop taking my medication when I feel better	369 (88.1)	50 (11.9)
I stop taking medication when I feel worse	366 (87.4)	53 (12.6)
I take my medication only when I am sick	387 (92.4)	32 (7.6)
It is unnatural for my mind and body to be controlled by medication.	293 (69.9)	126 (30.1)
My thoughts are clearer on medication.	58 (13.8)	361 (86.2)
By staying on medication, I can prevent getting sick.	76 (18.1)	343 (81.9)
I feel weird, like a 'zombie' on medication	398 (95.0)	21 (5.0)
Medication makes me feel tired and sluggish	345 (82.3)	74 (17.7)



4.1.4 Overall adherence to medication

Overall, 71.6% of patients adhere to medication (95% CI: 67.0 – 75.8) whiles 28.4% do not adhere to medication (95% CI: 24.2 – 32.9) (Figure 4.).

University of Ghana http://ugspace.ug.edu.gh

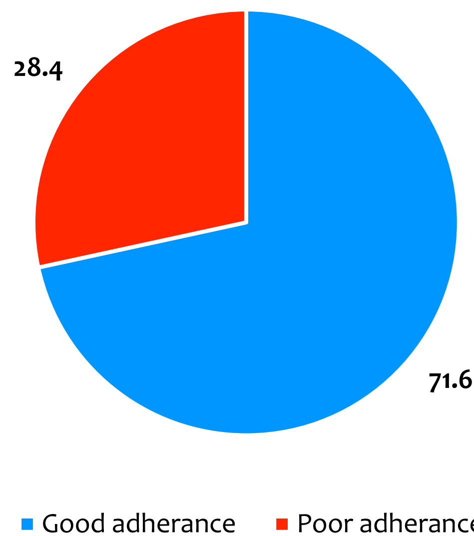
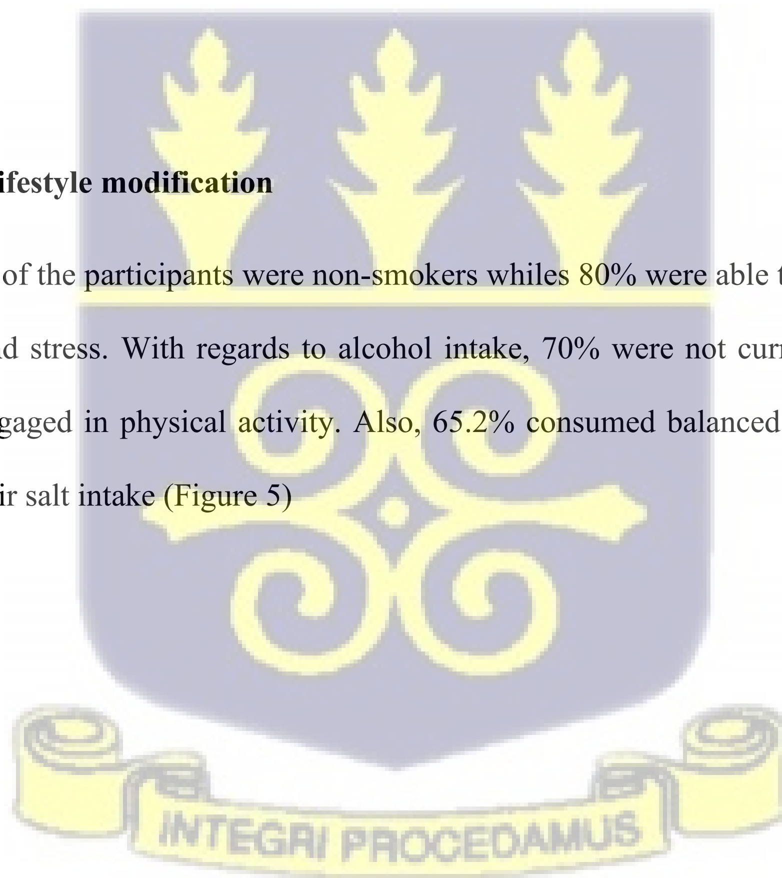


Figure 4: Overall adherence to medication



4.1.5 Healthy lifestyle modification

Overall, 98.8% of the participants were non-smokers whiles 80% were able to cope with their environment and stress. With regards to alcohol intake, 70% were not current drinkers and 66.8% were engaged in physical activity. Also, 65.2% consumed balanced diet whiles only 28.4% limit their salt intake (Figure 5)

University of Ghana http://ugspace.ug.edu.gh

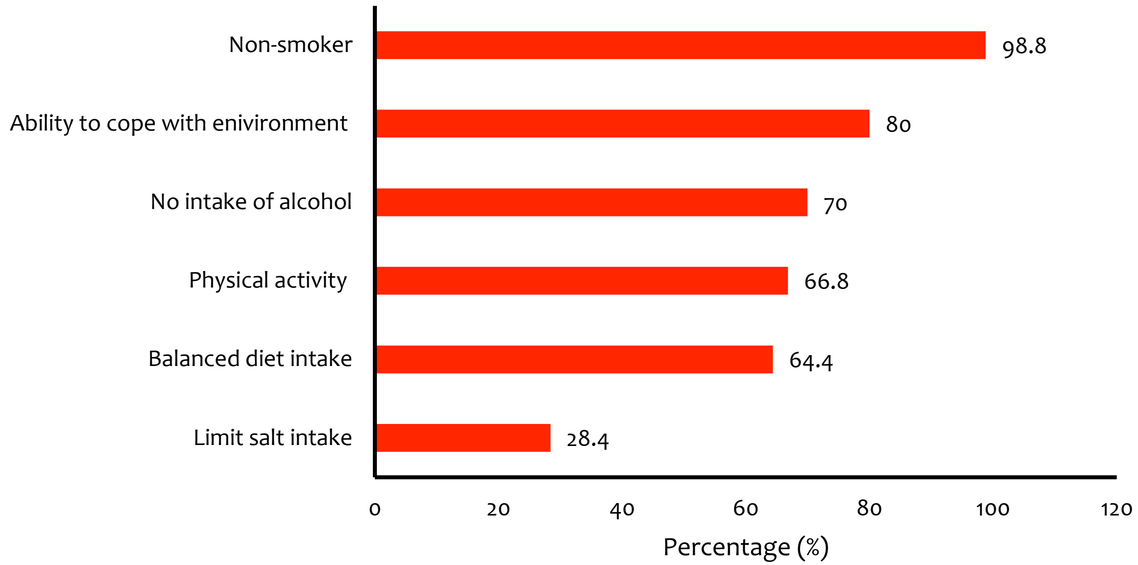


Figure 5: Behavioral health lifestyle modification among patients

4.1.6 Clinical healthy lifestyle modification

At the time of assessment, only 8.3% (n=37) had normal levels for fasting blood glucose and only 5.5% (n=23) had controlled blood pressure (Figure 4).

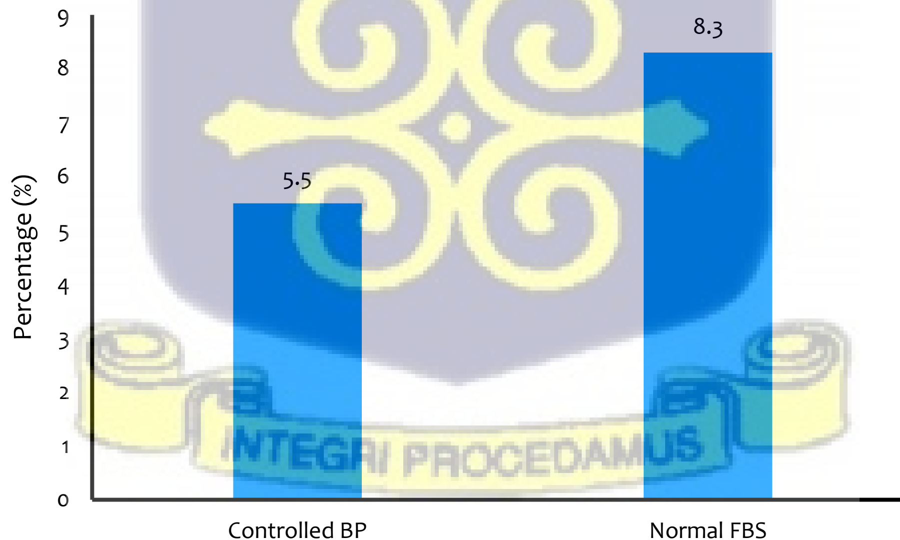


Figure 6 Clinical lifestyle modification

University of Ghana http://ugspace.ug.edu.gh

4.1.7 Prevalence of behavioral and clinical healthy lifestyle modification by demographic

None smoking: The overall prevalence of non-smoking was 98.8%. The rate was high among all age groups, both male and female, marital status as well as participants with comorbid conditions (Table 4).

Ability to cope with stress / environment: Overall, 80% of participants were able to cope with their environment. The rate was high among males (84.9%) than females (79.4%); among those married (83.1%) than those who were single (79.3%); and high among those without comorbid conditions (83.6%) than those with comorbid conditions (77.3%) (Table 4).

No alcohol intake: Overall, 70% of participants do not consume alcohol at the time of survey. The rate was higher among males (70.5%) compared to females (64.9%). The rate was also significantly higher among those with comorbidity (83.5%) conditions than those without (58.4%).

Physical activity: Physical activity was observed in 66.8% of participants. A higher prevalence was reported among 30 – 39 years olds (76%) compared to 60 – 69 years old (67.6%) and slightly higher among males (67.5%) than females (67.5%). The rate was also higher among participants with tertiary level of education (73.2%) compared to those without formal education and some education. However, this difference was not significant. More respondents with the heart disease in less than 10 years engaged in physical activity (70%) than those with the disease for 10 years and more. This was statistically significant. The rate was also significantly higher among those without comorbid conditions (80.3%) than those without (54.8); and those with adequate knowledge on hypertension (81.8%) than those with inadequate knowledge (65.1%).

University of Ghana http://ugspace.ug.edu.gh

Limit salt intake: The overall prevalence of limited salt intake was 28.4%. The rate was higher among age groups; both males and females; educational levels, marital status and those with adequate and inadequate knowledge (Table 4).

Balanced diet intake: Balanced diet intake was prevalent among 64.4% of the respondents. Sufficient intake was significantly higher among the 40 – 49 years olds (78.9%); those with tertiary level of education (78.9%); slightly higher among males (66.4%) compared to females (64.8%); and those without comorbid conditions (80.3%) (Table 4).

Controlled BP: Among participants who had their blood pressure checked, only 5.5% had blood pressure controlled. The rate was higher among 20 – 29 years old (14.3%); among females (6.6%); among singles (6.9%); and those without comorbid conditions (6.2%) (Table 4).

Blood glucose: Overall, only 8.3 participants had normal blood glucose levels. The rate was higher among participants aged 40 – 49 years (18.4%); and higher among males (11.4%) compared to females (7.8%).

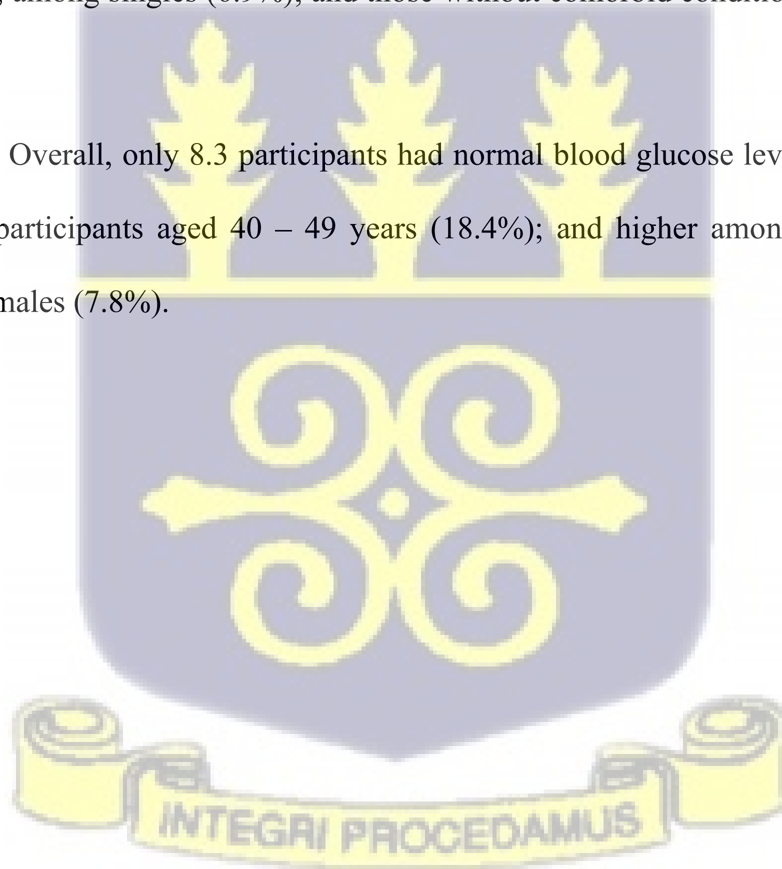
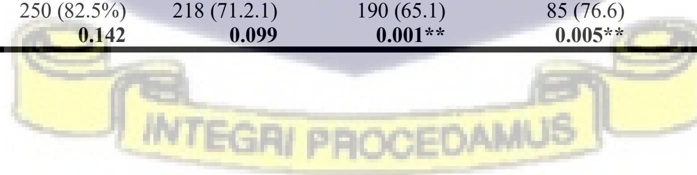


Table 4: Prevalence of behavioral and clinical lifestyle modification

Characteristics	Behavioral and clinical lifestyle modification								
	Non-smoker N = [414]	Ability to cope N = [335]	No alcohol intake N = [289]	Physical activity N = [280]	Balanced diet intake N = [270]	Limit salt intake N = [119]	Controlled BP N = [23]	Fasting blood glucose N = [37]	Adherence to medication N = [300]
	n (%)								
Age									
20 – 29	7 (100)	7 (100.0)	3 (42.9)	5 (71.4)	4 (57.1)	5 (71.4)	1 (14.3)	0 (0)	6 (85.7)
30 – 39	25 (100)	20 (80.0)	20 (80)	19 (76.0)	16 (64.0)	18 (72.0)	3 (12.0)	3 (12.0)	15 (60.0)
40 – 49	37 (97.4)	32 (84.2)	27 (71.1)	26 (68.4)	30 (78.9)	29 (69.4)	4 (10.5)	7 (18.4)	27 (71.1)
50 – 59	98 (100)	83 (84.6)	73 (74.5)	67 (68.4)	52 (53.1)	68 (69.4)	7 (7.1)	6 (6.1)	70 (71.4)
60 – 69	143 (97.3)	113 (76.9)	91 (61.9)	94 (64.0)	104 (70.7)	106 (72.1)	6 (4.1)	15 (10.2)	106 (72.1)
70 +	104 (100)	80 (79.2)	75 (72.1)	69 (66.4)	64 (61.5)	74 (71.1)	2 (1.9)	6 (5.8)	76 (73.1)
p-value	**0.269**	**0.413**	**0.108**	**0.886**	**0.033***	**0.984**	**0.127**	**0.169**	**0.780**
Sex									
Male	300 (98.4)	96 (84.9)	215 (70.5)	77 (67.5)	75 (66.4)	76 (66.7)	3 (2.6)	13 (11.4)	80 (70.2)
Female	114 (100.0)	239 (79.4)	74 (64.9)	203 (66.6)	195 (64.8)	224 (73.4)	20 (6.6)	24 (7.8)	220 (72.1)
p-value	**0.169**	**0.183**	**0.272**	**0.849**	**0.724**	**0.171**	**0.116**	**0.256**	**0.693**
Marital status									
Single	29 (100.0)	23 (79.3)	19 (65.5)	20 (68.9)	17 (58.6)	20 (69.0)	2 (6.9)	3 (10.3)	18 (62.1)
Married	266 (98.9)	221 (83.1)	186 (69.1)	180 (69.2)	175 (65.1)	196 (72.9)	17 (6.3)	25 (9.3)	198 (73.6)
Divorced	34 (100.0)	26 (76.5)	23 (67.6)	21 (67.7)	19 (55.9)	23 (67.6)	1 (2.9)	3 (8.8)	20 (58.8)
Widowed	85 (97.7)	65 (76.5)	61 (70.1)	59 (71.9)	59 (67.8)	61 (70.1)	3 (3.5)	6 (6.9)	64 (73.6)
p-value	**0.642**	**0.463**	**0.970**	**0.921**	**0.574**	**0.881**	**0.661**	**0.906**	**0.193**
Level of education									
No formal education	80 (98.8)	61 (75.3)	61 (75.3)	52 (64.2)	47 (58.0)	57 (70.4)	4 (4.9)	5 (6.2)	52 (64.2)
Primary	141 (97.2)	116 (80.0)	90 (62.1)	92 (63.5)	84 (57.9)	109 (75.2)	10 (6.9)	9 (6.2)	109 (75.2)
Secondary	122 (100)	101 (82.8)	94 (77.1)	84 (68.8)	83 (68.0)	88 (72.1)	7 (5.7)	16 (13.1)	88 (72.1)
Tertiary	71 (100)	57 (80.3)	44 (62.0)	52 (73.2)	56 (78.9)	46 (64.8)	2 (2.8)	7 (9.9)	51 (71.8)
p-value	**0.148**	**0.636**	**0.018***	**0.468**	**0.010***	**0.456**	**0.661**	**0.185**	**0.375**
Duration of heart diseases									
<10	302 (99.7)	243 (81.0)	203 (67.0)	212 (70.0)	197 (65.0)	234 (77.2)	16 (5.3)	27 (8.9)	224 (73.9)
10+	112 (96.6)	92 (80.7)	86 (74.1)	68 (58.6)	73 (62.9)	66 (56.9)	7 (6.0)	10 (8.6)	76 (65.5)
p-value	**0.009****	**0.839**	**0.157**	**0.027***	**0.690**	**<0.001***	**0.762**	**0.925**	**0.088**
Commobidity									
Yes	174 (98.9)	136 (77.3)	147 (83.5)	92 (54.8)	116 (66.3)	120 (68.2)	8 (5.6)	10 (5.7)	111 (63.1)
No	240 (98.8)	199 (83.6)	142 (58.4)	188 (80.3)	154 (64.4)	180 (74.1)	15 (6.2)	27 (11.1)	189 (77.8)
p-value	**0.927**	**0.244**	**<0.001****	**<0.001****	**0.593**	**0.187**	**0.470**	**0.053**	**0.001****
Knowledge level									
Adequate	113 (100.0)	85 (76.6)	71 (62.8)	90 (81.8)	185 (61.1)	88 (77.9)	6 (5.3)	9 (8.0)	90 (79.6)
Inadequate	301 (98.4)	250 (82.5%)	218 (71.2.1)	190 (65.1)	85 (76.6)	212 (69.3)	17 (5.6)	28 (9.2)	210 (68.6)
	0.172	**0.142**	**0.099**	**0.001****	**0.005****	**0.083**	**0.922**	**0.704**	**0.026***

***** p<0.01, ** p<0.05, * p<0.1**



University of Ghana http://ugspace.ug.edu.gh

4.1.8 Knowledge on hypertension

Only 145 (34.6%) of participants were aware systolic blood pressure of 140 and diastolic of 90 were considered hypertension. Less than half 192 (45.8%) disagreed that one can tell when their blood pressure is high because they feel bad. Majority 393 (93.8%) of participants agreed uuncontrolled hypertension can lead to diabetes whiles 100 (23.9%) agreed uncontrolled hypertension can lead to kidney failure. Gaining weight was considered by half 217 (51.8%) of participants as an element that increases risk of hypertension. Majority 365 (87.1%) disagreed that, people with hypertension do not need to take medicine if they exercise regularly and 404 (96.4%) were aware drinking can raise blood pressure. Also, 391 (93.3%) were aware of the linkage between hypertension and high sodium (salt) intake. To lose weight, majority 343 (81.7%) agreed one must consume fewer calories and regular exercise has been shown to lower blood pressure 375 (89.5%) was known to majority of the participants. Majority 395 (94.3%) were aware that treatment of high blood pressure with medication usually continues for a lifetime and only 13.8 believed the most common symptom of high blood pressure is No symptom (Table 5).

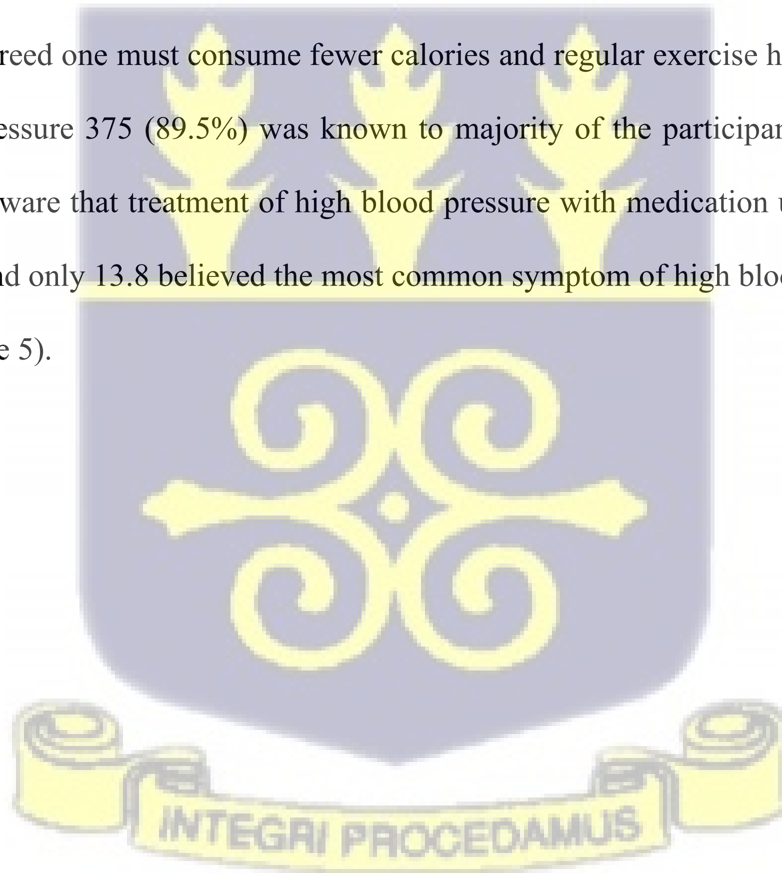
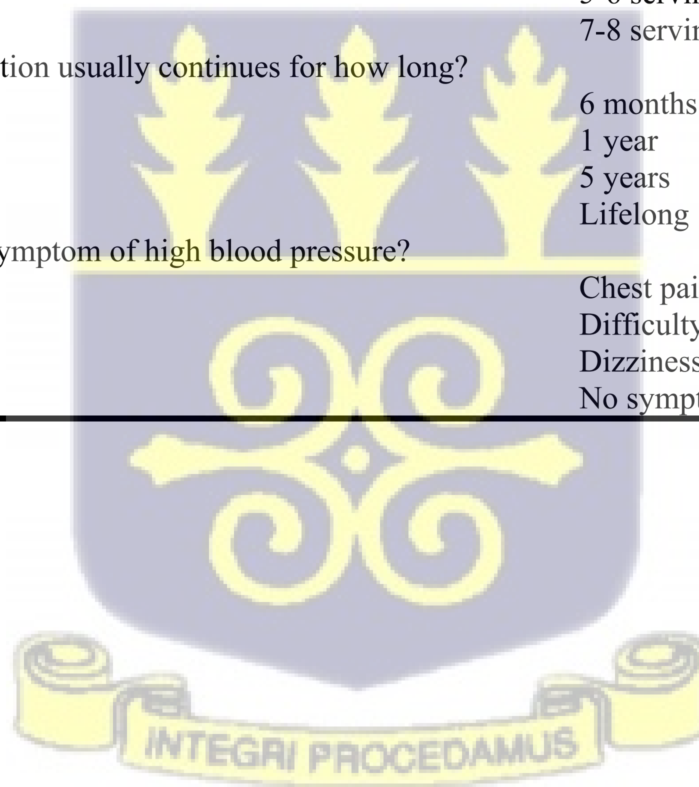


Table 5 Knowledge indicators of participants on hypertension (HeLM Scale)

Knowledge questions	Response	n (%)
A person is considered to have hypertension if either their systolic blood pressure is 140 or their diastolic is 90 or higher on two separate occasions.		
	True	145 (34.6)
	False	274 (65.4)
Most people can tell when their blood pressure is high because they feel bad.		
	True	227 (54.2)
	False	192 (45.8)
Uncontrolled hypertension can lead to which of the following:		
	Lung cancer	35 (8.4)
	Kidney failure	100 (23.9)
	High cholesterol	172 (41.1)
	Diabetes	393 (93.8)
Which of the following increases your risk of having hypertension?		
	Weight lifting	118 (28.2)
	Drinking >2 cups of coffee a day	356 (85.0)
	Smoking a pack of cigarettes	345 (82.3)
	Gaining weight	217 (51.8)
People with hypertension do not need to take medicine if they exercise regularly		
	True	54 (12.9)
	False	365 (87.1)
Which of the following statements about alcohol and hypertension is true?		
	Alcohol has no effect on BP	5 (1.2)
	Drinking alcohol in moderation can lower BP	8 (1.9)
	Alcohol is good for the heart	2 (0.5)
	Drinking too much can raise BP	404 (96.4)
Hypertension has been linked to a high sodium (salt) intake		
	True	391 (93.3)

INTEGRI PROCEDAMUS

	False	28 (6.7)
To lose weight, you must consume fewer calories than you use		
	True	343 (81.7)
	False	76 (18.1)
Regular exercise has been shown to lower BP		
	True	375 (89.5)
	False	44 (10.5)
How many servings of fruits and vegetables do you need a day to maintain a healthy diet?		
	1-2 servings	217 (51.8)
	3-4 servings	132 (31.5)
	5-6 servings	66 (15.8)
	7-8 servings	4 (10.0)
Treatment of high blood pressure with medication usually continues for how long?		
	6 months	6 (1.4)
	1 year	4 (0.9)
	5 years	14 (3.3)
	Lifelong	395 (94.3)
Which of the following is the most common symptom of high blood pressure?		
	Chest pain	71 (16.9)
	Difficulty breathing	181 (43.2)
	Dizziness	109 (26.0)
	No symptom	58 (13.8)



University of Ghana http://ugspace.ug.edu.gh

4.1.9 Overall knowledge on hypertension

Overall, only 27% of participants had adequate knowledge on hypertension whiles 73% had inadequate knowledge on hypertension

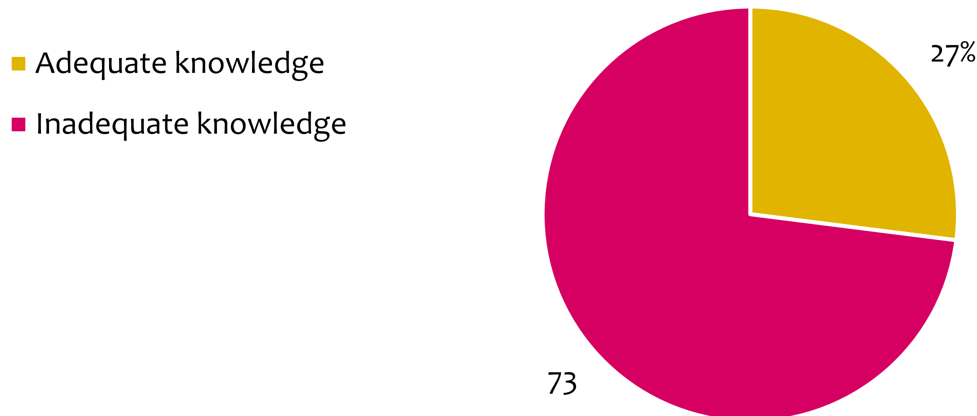


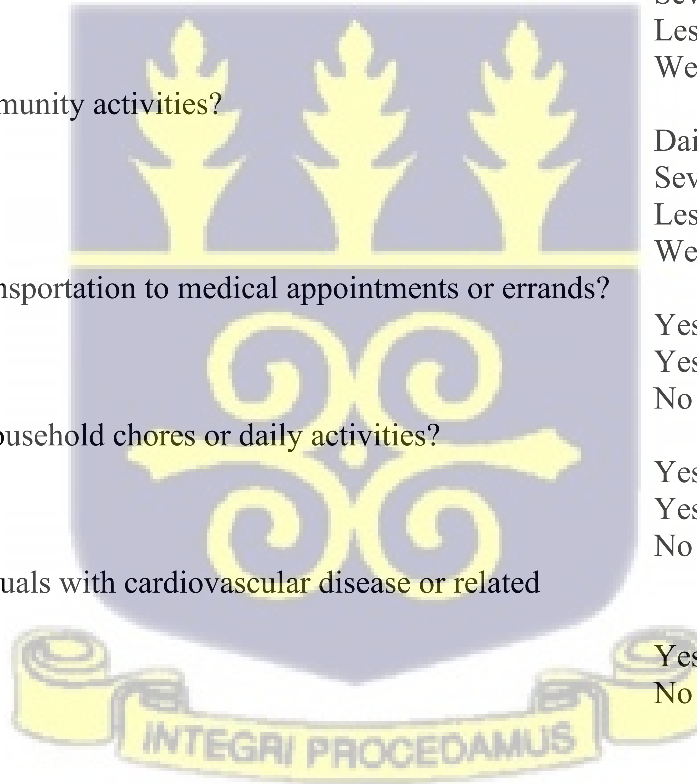
Figure 7: Overall knowledge on hypertension

4.1.10 Social Support Assessment

In order to effectively cope with the environment/stress, most 179 (42.7%) of the participants had 1-2 friends. However most 225 (53.7%) interact with friends or family members outside of their home less than once a week. Also, most 252 (60.1%) participate in social or community activities less than once a week. Less than half 171 (40.8%) have someone who helps them with transportation to medical appointments or errands occasionally. However, majority 264 (63%) have someone who assists them with household chores or daily activities regularly. Only few 32 (7.6%) were part of support groups for individuals with cardiovascular disease or related conditions. However, majority 269 (64.2%) were somewhat satisfied with the support they receive from friends and family regarding their health and most had someone to talk to about their feelings regarding cardiovascular occasionally. Most 203 (48.5%) receive encouragement or emotional support from friends or family regarding on cardiovascular health several times a week (Table 6).

Table 6: Social support among participants

Question	Response	n (%)
How many close friends or family members do you feel comfortable confiding in?		
	None	16 (3.8)
	1-2	179 (42.7)
	3-5	175 (41.8)
	More than 5	47 (11.2)
How often do you interact with friends or family members outside of your home?		
	Daily	17 (4.1)
	Several times a week	88 (21.0)
	Less than once a week	225 (53.7)
	Weekly	89 (21.2)
How often do you participate in social or community activities?		
	Daily	6 (1.4)
	Several times a week	89 (21.2)
	Less than once a week	252 (60.1)
	Weekly	72 (17.2)
Do you have someone who helps you with transportation to medical appointments or errands?		
	Yes, regularly	122 (29.1)
	Yes, occasionally	171 (40.8)
	No	126 (30.1)
Do you have someone who assists you with household chores or daily activities?		
	Yes, regularly	264 (63.0)
	Yes, occasionally	117 (27.9)
	No	38 (9.1)
Are you part of any support groups for individuals with cardiovascular disease or related conditions?		
	Yes	32 (7.6)
	No	387 (92.4)


INTEGRI PROCEDAMUS

How satisfied are you with the support you receive from friends and family regarding your cardiovascular health?		
	Very satisfied	97 (23.2)
	Somewhat satisfied	269 (64.2)
	Neutral	47 (11.2)
	Somewhat dissatisfied	3 (0.7)
	Very dissatisfied	3 (0.7)
Do you have someone to talk to about your feelings regarding your cardiovascular health?		
	Yes, regularly	100 (23.9)
	Yes, occasionally	281 (67.1)
	No	38 (9.1)
How often do you receive encouragement or emotional support from friends or family regarding your cardiovascular health?		
	Daily	20 (4.8)
	Several times a week	203 (48.5)
	Less than once a week	111 (26.5)
	Weekly	85 (20.3)

University of Ghana http://ugspace.ug.edu.gh

4.1.11 Strategies and interventions adopted for healthy lifestyle adherence

Of the 419 participants, only 24.3% have participated in management and educational programs on cardiovascular disease (Figure 8). Out of the 24.3% who participated in these programs, 49.88% found it very effective. Further, most of the participants have also engaged in regular physical activity 342 (81.6%), healthy diet consumption 391 (93.3%) and ensured they adhered to medication 378 (90.2%). Only a few have been engaged in stress management programs 72 (17.2%). For perceive effectiveness, more than half 228 (60.3%) found adherence to medication very effective compared to regular physical activity 134 (39.2%), healthy diet 195 (49.9%), and stress management techniques 25 (34.7) (Table 8).

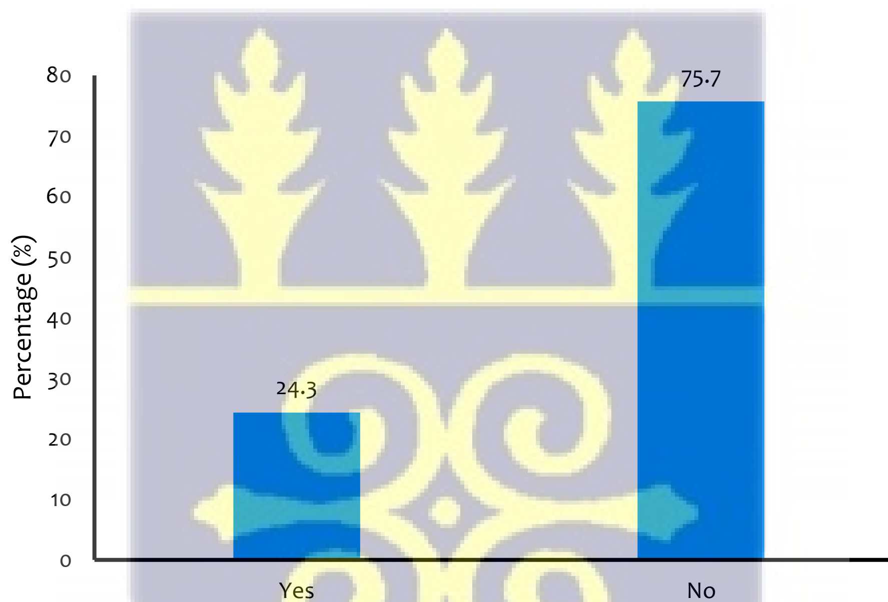


Figure 8: Participation in educational programs by participants

Table 7: Strategies and interventions used in promoting adherence to healthy lifestyle and effectiveness

Recommended strategy		Level of effectiveness n (%)			
	Overall	**Effective**	**Not effective**	**Somewhat effective**	**Very effective**
Regular physical activity	342 (81.6)	155 (45.3)	0 (0)	53 (15.5)	134 (39.2)
Healthy Diet	391 (93.3)	179 (45.8)	0 (0)	17 (4.4)	195 (49.9)
Medication adherence	378 (90.2)	105 (27.8)	0 (0)	45 (11.9)	228 (60.3)
Smoking Cessation programs	148 (35.3)	113 (40.5)	2 (0.7)	27 (9.7)	137 (49.1)
Stress management techniques	72 (17.2)	25 (34.7)	0 (0)	22 (30.6)	25 (34.7)

University of Ghana http://ugspace.ug.edu.gh

4.1.12 Barriers and challenges affecting adherence to recommended lifestyle modifications

Overall, participants face some challenges and barriers adhering to lifestyle modification. About 66.4% participants reported financial constraints as a major challenge. Among other challenges, lack of knowledge (46.3%) and motivation (42.5%) were other major challenges reported. Side effects associated with medications (19.1%) and lack of support from family and friends (11.7%) were also reported by few participants.

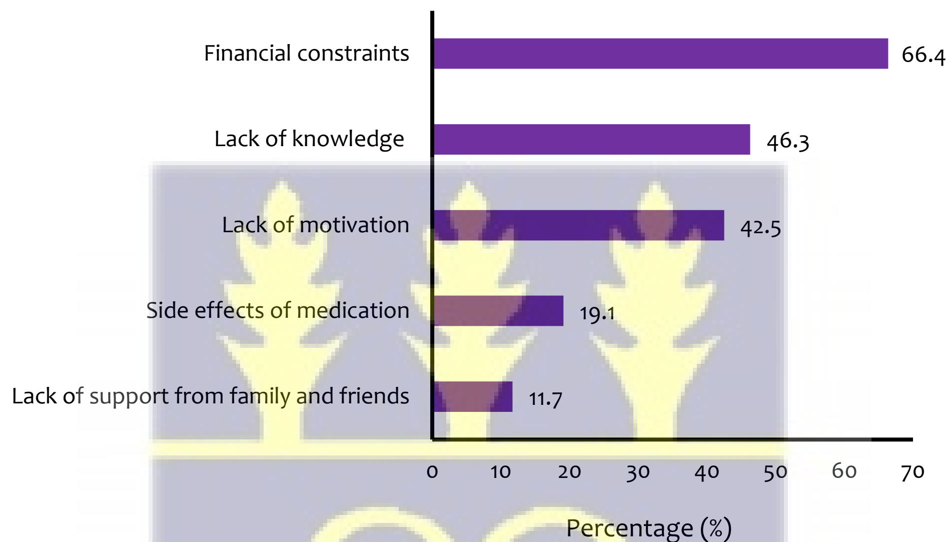


Figure 9: Barriers and challenges affecting adherence to recommended lifestyle modifications

4.1.13 Examining Sociodemographic and Clinical Predictors of Medication Adherence

We conducted a binary logistic regression to examine whether age group, gender, marital status, education level, presence of comorbidities, duration of heart disease, and knowledge level significantly predicted adherence to medication among patients with cardiovascular disease. The overall model was statistically significant, χ^2 (7) = 16.10, p = .024, indicating that the predictors, as a set, reliably distinguished between individuals with high versus low medication adherence. However, the model explained a modest portion of the variance in adherence, as indicated by a McFadden pseudo R^2 of .032.

As shown in Table 4, among the predictors, only the presence of comorbidities significantly predicted adherence. Specifically, participants with comorbidities had significantly lower

University of Ghana http://ugspace.ug.edu.gh

odds of adhering to medication compared to those without comorbid conditions (OR = 0.54, 95% CI [0.35, 0.85], $p = .007$). The remaining predictors; age group, gender, marital status, education level, duration of heart disease, and knowledge level were not statistically significant (all $p > .05$), indicating no meaningful differences in adherence across those characteristics.

Table 4.

Logistic Regression Predicting Adherence to Medication (N = 419)

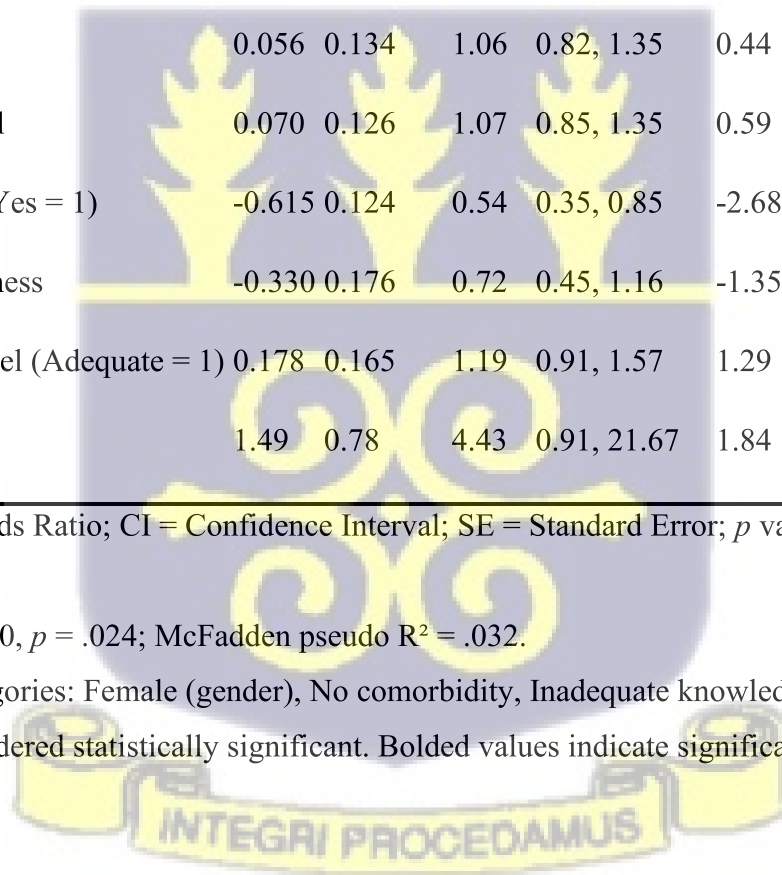
Predictor	**B**	**SE**	**OR**	**95% CI for OR**	**z**	**P**
Age group	0.088	0.096	1.09	0.91, 1.32	0.92	.358
Gender (Male = 1)	-0.097	0.229	0.91	0.55, 1.49	-0.38	.700
Marital status	0.056	0.134	1.06	0.82, 1.35	0.44	.661
Education level	0.070	0.126	1.07	0.85, 1.35	0.59	.553
Comorbidity (Yes = 1)	-0.615	0.124	0.54	0.35, 0.85	-2.68	.007
Duration of illness	-0.330	0.176	0.72	0.45, 1.16	-1.35	.178
Knowledge level (Adequate = 1)	0.178	0.165	1.19	0.91, 1.57	1.29	.197
Constant	1.49	0.78	4.43	0.91, 21.67	1.84	.066

Note. OR = Odds Ratio; CI = Confidence Interval; SE = Standard Error; *p* values based on Wald z test.

LR $\chi^2(7) = 16.10$, $p = .024$; McFadden pseudo $R^2 = .032$.

Reference categories: Female (gender), No comorbidity, Inadequate knowledge level.

$p < .05$ is considered statistically significant. Bolded values indicate significance.



University of Ghana http://ugspace.ug.edu.gh

4.1.14 Exploring the Role of Age and Clinical Characteristics in Predicting Uncontrolled *Blood Pressure*

We also examined whether age group, gender, marital status, education level, presence of comorbidities, duration of heart disease, and knowledge level significantly predicted the likelihood of having uncontrolled blood pressure among participants. The overall model approached statistical significance, $\chi^2(7) = 13.23$, $p = .067$, indicating that the predictors collectively provided limited explanatory power for uncontrolled blood pressure status. The model explained approximately 7.4% of the variance (McFadden pseudo $R^2 = .074$). Age group emerged as the only statistically significant predictor. For each higher age group, the odds of having uncontrolled blood pressure increased by approximately 75% (OR = 1.75, 95% CI [1.22, 2.51], $p = .002$). None of the other variables, including gender, marital status, education level, comorbidity status, duration of illness, or knowledge level, were significantly associated with blood pressure control status (all $p > .05$).

Table 5.

Logistic Regression Predicting Uncontrolled Blood Pressure (N = 419)

Predictor	**B**	**SE**	**OR**	**95% CI for OR**	**z**	***P***
Age group	0.561	0.183	1.75	1.22, 2.51	3.07	.002
Gender (Male = 1)	0.975	0.649	2.65	0.74, 9.47	1.50	.133
Marital status	–0.008	0.277	0.99	0.57, 1.71	–0.03	.978
Education level	0.276	0.317	1.32	0.82, 2.11	1.15	.250
Comorbidity (Yes = 1)	0.275	0.625	1.32	0.52, 3.34	0.58	.563
Duration of illness	–0.349	0.349	0.71	0.27, 1.86	–0.71	.481
Knowledge level (Adequate = 1)	–0.004	0.257	1.00	0.60, 1.65	–0.02	.986
Constant	–1.83	0.944	0.16	0.01, 4.69	–1.06	.288

Note. OR = Odds Ratio; CI = Confidence Interval; SE = Standard Error. *p* values are based on Wald z tests.

LR $\chi^2(7) = 13.23$, $p = .067$; McFadden pseudo $R^2 = .074$.

Reference categories: Female (gender), No comorbidity, Inadequate knowledge level.

University of Ghana http://ugspace.ug.edu.gh

4.1.15 Examining Sociodemographic and Clinical Predictors of Normal Fasting Blood Glucose

We also examine whether age group, gender, marital status, education level, presence of comorbidities, duration of heart disease, and knowledge level significantly predicted normal fasting blood sugar (FBS) among participants. The overall model was not statistically significant, $\chi^2(7) = 8.39$, $p = .300$, suggesting that the set of predictors did not reliably distinguish between participants with normal versus abnormal fasting blood glucose levels. The model explained only 3.4% of the variance in FBS control status (McFadden pseudo-$R^2 = .034$). Among all predictors, only comorbidity status reached statistical significance. Specifically, individuals with comorbidities were less likely to have normal fasting blood glucose compared to those without comorbidities (OR = 0.45, 95% CI [0.21, 0.99], $p = .047$), indicating a 55% reduction in the odds of FBS control in this group. All other predictors, including age group, gender, marital status, education level, duration of illness, and knowledge level, were not significantly associated with fasting blood glucose control ($p > .05$).

Table 6.

Logistic Regression Predicting Normal Fasting Blood Sugar (N = 419)

Predictor	**B**	**SE**	**OR**	**95% CI for OR**	**z**	***p***
Age group	–0.096	0.128	0.91	0.69, 1.20	–0.68	.499
Gender (Male = 1)	0.405	0.563	1.50	0.72, 3.13	1.08	.281
Marital status	–0.076	0.196	0.93	0.61, 1.40	–0.36	.721
Education level	0.195	0.223	1.22	0.85, 1.74	1.06	.289
Comorbidity (Yes = 1)	–0.792	0.180	0.45	0.21, 0.99	–1.99	.047
Duration of illness	0.130	0.460	1.14	0.52, 2.51	0.32	.747
Knowledge level (Adequate = 1)	–0.172	0.174	0.84	0.56, 1.26	–0.83	.406
Constant	–1.67	0.945	0.19	0.02, 2.25	–1.32	.187

University of Ghana http://ugspace.ug.edu.gh

Note. OR = Odds Ratio; CI = Confidence Interval; SE = Standard Error. *p* values are based on Wald z tests.

LR $\chi^2(7) = 8.39$, $p = .300$; McFadden pseudo-$R^2 = .034$.

Reference categories: Female (gender), No comorbidity, Inadequate knowledge level.

University of Ghana http://ugspace.ug.edu.gh

4.2.1 Qualitative results

In all, 15 in-depth interviews and one focus group discussion (FGD) were conducted for patients. Interview sessions produced approximately 7 hours of audio recordings, lasting between 30 – 15 minutes for IDs and 75 minutes for the FGD.

4.2.2 Background of participants

Table 8 Background of qualitative participants

Characteristics	Details
Number of interviews conducted	15 in-depth interviews, 1 focus group discussion (FGD)
Duration of Interview Sessions	7 hours of audio recordings; IDIs: 30-45 mins, FGD: 75 mins
Age Range	46 – 72 years
Health Condition Duration	Varied; some managed diabetes and hypertension for decades, others newly diagnosed. Least duration; 1year and half. Long duration: 40years
Age and Health Condition Examples	Older Participants (e.g., 72 years): Long-term management (e.g., '40 years diabetic' P1) Younger Participants (e.g., 46 years): Shorter duration, e.g., '1.5 years diabetic' - P3
Occupational Status	Majority retired or in less physically demanding roles, adapting to health needs Retired Example: 'I'm currently on retirement for some years' - P1 Current Employment Example: 68-year-old pastor managing stress in ministry role P6
Cultural Influences on Diet	Age-related preferences for traditional foods among older participants Traditional Diet Example: 'I usually take fante kenkey and plantain...' - P1 Consistent Diet Example: 'My diet hasn't changed; eating fufu, ampesi, rice...' - P5

University of Ghana http://ugspace.ug.edu.gh

4.2.3 Qualitative themes and sub-themes descriptions

This current study yielded 113 codes. These codes combine and yielded five (7) themes and seven (21) sub-themes. The themes were "*dietary consistency and resistance", "cultural impacts on health", "consistent health education", "limited valued exercise", "modified healthy strategies","perceived support"* and *"perceived challenges"* (Table 9). Dietary Consistency and Resistance: Participants often stick to traditional dietary habits despite medical advice, making only minor changes, like portion adjustments, but largely resisting significant dietary shifts. Cultural Impacts on Health: Cultural beliefs strongly influence health practices, with participants often favoring traditional foods and herbal or spiritual remedies, sometimes conflicting with clinical guidance. Consistent Health Education: Regular health education is valued but often infrequent; participants express a need for brief, ongoing sessions to reinforce health management practices and support adherence. Limited Valued Exercise: While participants recognize exercise as beneficial, age and health limitations restrict activity types and frequency, leading them to adapt with lighter forms like slow-paced walking or stretching. Modified healthy strategies were defined as adopted healthy measures taken to reduce the burden of associated with the management of the disease. Perceived support was defined as assistance received from family and friends in the course of disease management whereas perceived challenges were defined as hindrances perceived during the management of the disease.

4.2.4 Dietary Consistent and Resistance

Many participants demonstrate a strong attachment to traditional foods and routines, even after diagnosis. While some adapt by adjusting portion sizes or incorporating more fiber, a majority maintain long-standing dietary habits with minimal change.

> *I eat everything basically. No, my diet hasn't changed, I have been eating the same food. p5*

University of Ghana http://ugspace.ug.edu.gh

I mostly take fante kenkey and plantain because it goes along with many soups and stews, I don't like rice or yam. P1

We have been told to incorporate fiber into our meals so I do that a lot. Now I eat in smaller quantities and I don't use a lot of sugar for my breakfast as well as small quantity of oil in my stews. P3

4.2.4 Cultural Impacts on Health

Cultural beliefs also influence attitudes towards herbal remedies and spiritual interventions, at times competing with clinical advice. Cultural dietary preferences, like fufu, kenkey, and yam, are common and often retained despite medical advice.

There are talks that herbal medicines are able to cure the condition, but when I started coming to the clinic, I was told it wasn't true. It can only be managed but not cured. I know a certain woman who used to come to this clinic, who stopped attending once she started going to church and was offered the blood of Jesus. So, the spiritualist and herbal people are really disturbing. P5

In the mornings, I usually take milo tea with bread after which I take kenkey and garden egg stew in the afternoon. In the evenings, I take fufu and light soup or ampesi when I feel like. P3

In the mornings, I usually take milo tea with bread after which I take kenkey and garden egg stew in the afternoon. In the evenings, I take fufu and light soup or ampesi when I feel like. P2

4.2.5 Consistent Health Education

Health education from clinics is generally appreciated but infrequent. Many participants expressed a desire for regular, brief education sessions to reinforce adherence to health advice, indicating that ongoing education could aid in consistent management.

University of Ghana http://ugspace.ug.edu.gh

The health education should be given daily, even if it's just 3-5 minutes. P3

Whatever you say to the doctor... is what he will base on to advise you. P6

4.2.6 Limited Valued Exercise

Exercise is widely recognized as beneficial, but physical limitations due to age or health complications restrict the type and frequency of physical activity. Walking is the preferred exercise for most, though some have scaled back due to issues like dizziness or leg pain.

I used to do exercise until recently when I got a problem with my leg, so I'm unable to do it. I used to walk a lot. I have been told that it when walking, it can be done slowly because it also works. P5

Previously I used to walk for walks, but I started feeling dizzy, so I stopped. Currently, I do stretches at home in the morning. P6

4.2.7 Modified healthy strategies

Overall, the majority of participants reported regular engagement in physical activity, which is recognized as a crucial strategy for managing excess body fat and maintaining a healthy weight. Many participants indicated that they incorporate daily walks into their routines as a primary method to stay active and support their physical health. Additionally, a subset of participants noted that they engage in walking exercises several times a week, further emphasizing their commitment to an active lifestyle. This consistent participation in physical activity highlights the importance these individuals place on physical fitness as a means to promote overall well-being and prevent weight-related health issues. Some of them indicated;

I really like exercises and it's really helpful. After every meal, I take walk before I relax at home. P1

I usually take walks about 3-4 times daily. P2

University of Ghana http://ugspace.ug.edu.gh

We have been told to incorporate fiber into our meals, so I do that a lot. I prefer walking as a form of exercise. P3

I do not have any problem with stress and overthinking. We've been taught not to think of the condition and stress ourselves. I only get worried when I don't get the medications from the hospital and it gets me thinking, because I find it difficult to buy the medications on my own. Due to that my sickness worsens. P7

I put in a lot of effort to follow the eating habit. We are taught to eat light food and not eat at night. P6

I used to do exercise until recently when I got a problem with my leg so I'm unable to do it. I used to walk a lot. P14

As a minister of God, now we I choose to talk and not rather shout when preaching. Since, we deal with human beings, you will definitely be provoked so I don't give chance for that. I always choose to deal with issues in a calm way. Apart from that, I have not adopted any significant lifestyle or way of doing things. P6

4.2.8 Perceived support

Some of the participants reported receiving domestic and financial support from their family members and friends, which played a role in assisting them with their daily needs and alleviating some of the burdens associated with managing their health. Additionally, few of the participants mentioned that they were provided with educational resources and guidance on healthy lifestyle practices by healthcare providers. Specifically, three participants highlighted that healthcare professionals offered them valuable information and advice on how to adopt and maintain healthier habits, which contributed to their overall well-being. This indicates that, although support was not widespread, those who did receive assistance from both their personal networks and healthcare providers benefited from a more comprehensive approach to managing their health.

We are told to get enough rest and don't be stressed out. So, when I don't have any schedule at work, I get some rest. ***P4***

University of Ghana http://ugspace.ug.edu.gh

My wife has been very supportive and does not starve me. She knows what I like so she makes soup every now and then just for me. ***P1***

I really like exercises and its really helpful. After every meal, I take walk before I relax at home. ***FGD***

The support system is not helping me. My mother is old, my father is late and my husband is also olde, these makes it difficult for me because I don't get anyone to support me. ***P7***

I try to engage my friends a lot in conversations so it works for me. Singing also helps me. ***P10***

Yes, I do get support from my children. They support me financially to buy some drugs. ***P15***

4.2.9 Perceived challenges

Financial limitations prevent some participants from accessing all recommended medications or maintaining a healthy diet, particularly when advised to incorporate costlier items like fruits and vegetables. Participants also often experience uncertainty around combining herbal remedies with conventional treatments. Cultural beliefs in herbal treatments create confusion, especially without clear guidance from healthcare providers on potential interactions. Social and family support varies, with some participants receiving financial and practical help, while others lack consistent support, which can affect motivation and adherence to health recommendations.

Sometimes there is no money to buy certain drugs, so that's one challenge I face. ***P2***

They [vegetables] are expensive these days, but when I get an amount, I try to buy in large quantities so I use later. ***P5***

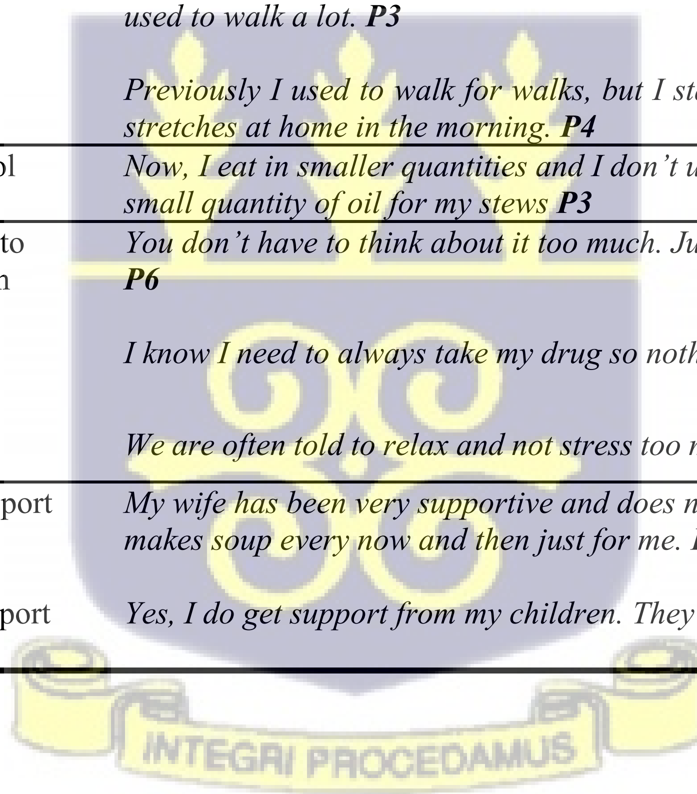
Sometimes you want to take herbal medicine, and you don't know if you can add it to your hospital-given drugs. ***P3***

Table 9: Description of themes, sub-themes and example quotations from patients

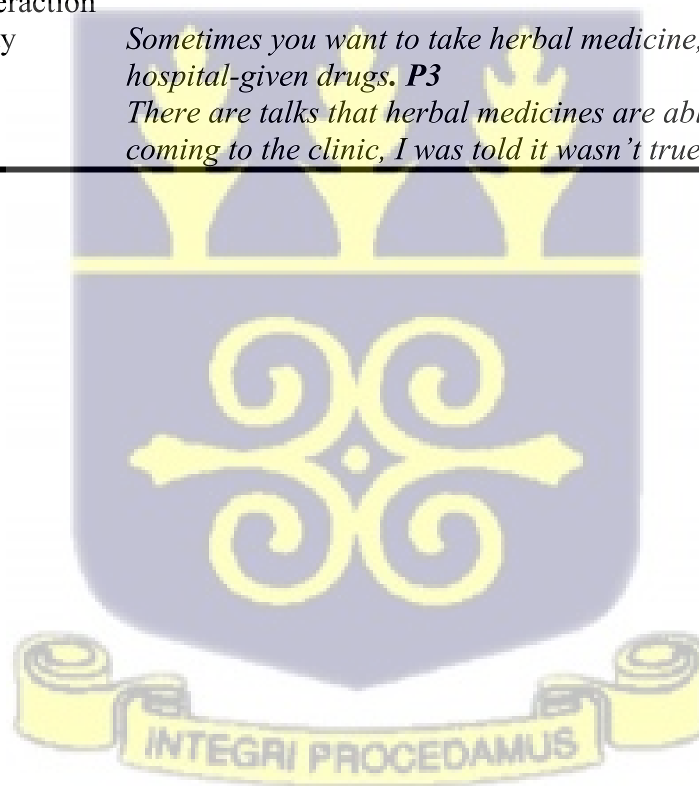
Theme	Sub-theme	Example
Dietary consistency and resistance	Adherence to traditional foods	*I mostly take fante kenkey and plantain because it goes along with many soups and stews.* ***P1***
	Minimal dietary Modification	*I eat everything basically. No, my diet hasn't changed, I have been eating the same food.* ***P5***
	Selective adjustment to diet	*Now I eat in smaller quantities and I don't use a lot of sugar for my breakfast as well as small quantity of oil in my stews.* ***P3***
Cultural impact on health	Preference for Traditional Foods	*In the mornings, I usually take milo tea with bread after which I take kenkey and garden egg stew in the afternoon. In the evenings, I take fufu and light soup or ampesi.* ***P3***
	Reliance on Herbal Remedies	*There are talks that herbal medicines are able to cure the condition, but when I started coming to the clinic, I was told it wasn't true. It can only be managed but not cured.* ***P5***
	Spiritual and religious believes	*I know a certain woman who used to come to this clinic, who stopped attending once she started going to church and was offered the blood of Jesus. So, the spiritualist and herbal people are really disturbing.* ***P5***
Consistent health education	Desire for frequent reinforcement	*The health education should be given daily, even if it's just 3-5 minutes.* ***P3***
	Reliance on provider guidance	*Whatever you say to the doctor... is what he will base on to advise you.* ***P4***
	Perceived value of health education	*The education given also helps a lot.* ***P5*** *Oh yes. The education given helps a lot.* ***P4***

INTEGRI PROCEDAMUS

	Health literacy and understanding	*Sometimes you may meet a doctor who explains and answers all your questions. Others go straight to the point and talk about your current condition.* ***P3***
Limited valued exercise	Adjustments to Physical Limitations	*Currently, I do stretches at home in the morning. P6* *I have been told that it when walking, it can be done slowly because it also works****. P5***
	Impact of Age-Related Health Complications	*I used to do exercise until recently when I got a problem with my leg, so I'm unable to do it.* ***P5*** *I started feeling dizzy, so I stopped.* ***P6***
Modified healthy strategies	Physical exercise strategy	*I used to do exercise until recently when I got a problem with my leg so I'm unable to do it. I used to walk a lot.* ***P3*** *Previously I used to walk for walks, but I started feeling dizzy so is stopped. Currently, I do stretches at home in the morning.* ***P4***
	Diet control	*Now, I eat in smaller quantities and I don't use a lot of sugar for my breakfast as well as small quantity of oil for my stews* ***P3***
	Adherence to medication	*You don't have to think about it too much. Just keep taking your medication and that's all.* ***P6*** *I know I need to always take my drug so nothing hinders me.* ***P5*** *We are often told to relax and not stress too much and also to always take the medications.* ***P2***
	Domestic support	*My wife has been very supportive and does not starve me. She knows what I like so she makes soup every now and then just for me.* ***P1***
Perceived support	Financial support	*Yes, I do get support from my children. They support me financially to buy some drugs.* ***P3***



		The church pays me money so I am okay financially. With family, there is not much. My wife cooks and makes sure I've taken my drugs but not a lot of people are aware of my condition so I don't expect support from them. ***P4***
	Educational support	*We are often told to relax and not stress too much and also to always take the medications.* ***P2***
Perceived challenges	Financial Constraints on Medication and Diet	*Sometimes there is no money to buy certain drugs so that's one challenge I face.* ***P2*** *They [vegetables] are expensive these days, but when I get an amount, I try to buy in large quantities so I use later.* ***P5***
	Social and Family Support Limitations	*My wife cooks and makes sure I've taken my drugs, but not a lot of people are aware of my condition, so I don't expect support from them.* ***P6***
	Herbal-Drug Interaction Uncertainty	*Sometimes you want to take herbal medicine, and you don't know if you can add it to your hospital-given drugs.* ***P3*** *There are talks that herbal medicines are able to cure the condition, but when I started coming to the clinic, I was told it wasn't true.* ***P5***



University of Ghana http://ugspace.ug.edu.gh

4.3.1 Experiences of healthcare providers in supporting people diagnosed with CVD

Of the 10 healthcare providers accessed, majority (90%) recommend dietary changes for their patients compared to alcohol moderation (40%). About 70% recommends medication adherence and weight management. Further about 50% also recommend increase in physical activity, smoking cession and stress management techniques (Figure 10)

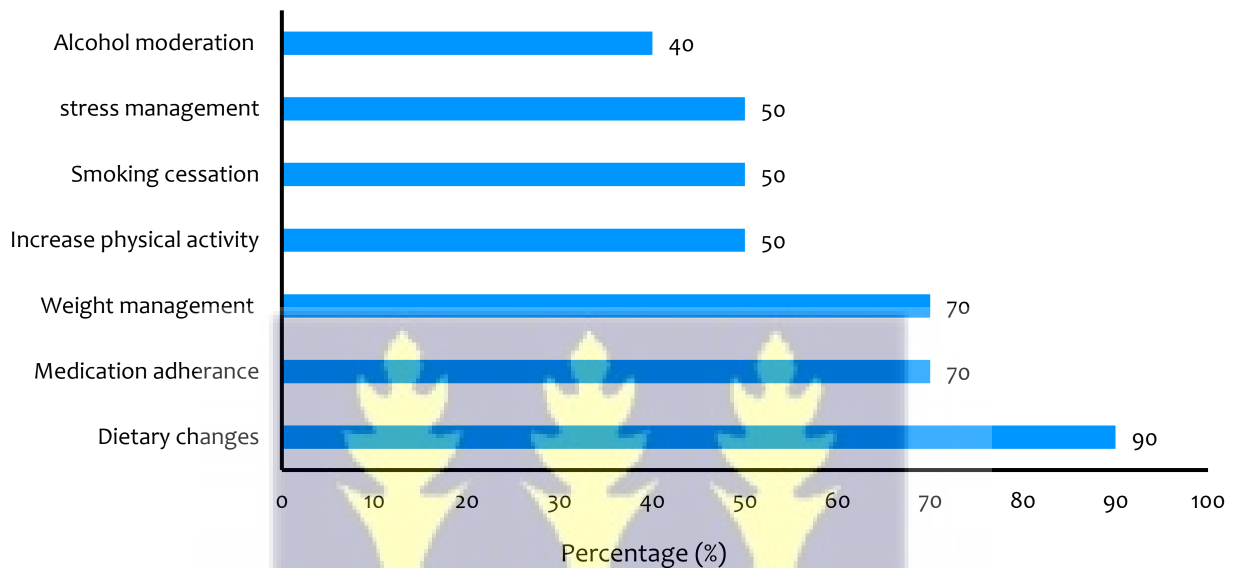


Figure 10: Recommended lifestyle modification by health workers

4.3.2 Health worker challenges in recommending healthy lifestyle

About 70% of healthcare workers do not have enough time for consultation and about 60% attribute lack of adherence to the socioeconomic status of patients. Also, about half (50%) lack resources and 30% lack motivation from patients. About 10% of the healthcare providers expressed insufficient training in lifestyle counselling (Figure 10).

INTEGRI PROCEDAMUS

University of Ghana http://ugspace.ug.edu.gh

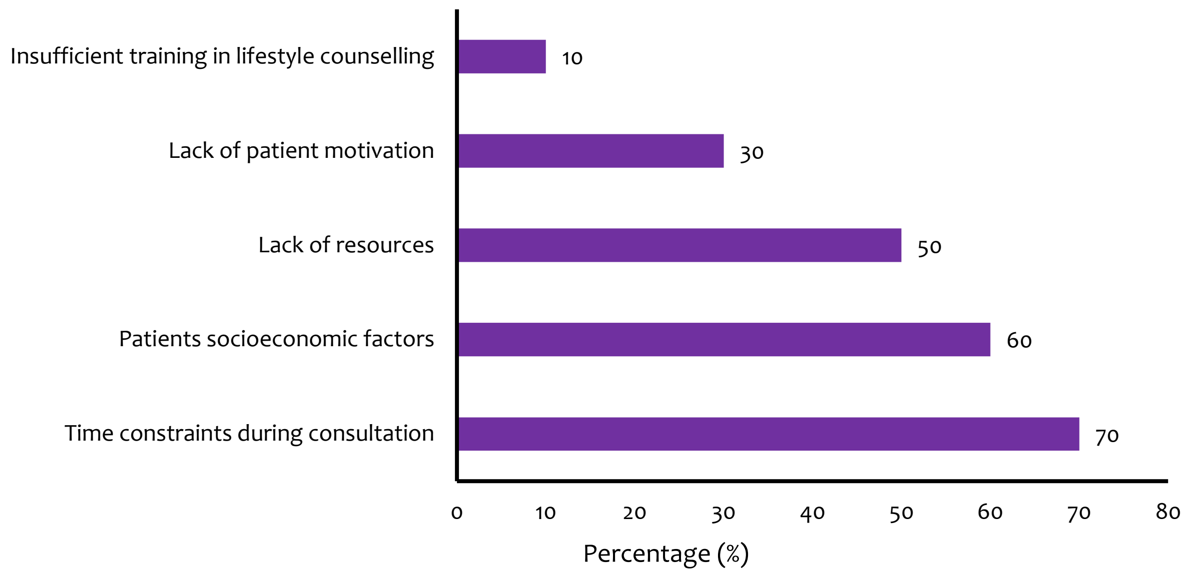
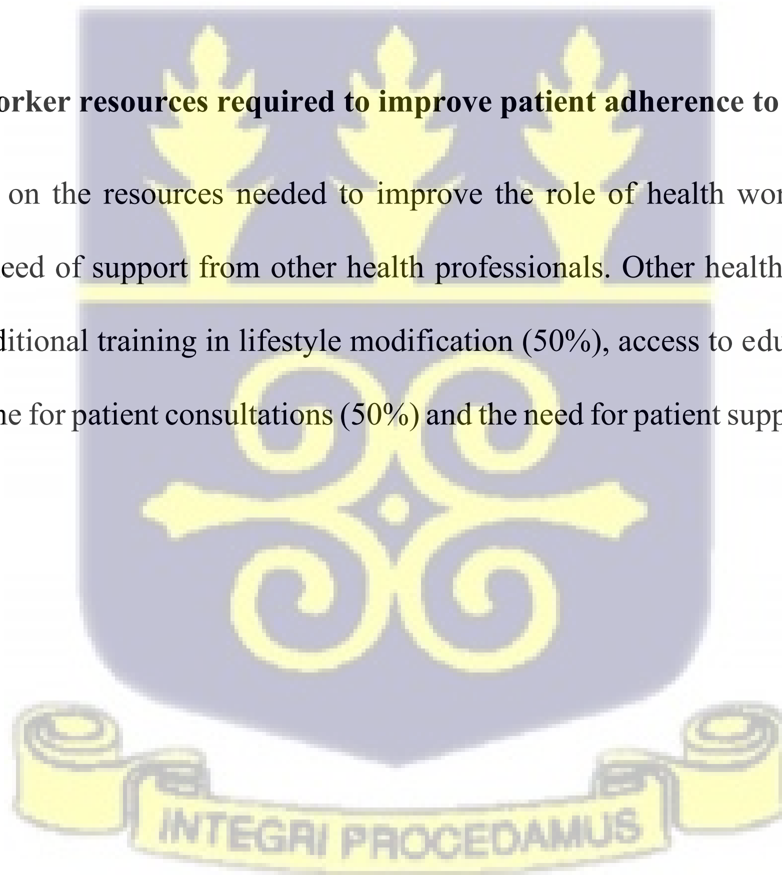


Figure 11: Health worker challenges in recommending healthy lifestyle


INTEGRI PROCEDAMUS

4.3.4 Health worker resources required to improve patient adherence to healthy lifestyle

When assessed on the resources needed to improve the role of health workers, about 70% expressed the need of support from other health professionals. Other health workers express the need for additional training in lifestyle modification (50%), access to educational material (50%), more time for patient consultations (50%) and the need for patient support groups (50%) (Figure 12).

University of Ghana http://ugspace.ug.edu.gh

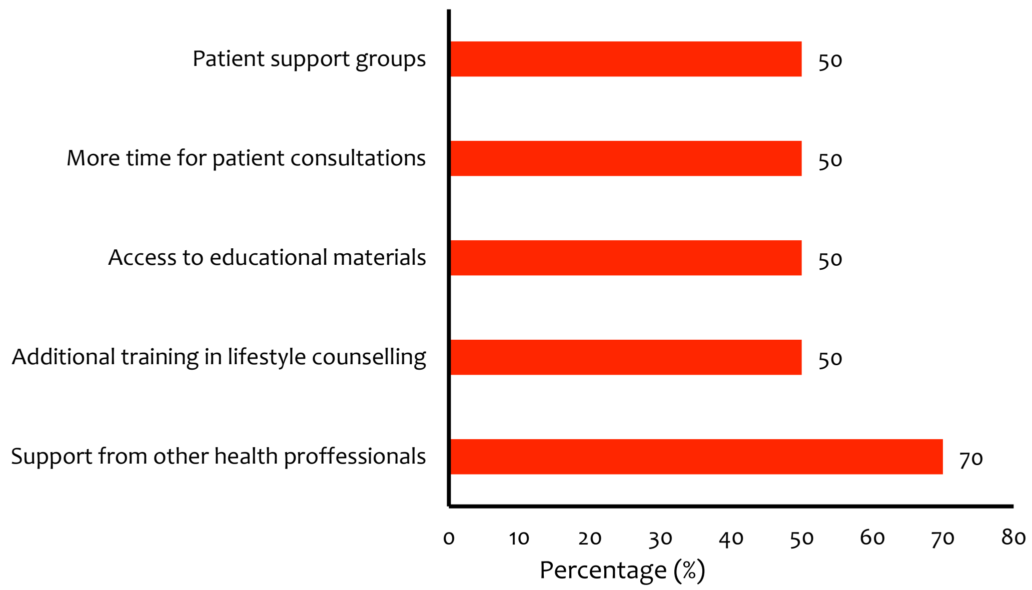


Figure 12: Resources required to improve patient adherence to healthy lifestyle

Table 10.

Joint Display of Integrated Quantitative and Qualitative Findings

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
Current adherence levels to medication and healthy lifestyle (diet, exercise, smoking cessation, stress management) among CVD patients.	-Medication: Approximately 71.6% of patients had high medication adherence (MARS-10); however, about 28.4% were non-adherent (e.g., 31.5% sometimes forgot doses). -No Smoking: 98.8% were non-smokers, indicating almost universal avoidance of tobacco. -Alcohol: About 70% were not current drinkers of alcohol. Physical Activity: 66.8% engaged in regular physical activity (at least light-to-moderate exercise).	Patients generally affirmed strong commitment to taking medications as prescribed ("I know I need to always take my drug so nothing hinders me." - P5), aligning with the high adherence rates quantitatively. Many attempt daily healthy lifestyle changes: for example, they incorporate daily walks or light exercise ("I usually take walks about 3-4 times daily." - P2) and adjust diets by adding fiber or reducing portion sizes ("Now I eat in smaller quantities and don't use a lot of sugar... and oil in my stews." - P3). Stress	Convergent findings show that while medication adherence is high and most patients avoid risk factors like smoking, adherence to lifestyle modifications is only partial. Quantitatively, a majority engage in some healthy behaviors (dietary improvements, exercise, stress coping), and qualitatively patients describe implementing these changes. However, both data strands highlight gaps: for example, diet change is modest (reflected in low salt limitation rates and patients sticking to familiar foods) and exercise is

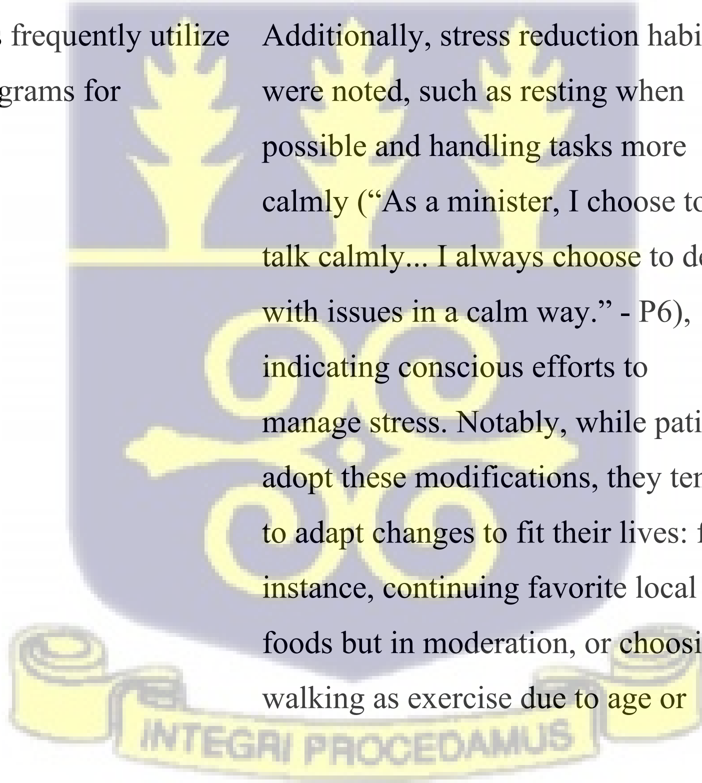
Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	-Diet: About 65.2% reported eating a balanced diet, but only 28.4% actively limited their salt intake (a low adherence to salt restriction). Stress Management: -80% felt able to cope with stress in their environment, suggesting good stress management in most patients.	management is also practiced by some; patients mentioned trying to avoid undue stress and get adequate rest ("We are taught not to think of the condition and stress ourselves… when I don't have any schedule at work, I get some rest." – P4). Despite these efforts, many maintain traditional dietary habits with minimal change ("My diet hasn't changed, I have been eating the same food." – P5; "I mostly take *fante kenkey* and plantain... I don't like rice or yam." – P1), indicating resistance to altering their diet. Physical limitations due to age or comorbid conditions also curb exercise capacity ("I used to walk a lot, but I started feeling dizzy, so I stopped. Now I do stretches at home."	limited in intensity. This suggests that patients are willing and aware - taking medications diligently and trying to be healthy, but ingrained habits, cultural food preferences, and health limitations prevent full adherence. Overall, patients manage to follow the easiest or most essential recommendations (medications, not smoking), but need additional support to achieve comprehensive lifestyle adherence (especially in dietary change and sustained physical activity).

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
		-P6), suggesting that while exercise is valued, it is often gentle or scaled back.	
Common lifestyle modifications adopted by people with CVD.	Widely adopted modifications include a *healthy diet* and *regular exercise*: about 93% of patients reported eating a healthier diet and 81- 67% engaged in regular physical activity (walking was most common). Nearly 90% consistently adhered to prescribed medications as part of their lifestyle management. Avoidance of harmful behaviors is notable: almost all (99%) abstained from smoking and 70% had ceased alcohol use. In contrast, participation in structured programs was lower - e.g., only 35.3% had engaged in any smoking cessation program (likely	Participants described a range of specific lifestyle changes they have incorporated. Dietary modifications are common: many have adjusted their diets by controlling portions and increasing healthier elements (e.g., vegetables or fiber) without completely abandoning traditional foods ("We have been told to incorporate fiber into our meals, so I do that a lot." - P3). Regular physical activity is also a prevalent practice: patients often mentioned daily or frequent walks as exercise ("After every meal, I take a walk before I relax at home." - P1) and some do	Both data sources indicate a core set of lifestyle modifications embraced by patients: improved diet, increased physical activity (mostly walking), strict medication adherence, and basic stress management. This convergence shows that patients are actively engaging in recommended behaviors on an individual level. The high prevalence of self-reported healthy eating and exercise parallels patients' accounts of adjusting meals and doing daily walks. The lack of formal program participation in the numbers is also echoed by interviews, where patients did not report involvement in

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	because most did not smoke) and 17.2% tried formal stress management techniques. These figures indicate that patients largely adopt *individual lifestyle changes* (diet, exercise, medication adherence) but less frequently utilize formal support programs for behavior change.	light exercises or stretches at home. Maintaining medication routines is seen as a crucial daily practice ("Just keep taking your medication and that's all." - P6), and patients integrate this into their lifestyle. Additionally, stress reduction habits were noted, such as resting when possible and handling tasks more calmly ("As a minister, I choose to talk calmly... I always choose to deal with issues in a calm way." - P6), indicating conscious efforts to manage stress. Notably, while patients adopt these modifications, they tend to adapt changes to fit their lives: for instance, continuing favorite local foods but in moderation, or choosing walking as exercise due to age or	support groups or structured cessation programs – instead, they rely on informal, self-directed changes. In summary, patients commonly adopt lifestyle changes that are feasible and easily integrated into their daily routines (e.g. walking, portion control), demonstrating a willingness to manage their health, though often outside of formal support frameworks. This suggests that interventions are largely being carried out by patients themselves in day-to-day life, emphasizing the importance of supporting these individual efforts.



Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
		comfort. Very few mentioned attending any support group or formal lifestyle program, aligning with the low uptake of such programs quantitatively.	
Strategies and interventions to promote healthy lifestyle adherence (and their effectiveness).	Healthcare efforts have included patient education and counseling programs: about 24.3% of patients reported having participated in a CVD management or educational program. Among those, roughly half found these programs "very effective" in supporting lifestyle adherence. The most common recommended strategies (as reported by patients and providers) are encouraging regular physical activity, a healthy diet, and medication adherence – indeed, over	Patients highlighted the importance of health education and guidance from healthcare providers as a strategy to improve adherence. Many recalled receiving advice or brief counseling on lifestyle at clinic visits, for example, being taught dietary tips ("We are taught to eat light food and not eat at night." - P6) and the need to relax and avoid stress ("We are often told to relax and not stress too much and also to always take the medications." - P2). Such education is valued: participants noted that it helps	There is a clear convergence in recognizing education, counseling, and regular follow-up as critical strategies for fostering healthy lifestyle adherence. Quantitatively, a portion of patients have attended educational programs and most adhere to recommended behaviors, reflecting the impact of provider-driven strategies (dietary counseling, exercise advice, medication management support). Qualitative insights reinforce the effectiveness of these strategies: patients credit even

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	80–90% of patients followed advice on exercise, diet, and taking medications, reflecting these as key strategies promoted. In terms of perceived effectiveness, patients rated medication adherence and dietary changes as the most effective components (with 50-60% saying these were "very effective" for their health), followed by exercise (39% "very effective"). Interventions like smoking cessation support or stress management training were less commonly used (only 17-35% engagement) but when used, around half of those patients still found them very effective. Additionally, healthcare providers' role is central: nearly 90% of providers reported	them manage their condition better ("The education given helps a lot." - P5) and expressed a desire for more frequent reinforcement ("The health education should be given daily, even if it's just 3-5 minutes." - P3). This suggests that ongoing counseling is seen as an effective intervention when it occurs. However, patients also indicated that these interventions are not always regular or comprehensive, some only receive advice when they specifically ask or when their doctor has time ("Sometimes you may meet a doctor who explains and answers all your questions. Others go straight to the point…" - P3). There was little mention of formal support groups or community programs in interviews,	brief health education sessions with improving their adherence and outcomes. Both data sets suggest that when patients are well-informed and supported, they perceive better management of their condition (hence rating interventions like diet and medication adherence as highly effective). At the same time, the findings also highlight a gap: the relatively low reach of formal programs and the patient reports of infrequent counseling indicate that current interventions could be scaled up. In meta-inference, we deduce that sustained, frequent engagement strategies (e.g. regular lifestyle counseling, support groups, stress management training) are likely to

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	they advise dietary modifications to patients, 70% emphasize medication adherence and weight management, and 50% encourage increased exercise, smoking cessation, and stress management techniques , indicating a multi-faceted intervention approach in clinical practice.	implying that such structured interventions are either scarce or under-utilized. Instead, patients often rely on personal strategies and occasionally support from family (e.g., a spouse preparing appropriate meals or reminding them to take medication) as auxiliary interventions to stay on track.	further enhance adherence. The effectiveness of medication adherence and diet changes – supported by both patient perception and clinical emphasis - suggests these should remain focal points, while expanding access to structured support (educational sessions, community or group-based programs) could address areas like stress management and smoking cessation that are currently less attended to.
Barriers and challenges to adhering to recommended lifestyle modifications.	Patients face several key barriers to lifestyle adherence. The most commonly reported challenge was financial constraints (66.4% of patients), which can limit their ability to buy medications or healthy foods. A significant proportion also	Financial difficulties were vividly described by patients as a major obstacle. Several participants shared that they cannot always afford medications or recommended foods, which disrupts their management ("Sometimes there is no money to buy	Both quantitative and qualitative evidence converge on several major barriers that impede adherence. Financial constraint clearly stands out: many patients cannot sustain recommended diets or medication regimens due to cost, a reality

INTEGRI PROCEDAMUS

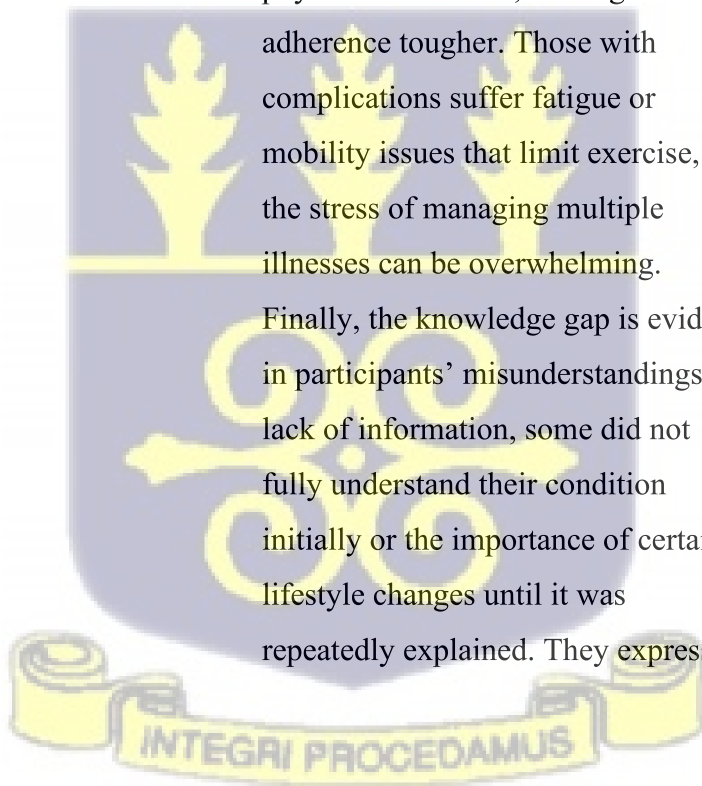
Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	cited lack of knowledge about what to do (46.3%) and lack of motivation (42.5%) as barriers. Smaller but noteworthy subsets reported medication side effects (19.1%) and lack of family/social support (11.7%) hindering their adherence. Objective data reflects some of these challenges: for instance, only 27% of patients demonstrated *adequate knowledge* about hypertension management (with many unaware of blood pressure targets or risks), and social support metrics showed that most patients had very limited engagement in support groups (only 7.6% in a support group) and infrequent social interactions related to their health. Furthermore, clinical	certain drugs, so that's one challenge I face." - P2; *vegetables and healthy foods "are expensive these days"* - P5). Cultural dietary habits and preferences also pose a challenge: many patients are deeply accustomed to traditional diets (e.g., kenkey, fufu, yam) and resist changing these habits, even when advised otherwise, resulting in only minor dietary modifications. This resistance is rooted in both preference and belief, some trust traditional or herbal remedies and are skeptical about entirely relying on prescribed regimens. In the interviews, a few patients admitted to exploring herbal or spiritual "cures" and being uncertain about how they interact	confirmed by the high percentage citing finances as an issue and echoed in personal stories. Knowledge deficits also align – the low hypertension knowledge scores and patients' confusion over treatment options (e.g., mixing herbs with drugs) highlight that incomplete understanding undermines adherence. This suggests a need for better patient education as a remedy. Furthermore, cultural and social factors are prominent: patients' attachment to traditional foods and remedies, as well as variable social support, correspond with the relatively fewer patients getting family help or joining support groups. These cultural barriers mean that adherence

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	and demographic factors underline certain challenges. Patients with *comorbid conditions* had significantly lower odds of adhering to medication (OR 0.54, p<.01) and of maintaining normal blood glucose (OR 0.45, p<.05) compared to those without comorbidities, suggesting that managing multiple health issues is more difficult. Likewise, *older age* was associated with higher odds of uncontrolled blood pressure (each higher age group increased the risk, OR 1.75, p<.01), indicating that older patients struggle more with blood pressure control (potentially due to long-term disease severity or difficulties maintaining lifestyle changes).	with their medications ("Sometimes you want to take herbal medicine, and you don't know if you can add it to your hospital-given drugs." - P3). Such beliefs, influenced by cultural narratives, can lead to inconsistent adherence (one patient recounted a peer who abandoned clinical care for a spiritual remedy – P5). Another barrier frequently mentioned was the lack of robust support networks. While some receive help from family, others live with limited assistance ("My support system is not helping me... I don't get anyone to support me." - P7). This can affect motivation and the practical ability to maintain lifestyle changes (for example, having no one to help with healthy meal	strategies must be culturally sensitive and include family/community where possible. The data also emphasize personal health factors – those who are older or have comorbidities face compounded challenges, likely requiring more tailored support (e.g., integrated care for multiple conditions, exercise plans adapted to physical ability). In summary, the integrated inference is that adherence is a multifaceted challenge: structural-economic barriers (poverty), informational barriers (limited knowledge), cultural barriers (traditional beliefs and habits), and personal barriers (lack of support, health limitations) all intersect. Effective interventions must address

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
		preparation or encouragement). Health-related challenges also emerged: patients with long-standing disease or multiple conditions often experience more complications and physical limitations, making adherence tougher. Those with complications suffer fatigue or mobility issues that limit exercise, and the stress of managing multiple illnesses can be overwhelming. Finally, the knowledge gap is evident in participants' misunderstandings or lack of information, some did not fully understand their condition initially or the importance of certain lifestyle changes until it was repeatedly explained. They expressed	these layers, for instance, providing affordable medication/food options, continuous education, engaging culturally appropriate counseling, and strengthening support networks – to improve lifestyle adherence among CVD patients in this context.


INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
		that more education could help overcome this barrier.	
Healthcare providers' experiences in supporting patient adherence to a healthy lifestyle.	Healthcare providers generally reported that they prioritize lifestyle counseling as part of managing CVD patients, but they also identified significant challenges in doing so. In a survey of health workers (N=10), 90% said they regularly recommend dietary changes to their patients, and around 70% promote medication adherence and weight management strategies. Approximately half of the providers also encourage increased physical activity, advise on smoking cessation, and teach stress management techniques, indicating that most providers are attempting a comprehensive approach to lifestyle	Providers' efforts as perceived by patients are appreciated but appear uneven due to practical constraints. Patients noted that doctors and nurses do give advice on lifestyle ,example, instructing them on diet ("My doctor advised me not to eat heavy meals at night and to cut down salt." - as commonly reported) and stressing medication adherence and stress reduction. Some patients described their healthcare providers as supportive and informative when time permits ("Sometimes you meet a doctor who explains and answers all your questions…" -P3), indicating that providers *do* share their expertise	Integrated inference: Healthcare providers are keenly aware of the importance of lifestyle modification and actively incorporate advice on diet, exercise, and medication adherence into patient care, which is confirmed by both their self-report and patients recalling such guidance. However, there is a clear convergence on the challenges: providers point to *lack of time, resources, and patient socioeconomic difficulties*, and patients indeed observe that detailed lifestyle counseling is not always forthcoming at visits. This indicates a constraint in healthcare delivery rather than lack of provider

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	modification advice. However, providers face systemic constraints: about 70% reported insufficient consultation time with patients, which limits the depth of counseling they can provide. Additionally, 60% observed that patients' low socioeconomic status hampers adherence (e.g., inability to afford healthy food or medication), reflecting providers' awareness of external barriers. Around 50% of providers felt they lack resources or materials (like patient education tools) and that more training in lifestyle counseling would help. 30% noted a lack of patient motivation as a challenge in their experience, and a small number (10%) admitted they	and encourage lifestyle changes. Patients especially value these interactions, suggesting that providers' counseling is effective when it happens. On the other hand, the interviews also hinted at the time pressure and workload providers face: not all patients get detailed counseling at every visit ("Others [health staff] go straight to the point and talk about your current condition [only]." - P3). This corresponds to providers' own reports of limited time. Patients' desire for more frequent education (daily, even briefly) implies that currently, educational support is not as regular as they need , likely because providers cannot routinely accommodate it under their time	knowledge or intent. Both perspectives suggest that providers' impact could be enhanced if systemic issues are addressed , for example, by allowing longer consultation times, providing educational materials or counseling support services (nutritionists, counselors), and connecting patients to support groups or community resources. Providers' call for multidisciplinary support and additional training resonates with the complex needs of patients (who face dietary, psychological, and social challenges). Thus, the experiences illustrate a gap between knowing what to advise and having the capacity to ensure it is conveyed and reinforced. Strengthening healthcare

INTEGRI PROCEDAMUS

Research Question	Quantitative Findings (Survey/Clinical Data)	Qualitative Findings (Patient Interviews)	Integrated Interpretation (Meta-Inference)
	personally have insufficient training in lifestyle counseling. When asked what would help them support patients better, 70% called for *support from other health professionals* (suggesting a team approach), and about 50% wanted *more patient education materials, more time with patients,* additional *training*, and establishment of *patient support groups* to reinforce lifestyle advice outside the clinic.	constraints. No patients mentioned provider-led support groups or follow-up beyond clinic visits, which aligns with providers identifying the lack of such extended support structures. In sum, from the patient perspective, healthcare workers are knowledgeable and willing to help, but their ability to consistently provide thorough lifestyle support is curtailed by competing demands in the healthcare setting.	systems (through team-based care, training, and resources) and community linkage can empower providers to more effectively support patients' healthy lifestyle adherence, ultimately bridging the current gap noted in both the quantitative and qualitative evidence.

University of Ghana http://ugspace.ug.edu.gh

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This study seeks to assess the adherence of patients diagnosed with cardiovascular diseases to a healthy lifestyle and medications, with a focus on factors influencing adherence levels. This chapter provides detailed discussion of study findings. Relevant and recent literature has been used to compare findings.

5.1 Overview of the Results

The findings from the MARS-10 scale assessment provide insights into medication adherence patterns among participants. A notable proportion, 31.5%, reported forgetting to take their medication, while a smaller group, 12.9%, admitted to being careless about taking it. Additionally, 11.9% sometimes stop medication when feeling better, and 7.6% only take it when they feel sick. On the positive side, a large majority (86.2%) had a clear understanding of the importance of staying on medication, with 81.9% acknowledging its role in preventing illness. Furthermore, most participants did not experience adverse effects; 95% did not feel "zombie-like," and 82.3% did not feel tired or sluggish from taking medication. Overall, 71.6% of the participants adhered to their prescribed medication regimen, while 28.4% did not adhere, as reflected by the confidence intervals (95% CI: 67.0–75.8% for adherence and 24.2–32.9% for non-adherence). These results highlight both strengths in adherence and specific areas where adherence could be improved.

The findings on adherence to a healthy lifestyle among participants show encouraging levels of compliance in several areas, alongside opportunities for improvement. Nearly all participants (98.8%) were non-smokers or had quit smoking, indicating high adherence to smoking cessation. Additionally, 80% of participants felt able to cope with their environment,

University of Ghana http://ugspace.ug.edu.gh

suggesting strong psychological or environmental resilience. In terms of alcohol consumption, 70% were not current drinkers, reflecting a substantial avoidance of alcohol. Physical activity was also relatively common, with 66.8% of participants engaging in regular exercise. Dietary adherence was somewhat lower; while 65.2% consumed a balanced diet, only 28.4% reported limiting their salt intake. These findings highlight a strong commitment to non-smoking, environmental coping, and moderate levels of physical activity and balanced diet adherence, yet they suggest room for improved awareness and adherence regarding salt intake in particular.

The findings also revealed that participants' knowledge of hypertension is limited overall, with only 27% demonstrating adequate understanding, while 73% have inadequate knowledge. Specifically, only 34.6% correctly identified the clinical blood pressure threshold for hypertension (systolic ≥140 and diastolic ≥90 mmHg). Awareness of hypertension symptoms is mixed; only 45.8% disagreed with the misconception that high blood pressure can be detected by feeling unwell, and just 13.8% knew that hypertension often presents without symptoms. While 93.8% recognized that uncontrolled hypertension could lead to diabetes, only 23.9% knew it could result in kidney failure. Risk factor awareness varied, with 51.8% acknowledging weight gain as a hypertension risk factor, 96.4% understanding the impact of alcohol, and 93.3% linking high sodium intake to hypertension. Regarding lifestyle management, 81.7% agreed on the importance of consuming fewer calories to lose weight, and 89.5% knew regular exercise could help reduce blood pressure. Additionally, 94.3% understood that hypertension treatment often requires lifelong medication. Overall, the findings indicate strong knowledge in specific areas like lifestyle management and the asymptomatic nature of hypertension, but significant gaps remain, particularly regarding symptom awareness, hypertension complications, and clinical definitions.

The research findings also indicates that while most participants (42.7%) have a small social circle of 1-2 friends, social interactions tend to be limited, with 53.7% interacting with friends

University of Ghana http://ugspace.ug.edu.gh

or family outside the home less than once a week, and 60.1% engaging in social or community activities at the same frequency. Support for specific needs varies: 63% have regular help with household chores or daily activities, but only 40.8% receive occasional assistance with transportation for medical appointments. Participation in formal support groups is low, with only 7.6% involved in groups for cardiovascular-related conditions. Despite these limitations, 64.2% report being somewhat satisfied with the support received from friends and family for their health, and nearly half (48.5%) receive encouragement or emotional support on cardiovascular health several times a week. These results highlight a generally supportive social environment but suggest limited frequency of broader social engagement.

The strategies and interventions for healthy lifestyle adherence adopted among participants show high engagement in educational and lifestyle-focused activities. A majority (75.7%) have attended educational programs on cardiovascular disease, while even higher proportions engage in regular physical activity (81.6%), maintain a healthy diet (93.3%), and adhere to medication (90.2%). However, participation in smoking cessation (35.3%) and stress management programs (17.2%) is notably lower. In terms of perceived effectiveness, more than half (60.3%) view medication adherence as highly effective, followed by healthy diet (49.9%), smoking cessation (49.1%), regular physical activity (39.2%), and stress management techniques (34.7%). These results highlight a strong focus on diet, physical activity, and medication adherence, with room for increased emphasis on smoking cessation and stress management.

The findings indicate that participants encounter several barriers to adhering to recommended lifestyle modifications. Financial constraints were the most common challenge, affecting 66.4% of participants. Additionally, lack of knowledge (46.3%) and low motivation (42.5%) were significant obstacles to lifestyle adherence. Fewer participants reported medication side effects (19.1%) and insufficient support from family and friends (11.7%) as challenges. These

University of Ghana http://ugspace.ug.edu.gh

findings suggest that while financial issues and knowledge gaps are the predominant barriers, other factors like motivation and social support also play roles in limiting adherence to lifestyle changes.

The study's qualitative findings reveal several key influences on participants' adherence to lifestyle changes. Many maintain traditional dietary habits, with only minor adjustments, showing resistance to significant dietary shifts. Cultural beliefs strongly shape health practices, often favouring traditional remedies over clinical advice. Participants value health education but find it infrequent, expressing a need for brief, ongoing sessions to support adherence. Exercise is limited by age or health, leading to lighter activity adaptations. Personalized strategies are adopted to reduce the disease burden, with strong support from family and friends playing a crucial role in adherence. However, financial, motivational, and informational barriers present significant challenges to following lifestyle modifications. These factors collectively highlight a complex environment influencing participants' health management.

The findings also reveal several challenges healthcare workers face in promoting healthy lifestyle recommendations to patients. (70%) of participants report insufficient consultation time, which limits their ability to provide comprehensive guidance. Additionally, 60% attribute patients' low adherence to their socioeconomic status, suggesting that financial barriers play a major role. Resource constraints affect half (50%) of the healthcare workers, while 30% indicate that lack of motivation from patients makes lifestyle counselling more challenging. Furthermore, 10% of providers cite insufficient training in lifestyle counselling, highlighting a gap in skills essential for encouraging healthy behaviours. These barriers collectively underscore the need for more time, resources, and training to support healthcare workers in promoting lifestyle changes effectively.

University of Ghana http://ugspace.ug.edu.gh

5.2 Findings Compared with Previous Studies

Adherence to Healthy lifestyle modifications among people living with CVD

Lifestyle adjustments have a significant impact on cardiovascular health. Implementing good behaviors like regular physical activity, a balanced diet, quitting smoking, managing stress, and getting enough sleep can greatly reduce the incidence of CVDs and improve overall cardiovascular health (Ghodeshwar et al., 2023). In this study, most participants made healthy lifestyle choices: 98.8% were non-smokers, 70% did not drink alcohol, and 66.8% were physically active. Additionally, 65.2% ate a balanced diet, but only 28.4% limited their salt intake. These findings were inconsistent with what was recently reported among the Ghanian population where 8.6% reported using tobacco, 48.9% alcohol, 83.7% physically inactive, 81.4% and 84.9% inadequate fruit and vegetable intake, respectively (Agyekum et al., n.d.). These disparities could be attributed to the fact that the current study was conducted in a health facility, which could increase adapting healthy lifestyle due to consultations, counselling and health education compared to the study conducted by Agyekum et al. (2024) where the study was conducted in the community. However the study's findings is consistent with Obirikorang et al. (2018) study findings; 72.0% of the patient were adherent to life style modification. Although a significant proportion of participants in this study improved their lifestyle habits, they were not able to control their blood pressure, sugar levels and salt intake. This is in line with other studies assessing lifestyle habits at one timepoint after a CVD event.

Adherence to medication and recommended healthy lifestyle among patients

Cardiovascular medications are essential for secondary prevention of coronary artery disease (CAD). However, the effectiveness of cardiovascular therapy may be determined by patients' ideal adherence. In this study, 7 in 10 patients adhered to their medication. This rate, while substantial, is lower than the 89.2% adherence reported in a survey among hypertensive patients in Ghana, where factors such as patients' knowledge of their condition and perceptions

University of Ghana http://ugspace.ug.edu.gh

of severity significantly influenced adherence (Sarkodie et al., 2020). Contrasting with another study from Ghana, which noted a remarkably low adherence rate of 6.7% among hypertensive patients influenced by locus of control and medication side effects (Kretchy et al., 2014). The current study's findings are also higher than what was reported in a global systematic review, where it was found that, only 60% of patients were adherence to their cardiovascular medications (Chowdhury et al., 2013) and in a cross-sectional study 33.5% (Jarrah et al., 2023). Another study conducted in Australia among patients with cardiovascular diseases reported adherence of patients to medication was 64.3% (Al-Ganmi et al., 2019). Findings from this study was however similar to what was previously reported in Saudi Arabia where 74% of patients were adherent to medications (Al-Asmari & Ismail, 2023). The variations in adherence rates found in these studies could be attributed to disparities in health-care quality and access. As a result, countries with better access to health care may report higher adherence rates. This divergence in adherence rates highlights the variability based on factors like socio-demographic characteristics, healthcare access, and psychological factors, emphasizing the need for context-specific adherence interventions. Furthermore, the significant adherence rate reported in this study could be attributed to differences in illness duration; the majority of the patients had been diagnosed with heart disease for more than 5 years prior. Previous research has shown that increasing the duration of treatment can enhance adherence rates (Fitz-Simon et al., 2005; Mekonnen et al., 2017).

Strategies and interventions adopted by patient to promote adherence to healthy lifestyle

Getting patients to adhere to lifestyle recommendations can be quite challenging in health practice. More than half 228 (60.3%) found adherence to medication very effective compared to regular physical activity 134 (39.2%), healthy diet 195 (49.9%) , though few engaged in stress management programmes. This finding is consistent with what was reported in a

University of Ghana http://ugspace.ug.edu.gh

systematic review, where taking part in nutrition education programme was an identified strategy (Vanzella et al., 2021). In the qualitative findings, receiving domestic and financial support from family members and friends played a role in assisting patients with their daily needs and alleviating some of the burdens associated with managing their health. Findings of this study is consistent with what was reported in a systematic review, where it was noted that, conducting a lifestyle intervention using health education could improve lifestyle factors, such as reducing salt, sodium, and fat intake, changing eating habits to include more fruits and vegetables, not smoking, consuming less alcohol, exercising regularly, maintaining healthy body weight, and minimizing stressful conditions (Ojangba et al., 2023). Another study has shown moderate to large effect of educational intervention on adherence to lifestyle modifications and blood pressure control (Tam et al., 2020). These studies suggest that education-based strategies not only promote better adherence to healthy lifestyle changes but also play a critical role in managing chronic conditions like cardiovascular disease. This reinforces the idea that comprehensive health education, combined with family support, is vital for long-term patient success in disease management and overall well-being.

Barriers and challenges affecting adherence to recommended healthy lifestyle

The significant prevalence of harmful lifestyle habits following a CVD occurrence may indicate that preventative strategies were not implemented effectively. This study identified several challenges affecting adherence to recommended healthy lifestyle among patients with CVD. Major barriers identified include, inadequate knowledge, financial constraints and motivation as well as lack of support from family and friends align closely with the barriers found in other studies on lifestyle modification and chronic disease management in Ghana. Financial Constraints found to be the primary barrier reported by 66.4% of participants in the findings is mirrored in other studies in Ghana, where financial limitations prevent access to necessary resources for lifestyle changes, such as healthier food options, exercise facilities, or

University of Ghana http://ugspace.ug.edu.gh

essential medical devices like glucometers (Akumiah et al., 2017; Mogre et al., 2020). A study among hypertensive patients in Ghana found that high costs and limited income significantly impacted the ability to adhere to prescribed lifestyle modifications and medication (Atinga et al., 2018). In this study only, 20% of patients had adequate knowledge on CVD. This lack of knowledge could be a critical factor in hindering effective adherence to healthy lifestyle behaviors. Other Studies found 46.3% of knowledge gaps and emphasize the need for education on specific types of exercise and diet that can support patients in managing their conditions effectively (Obirikorang, Obirikorang, Acheampong, Anto, Amoah, Fosu, Amehere, Batu, Brenya, Amankwaa, Adu, Akwasi, & Asiwu, 2018). Even if patients are motivated to follow recommended lifestyle changes, inadequate understanding of the interventions and their importance may prevent them from fully engaging in or sustaining these practices. This emphasizes the need for comprehensive educational strategies that not only provide information but also ensure that patients grasp the relevance and application of lifestyle modifications. Effective patient education should therefore be a key component of interventions aimed at improving adherence and ultimately, health outcomes in CVD management. This study found low motivation (42.5%) as psychological barrier that affects adherence, particularly in adopting long-term lifestyle changes such as diet and exercise routines. Akumiah et al., (2017) indicates that, motivation is crucial, as many patients report difficulty in maintaining consistent lifestyle changes due to competing personal and professional demands. Enhancing motivation through support mechanisms, goal setting, and counseling is suggested as a potential solution in the literature. Although medication side effects is less prominent in this study (19.1%), medication side effects remain a noted barrier. Obirikorang et al., (2018) also reported participants often turn to alternative therapies when experiencing side effects from prescribed medications, further complicating adherence to lifestyle and medical recommendations. This study found that insufficient support from family

University of Ghana http://ugspace.ug.edu.gh

and friends (11.7%) hinders adherence to lifestyle modifications. Social support has been highlighted as a critical component in adherence, as it influences both motivation and the ability to implement lifestyle changes sustainably. This emphasize the role of community and family encouragement in adherence, noting cultural and social influences as potential barriers when support is lacking. In this study only, 20% of patients had adequate knowledge on CVD. This lack of knowledge could be a critical factor in hindering effective adherence to healthy lifestyle behaviors. Even if patients are motivated to follow recommended lifestyle changes, inadequate understanding of the interventions and their importance may prevent them from fully engaging in or sustaining these practices. This emphasizes the need for comprehensive educational strategies that not only provide information but also ensure that patients grasp the relevance and application of lifestyle modifications. Effective patient education should therefore be a key component of interventions aimed at improving adherence and ultimately, health outcomes in CVD management.

Experience of healthcare providers in managing patients with CVD

In managing patients with CVD, health workers face major barriers and challenges. This research findings highlight substantial challenges health workers face in recommending and supporting healthy lifestyle modifications, with 70% citing insufficient time for consultations and 60% attributing poor adherence to socioeconomic factors of patients. These align with barriers identified in other studies in Ghana such as inadequate collaboration among healthcare professionals, shortages of resources and medications and limited training particularly in managing hypertension and other non-communicable diseases all of which hinder effective health promotion (Laar et al., 2019; Nyaaba et al., 2020). Similarly, 50% of health workers lacked resources to support lifestyle changes, and 10% felt insufficiently trained, mirroring the inadequacies in health professional capacity and training discussed in this Ghanaian-focused studies (Laar et al., 2019; Nyaaba et al., 2020). Time constraints are critical in managing

University of Ghana http://ugspace.ug.edu.gh

chronic conditions like CVD, which require detailed lifestyle counseling, patient education, and adherence monitoring. Without sufficient time, healthcare providers may only focus on the most pressing aspects of care, such as medication adherence and weight management, while neglecting important lifestyle interventions like stress management and physical activity. Socioeconomic factors such as inability to afford medications also emerge as a critical challenge, with 60% of healthcare providers attributing poor adherence to the socioeconomic status of patients. This finding is consistent with what was reported in a qualitative study where it was reported that, patient challenges impede the effective management of CVD (Kgatla et al., 2021). In addition, the lack of resources and motivation, as reported by 50% and 30% of healthcare providers respectively, reflects both structural and patient-related challenges in CVD management. This finding is similar to what was reported in a previous study where the need to resources were found to be vital in the managing of CVD (Schwalm et al., 2016). Limited resources prevent healthcare providers from offering the necessary support, such as access to educational materials, diagnostic tools, or follow-up services. At the same time, patient motivation plays a critical role in adherence to lifestyle modifications, and a lack of patient engagement can significantly hinder the success of interventions (Krist et al., 2017; Paterick et al., 2017). The study also highlights a gap in training, with 10% of healthcare providers reporting insufficient education in lifestyle counseling. This is particularly concerning given the central role of lifestyle modifications in managing CVD. Nurses and other healthcare providers must be equipped with the knowledge and skills to effectively counsel patients on exercise, stress reduction, and smoking cessation.

5.7 Limitations of the study

This was a facility-based study hence the study might have surveyed or interviewed patients who are already compliant or adherent to medication and lifestyle modifications. This can lead

University of Ghana http://ugspace.ug.edu.gh

to missing out patients who might not be compliant if the study was to be a community based research.

University of Ghana http://ugspace.ug.edu.gh

CHAPTER SIX

CONCLUSION

6.1 Introduction

In this study, most participants made healthy lifestyle choices: 98.8% were non-smokers, 70% abstained from alcohol, and 66.8% engaged in physical activity. While 65.2% maintained a balanced diet, only 28.4% restricted salt intake. A small percentage had normal fasting blood glucose (8.3%) and controlled blood pressure (5.5%). Overall, only 27% of participants had adequate knowledge on hypertension whiles 73% had inadequate knowledge on hypertension. Medication adherence was observed in 70% of patients. Various strategies and interventions were adopted to support healthy lifestyle adherence among participants. A majority participated in educational programs (75.7%), engaged in regular physical activity (81.6%), consumed a healthy diet (93.3%), adhered to medication (90.2%), and practiced stress management (17.2%). Smoking cessation was less common, with only 35.3% of former smokers engaging in such programs. Medication adherence was considered the most effective strategy by 60.3% of participants. Despite these efforts, participants faced significant challenges, with financial constraints being the most prevalent (66.4%), followed by lack of knowledge (46.3%) and low motivation (42.5%). These barriers highlight the need for more targeted support and resources to improve adherence to lifestyle modifications.

The study shows a high level of commitment among participants to healthy lifestyle choices, such as abstaining from smoking and alcohol and maintaining physical activity. However, there are notable gaps in knowledge, behavioral adherence, and clinical outcomes:

Lifestyle Adherence: The study highlights strong engagement in positive lifestyle behaviors, with high rates of abstinence from smoking (98.8%) and alcohol (70%) and a relatively high

University of Ghana http://ugspace.ug.edu.gh

percentage practicing physical activity (66.8%). Yet, specific behavioral changes, such as salt restriction, were low (28.4%), which may be critical given its link to hypertension management.

Clinical Markers: Despite the healthy lifestyle choices, only a small percentage of participants had normal fasting blood glucose (8.3%) and controlled blood pressure (5.5%). This indicates a disconnect between lifestyle adherence and the control of clinical markers, which could suggest either the severity of underlying health issues or the inadequacy of the lifestyle changes to address clinical goals alone.

Knowledge and Education: A significant portion of participants (73%) had inadequate knowledge about hypertension. This gap could impact their ability to manage or adhere to treatment regimens effectively. While many participated in educational programs (75.7%), the results show a potential gap in the quality or effectiveness of the knowledge transfer.

Medication Adherence: Medication adherence was high at 70%, and a majority (60.3%) identified it as the most effective strategy. This suggests a strong reliance on pharmacological support over lifestyle modifications in managing health conditions.

Barriers to Adherence: Financial constraints (66.4%), lack of knowledge (46.3%), and low motivation (42.5%) were major barriers, indicating the need for additional support structures, particularly in economically disadvantaged populations.

6.2 Implication of the study

Policymakers and Policy-making

The findings of this study suggest the need for policies that address financial barriers and improve access to affordable medications and healthcare resources for cardiovascular disease (CVD) management. Policymakers should also prioritize funding for training health workers in lifestyle counseling and also allocate resources to improve consultation time and healthcare infrastructure, ensuring that socioeconomic factors do not hinder patient adherence.

University of Ghana http://ugspace.ug.edu.gh

Investment in Preventive Education: Policy makers should support improved, targeted educational interventions on hypertension and lifestyle modifications to bridge the knowledge gap (73% had inadequate knowledge). This may require community-based educational campaigns and inclusion of health literacy in school curricula.

Financial Support Programs: With financial constraints affecting 66.4% of participants, policies should focus on subsidizing medication and lifestyle intervention programs. Policymakers could work toward integrating these interventions into universal healthcare packages to alleviate the financial burden on low-income individuals.

Emphasis on Multifaceted Health Strategies: Given the mixed results in clinical markers despite lifestyle adherence, policymakers should consider mandating a more integrative approach, including both medication adherence and accessible lifestyle programs, particularly for chronic conditions.

Public health

This study emphasises the importance of public health initiatives that improve patient education and motivation for CVD prevention and management. Public health initiatives should emphasise lifestyle improvements including quitting smoking, increasing physical exercise, and making dietary modifications, while also addressing socioeconomic and motivational hurdles to long-term adherence.

Enhanced Public Awareness Campaigns: Addressing the knowledge gap in hypertension management should be a public health priority. Public health initiatives could increase awareness on salt intake, stress management, and regular monitoring of blood pressure, especially in underserved communities.

Community-Based Interventions: With high levels of engagement in physical activity and educational programs, public health initiatives could expand access to community-based physical fitness programs and nutrition education that address key areas like salt reduction.

University of Ghana http://ugspace.ug.edu.gh

Tailored Behavioral Support Programs: Given that motivation and financial challenges are substantial barriers, public health practitioners could develop tailored programs addressing the psychosocial aspects of chronic disease management. Support groups, motivational interviewing, and targeted financial resources may enhance engagement.

Creating Community-Based Support Networks: Public health initiatives should focus on building local networks that offer peer support, group exercise programs, and dietary guidance. Leveraging community support may provide a sustainable solution for individuals struggling with motivation and access to resources.

Clinical Practice

Healthcare workers must be equipped with the necessary resources and training to efficiently counsel patients on lifestyle modifications. This entails allocating sufficient time for consultations, delivering precise instructions on drug adherence, and resolving issues with patient motivation and socioeconomic circumstances. In therapeutic settings, increasing patient participation through support networks can improve adherence to healthy behaviours.

Comprehensive Patient Education: Clinicians could prioritize patient education as part of routine care, particularly for chronic conditions. Providing structured counseling on diet, salt intake, and other modifiable risk factors could help improve outcomes.

Routine Monitoring and Feedback Mechanisms: Since lifestyle adherence did not translate to clinical improvements in all cases, clinicians should implement regular monitoring of key markers (e.g., blood glucose and blood pressure) and give feedback to patients to improve their understanding of the impacts of lifestyle on health.

Integration of Lifestyle and Pharmacological Support: Given the reliance on medication adherence, clinicians should combine pharmacological treatments with lifestyle counseling, offering practical steps and resources to address barriers like financial and motivational challenges.

University of Ghana http://ugspace.ug.edu.gh

Integrating Behavioural Support into Clinical Care: Clinicians should be equipped with resources to provide ongoing behavioural support, such as motivational counseling, goal-setting strategies, and access to support groups. This can help address psychosocial barriers, such as low motivation and lack of social support, which impact adherence.

Future Research

Future studies should focus on identifying strategies to overcome financial, motivational, and educational barriers and assess the impact of tailored interventions on patient outcomes. Additionally, future research could examine the role of family and community support in promoting lifestyle changes.

Exploring the Link Between Lifestyle Choices and Clinical Outcomes: Since high adherence to healthy behaviors did not translate to well-controlled blood glucose and blood pressure levels, future research should investigate the factors contributing to this disconnect. This could include examining the quality and type of lifestyle interventions or exploring possible genetic, socioeconomic, or environmental factors that may affect clinical outcomes despite adherence. Further research should explore the effectiveness of interventions in improving patient adherence to healthy lifestyle

Understanding Knowledge Gaps and Educational Efficacy: With 73% of participants showing inadequate knowledge on hypertension, future studies could investigate the efficacy of different educational methods, focusing on identifying which approaches (e.g., digital platforms, group sessions, individual counseling) are most effective in improving knowledge retention and subsequent behavioral changes.

INTEGRI PROCEDAMUS

Addressing Psychosocial and Financial Barriers: Research could focus on developing and testing interventions to overcome barriers such as financial constraints, low motivation, and lack of knowledge. Specifically, studies could explore which types of financial aids,

University of Ghana http://ugspace.ug.edu.gh

motivation-enhancing techniques (like goal setting or peer support), and educational interventions are most effective in sustaining lifestyle modifications in diverse populations.

Evaluating the Long-Term Effectiveness of Lifestyle Interventions: Research should also focus on longitudinal studies to assess the long-term effects of lifestyle changes on clinical outcomes and the sustainability of adherence. Understanding how behaviors fluctuate over time and identifying key factors for sustained adherence could inform more durable lifestyle intervention programs.

Investigating the Role of Personalized Approaches: Given the variation in adherence and effectiveness among participants, future research should explore personalized lifestyle interventions based on individual needs, health literacy levels, and socioeconomic backgrounds. This would help in tailoring interventions to maximize effectiveness.

Comparing Medication vs. Lifestyle Interventions: Given the high reliance on medication adherence, studies comparing the effectiveness of lifestyle-only interventions versus medication-supported approaches could provide insights into the optimal balance of interventions for managing chronic conditions like hypertension.

6.3 Recommendations to healthcare management

- Health workers should be provided with continus training and capacity building avenues to improve patient education and communication about cardiovascular disease (CVD) management. This training should focus on effectively conveying the importance of lifestyle changes and adherence to treatment.
- To address challenges related to patient support, health workers should be equipped with strategies to involve family members and support networks in patient care. Hospital management should facilitate the creation of support groups and networks that provide emotional and practical assistance.

University of Ghana http://ugspace.ug.edu.gh

- Hospital management and health workers should promote and facilitate participation in lifestyle improvement programs and utilize motivational techniques to boost patient adherence.

University of Ghana http://ugspace.ug.edu.gh

REFERENCES

Abate, N. (2000a). Obesity and cardiovascular disease. Pathogenetic role of the metabolic syndrome and therapeutic implications. *Journal of Diabetes and Its Complications*, *14*(3), 154–174. https://doi.org/10.1016/S1056-8727(00)00067-2

Abate, N. (2000b). Obesity and cardiovascular disease. Pathogenetic role of the metabolic syndrome and therapeutic implications. *Journal of Diabetes and Its Complications*, *14*(3), 154–174. https://doi.org/10.1016/S1056-8727(00)00067-2

Addo, J., Smeeth, L., & Leon, D. A. (2007). Hypertension In Sub-Saharan Africa. *Hypertension*, *50*(6), 1012–1018. https://doi.org/10.1161/HYPERTENSIONAHA.107.093336

Aggarwal, M., Bozkurt, B., Panjrath, G., Aggarwal, B., Ostfeld, R. J., Barnard, N. D., Gaggin, H., Freeman, A. M., Allen, K., Madan, S., Massera, D., & Litwin, S. E. (2018). Lifestyle Modifications for Preventing and Treating Heart Failure. *Journal of the American College of Cardiology*, *72*(19), 2391–2405. https://doi.org/10.1016/j.jacc.2018.08.2160

Agyei-Mensah, S., & De-Graft Aikins, A. (2010). Epidemiological transition and the double burden of disease in Accra, Ghana. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, *87*(5), 879–897. https://doi.org/10.1007/S11524-010-9492-Y

Agyekum, F., Folson, A. A., Abaidoo, B., Appiah, L. T., Adu-Boakye, Y., Ayetey, H., & Owusu, I. K. (n.d.). *Behavioural and nutritional risk factors for cardiovascular diseases among the Ghanaian population-a cross-sectional study*. https://doi.org/10.1186/s12889-024-17709-5

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, *22*(5), 453–474. https://doi.org/10.1016/0022-1031(86)90045-4

Akumiah, P. O., Owusu-Akyem, S., Nayembil, D. A., Agyapong, G. O., & Fataw, P. (2017). Medicine and Nursing www.iiste.org ISSN. In *An International Peer-reviewed Journal* (Vol. 39). www.iiste.org

Al-Asmari, F., & Ismail, A. I. H. (2023). Evaluating food safety knowledge and practices among Saudi women in Al-Ahsa Region, Saudi Arabia. *Italian Journal of Food Safety*, *12*(1). https://doi.org/10.4081/ijfs.2023.10716

Alberti, K. G. M. M., Eckel, R. H., Grundy, S. M., Zimmet, P. Z., Cleeman, J. I., Donato, K. A., Fruchart, J.-C., James, W. P. T., Loria, C. M., Smith, S. C., International Diabetes Federation Task Force on Epidemiology and Prevention, Hational Heart, L. and B. I., American Heart Association, World Heart Federation, International Atherosclerosis Society, & International Association for the Study of Obesity. (2009). Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation*, *120*(16), 1640–1645. https://doi.org/10.1161/CIRCULATIONAHA.109.192644

University of Ghana http://ugspace.ug.edu.gh

Al-Ganmi, A. H. A., Al-Fayyadh, S., Abd Ali, M. B. H., Alotaibi, A. M., Gholizadeh, L., & Perry, L. (2019). Medication adherence and predictive factors in patients with cardiovascular disease: A comparison study between Australia and Iraq. *Collegian*, *26*(3), 355–365. https://doi.org/10.1016/j.colegn.2018.10.002

Al-Ganmi, A., Perry, L., Gholizadeh, L., Collegian, A. A.-, & 2018, undefined. (n.d.). Behaviour change interventions to improve medication adherence in patients with cardiac disease: Protocol for a mixed methods study including a pilot. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S1322769617301816?casa_token=-ZgVnB431a8AAAAA:xoXx7qUvKXLLTtsD-mXFIe-DA4jZYEEFuD5kAuKTV8MNHM0BBgquWTF514G6RmtuHmh9IZnAYw

Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., Aldairem, A., Alrashed, M., Bin Saleh, K., Badreldin, H. A., Al Yami, M. S., Al Harbi, S., & Albekairy, A. M. (2023). Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC Medical Education*, *23*(1), 689. https://doi.org/10.1186/s12909-023-04698-z

Appiah, L. T., Sarfo, F. S., Agyemang, C., Tweneboah, H. O., Appiah, N. A. B. A., Bedu-Addo, G., & Opare-Sem, O. (2017). Current trends in admissions and outcomes of cardiac diseases in Ghana. *Clinical Cardiology*, *40*(10), 783–788. https://doi.org/10.1002/clc.22753

Armitage, C., psychology, M. C.-B. journal of social, & 2001, undefined. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *Wiley Online LibraryCJ Armitage, M ConnerBritish Journal of Social Psychology, 2001•Wiley Online Library*, *40*(4), 471. https://doi.org/10.1348/014466601164939

Atinga, R. A., Yarney, L., & Gavu, N. M. (2018). Factors influencing long-term medication non-adherence among diabetes and hypertensive patients in Ghana: A qualitative investigation. *PLoS ONE*, *13*(3). https://doi.org/10.1371/journal.pone.0193995

Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, *1*(3), 385–405. https://doi.org/10.1177/146879410100100307

Banerjee, S., Healthcare, S. H.-I. J. of, & 2020, undefined. (2020). Applying the theory of planned behavior: Examining how communication, attitudes, social norms, and perceived behavioral control relate to healthy lifestyle intention. *Taylor & FrancisS Banerjee, SS HoInternational Journal of Healthcare Management, 2020•Taylor & Francis*, *13*(S1), 496–503. https://doi.org/10.1080/20479700.2019.1605687

Barrera, M., Glasgow, R. E., McKay, H. G., Boles, S. M., & Feil, E. G. (2002). Do Internet-Based Support Interventions Change Perceptions of Social Support?: An Experimental Trial of Approaches for Supporting Diabetes Self-Management. *American Journal of Community Psychology*, *30*(5), 637–654. https://doi.org/10.1023/A:1016369114780

Baymot, A., Gela, D., & Bedada, T. (2022). Adherence to self-care recommendations and associated factors among adult heart failure patients in public hospitals, Addis Ababa, Ethiopia, 2021: cross-sectional study. *BMC Cardiovascular Disorders*, *22*(1), 275. https://doi.org/10.1186/s12872-022-02717-3

University of Ghana http://ugspace.ug.edu.gh

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, *51*(6), 843–857. https://doi.org/10.1016/S0277-9536(00)00065-4

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low Health Literacy and Health Outcomes: An Updated Systematic Review. *Annals of Internal Medicine*, *155*(2), 97. https://doi.org/10.7326/0003-4819-155-2-201107190-00005

Bissonnette, J. M., Bissonnette Mscn, J. M., & Acnp, R. N. (2008). Adherence: a concept analysis. *Wiley Online LibraryJM BissonnetteJournal of Advanced Nursing, 2008•Wiley Online Library*, *63*(6), 634–643. https://doi.org/10.1111/j.1365-2648.2008.04745.x

Bosu, W. K. (2010). Epidemic of hypertension in Ghana: a systematic review. *BMC Public Health*, *10*. https://doi.org/10.1186/1471-2458-10-418

Bosu, W. K. (2022). Accelerating the Control and Prevention of Non-communicable Diseases in Ghana: the Key Issues. *Postgraduate Medical Journal of Ghana*, *2*(1), 32–40. https://doi.org/10.60014/pmjg.v2i1.25

Bosworth, H. B., Granger, B. B., Mendys, P., Brindis, R., Burkholder, R., Czajkowski, S. M., Daniel, J. G., Ekman, I., Ho, M., Johnson, M., Kimmel, S. E., Liu, L. Z., Musaus, J., Shrank, W. H., Buono, E. W., Weiss, K., & Granger, C. B. (2011). Medication adherence: A call for action. *American Heart Journal*, *162*(3), 412–424. https://doi.org/10.1016/j.ahj.2011.06.007

Buja, L., Ottaviani, G., Pathology, R. M.-C., & 2019, undefined. (n.d.). Pathobiology of cardiovascular diseases: an update. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S1054880719302054?casa_token=S7A7hUFittMAAAAA:uWL8K17_LI8jmCmLOa0ZOIjyBPmffBe74AWLAD7aPOcujuUf49TICWV978Jfq4wJxIxSUNhqcA

Buttar, H., Li, T., cardiology, N. R.-E. & clinical, & 2005, undefined. (n.d.). Prevention of cardiovascular diseases: Role of exercise, dietary interventions, obesity and smoking cessation. *Ncbi.Nlm.Nih.GovHS Buttar, T Li, N RaviExperimental & Clinical Cardiology, 2005•ncbi.Nlm.Nih.Gov*. Retrieved November 13, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2716237/

Chan, R. H. M., Gordon, N. F., Chong, A., & Alter, D. A. (2008). Influence of Socioeconomic Status on Lifestyle Behavior Modifications Among Survivors of Acute Myocardial Infarction. *American Journal of Cardiology*, *102*(12), 1583–1588. https://doi.org/10.1016/j.amjcard.2008.08.022

Chowdhury, R., Khan, H., Heydon, E., Shroufi, A., Fahimi, S., Moore, C., Stricker, B., Mendis, S., Hofman, A., Mant, J., & Franco, O. H. (2013). Adherence to cardiovascular therapy: a meta-analysis of prevalence and clinical consequences. *European Heart Journal*, *34*(38), 2940–2948. https://doi.org/10.1093/eurheartj/eht295

Clark, A. M., DesMeules, M., Luo, W., Duncan, A. S., & Wielgosz, A. (2009a). Socioeconomic status and cardiovascular disease: Risks and implications for care. In *Nature Reviews Cardiology* (Vol. 6, Issue 11, pp. 712–722). https://doi.org/10.1038/nrcardio.2009.163

University of Ghana http://ugspace.ug.edu.gh

Clark, A. M., DesMeules, M., Luo, W., Duncan, A. S., & Wielgosz, A. (2009b). Socioeconomic status and cardiovascular disease: Risks and implications for care. In *Nature Reviews Cardiology* (Vol. 6, Issue 11, pp. 712–722). https://doi.org/10.1038/nrcardio.2009.163

Correa, V. C., Lugo-Agudelo, L. H., Aguirre-Acevedo, D. C., Contreras, J. A. P., Borrero, A. M. P., Patiño-Lugo, D. F., & Valencia, D. A. C. (2020). Individual, health system, and contextual barriers and facilitators for the implementation of clinical practice guidelines: A systematic metareview. *Health Research Policy and Systems*, *18*(1). https://doi.org/10.1186/S12961-020-00588-8

Coventry, P. A., Fisher, L., Kenning, C., Bee, P., & Bower, P. (2014). Capacity, responsibility, and motivation: A critical qualitative evaluation of patient and practitioner views about barriers to self-management in people with multimorbidity. *BMC Health Services Research*, *14*(1). https://doi.org/10.1186/S12913-014-0536-Y

Creswell, J. W. (2011). Controversies in mixed methods research. In *The Sage handbook of qualitative research* (pp. 269–284).

De-Graft Aikins, A., Kushitor, M., Koram, K., Gyamfi, S., & Ogedegbe, G. (2014). Chronic non-communicable diseases and the challenge of universal health coverage: Insights from community-based cardiovascular disease research in urban poor communities in Accra, Ghana. In *BMC Public Health* (Vol. 14, Issue SUPPL. 2). BioMed Central Ltd. https://doi.org/10.1186/1471-2458-14-S2-S3

Deka, P., Pozehl, B., Williams, M. A., & Yates, B. (2017). Adherence to recommended exercise guidelines in patients with heart failure. *Heart Failure Reviews*, *22*(1), 41–53. https://doi.org/10.1007/s10741-016-9584-1

DiMatteo, M. R. (2004). Social Support and Patient Adherence to Medical Treatment: A Meta-Analysis. *Health Psychology*, *23*(2), 207–218. https://doi.org/10.1037/0278-6133.23.2.207

Ding, D., Chong, S., Jalaludin, B., Comino, E., & Bauman, A. E. (2015). Risk factors of incident type 2-diabetes mellitus over a 3-year follow-up: Results from a large Australian sample. *Diabetes Research and Clinical Practice*, *108*(2), 306–315. https://doi.org/10.1016/J.DIABRES.2015.02.002

Doku, A., Tuglo, L. S., Chilunga, F., Edzeame, J., Peters, R. J. G., & Agyemang, C. (2023). A multilevel and multicenter assessment of health care system capacity to manage cardiovascular diseases in Africa: a baseline study of the Ghana Heart Initiative. *BMC Cardiovascular Disorders*, *23*(1), 421. https://doi.org/10.1186/s12872-023-03430-5

Dunn, A., Andersen, R., preventive, J. J.-A. journal of, & 1998, undefined. (n.d.). Lifestyle physical activity interventions: History, short-and long-term effects, and recommendations. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0749379798000841

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Economic Burden of Cardiovascular Disease in Type 2 Diabetes: A Systematic Review. *Value in Health*, *21*(7), 881–890. https://doi.org/10.1016/j.jval.2017.12.019

University of Ghana http://ugspace.ug.edu.gh

European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). (2012a). *European Journal of Preventive Cardiology*, *19*(4), 585–667. https://doi.org/10.1177/2047487312450228

European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). (2012b). *European Journal of Preventive Cardiology*, *19*(4), 585–667. https://doi.org/10.1177/2047487312450228

Ferdinand, K. C., Senatore, F. F., Clayton-Jeter, H., Cryer, D. R., Lewin, J. C., Nasser, S. A., Fiuzat, M., & Califf, R. M. (2017). Improving Medication Adherence in Cardiometabolic Disease: Practical and Regulatory Implications. *Journal of the American College of Cardiology*, *69*(4), 437–451. https://doi.org/10.1016/J.JACC.2016.11.034

Fitz-Simon, N., Bennett, K., & Feely, J. (2005). Therapeutics and Clinical Risk Management ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/dtcr20 A review of studies of adherence with antihypertensive drugs using prescription databases. *Therapeutics and Clinical Risk Management*, *2*, 93–106. https://doi.org/10.2147/tcrm.s129362915

Fumagalli, L., Radaelli, G., Lettieri, E., policy, C. M.-H., & 2015, undefined. (n.d.). Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0168851014002814?casa_token=8BAAeuoVDv4AAAAA:Kf19W4LRvMhigVqFkpYhcy70WMCtmnIdRB1AXdDLJ2V_eCda8NQoJ08jFGBGJrdsqQ6VMp-56Yw

Gandhi, S., Chen, S., Hong, L., Sun, K., Gong, E., … C. L.-C. J. of, & 2017, undefined. (n.d.). Effect of mobile health interventions on the secondary prevention of cardiovascular disease: systematic review and meta-analysis. *Elsevier*.

Ghobadi, P., Gholami, M., Hasanvand, S., Toulabi, T., Moradifar, N., & Birjandi, M. (2022). Effects of a multidisciplinary management program on symptom burden and medication adherence in heart failure patients with comorbidities: A randomized controlled trial. *BMC Nursing*, *21*(1), 346. https://doi.org/10.1186/s12912-022-01130-7

Ghodeshwar, G. K., Dube, A., & Khobragade, D. (2023). Impact of Lifestyle Modifications on Cardiovascular Health: A Narrative Review. *Cureus*. https://doi.org/10.7759/cureus.42616

Glasgow, R. E., Connie, L., Davis, R. N., Martha, A. R. N. P., Funnell, M., & Beck, C. D. E. A. (2003). Implementing practical interventions to support chronic illness self-management. *Elsevier*, *29*(11). https://www.sciencedirect.com/science/article/pii/S1549374103290675

Gouda, H. N., Charlson, F., Sorsdahl, K., Ahmadzada, S., Ferrari, A. J., Erskine, H., Leung, J., Santamauro, D., Lund, C., Aminde, L. N., Mayosi, B. M., Kengne, A. P., Harris, M., Achoki, T., Wiysonge, C. S., Stein, D. J., & Whiteford, H. (2019). Burden of non-communicable diseases in sub-Saharan Africa, 1990–2017: results from the Global Burden of Disease Study 2017. *The Lancet Global Health*, *7*(10), e1375–e1387. https://doi.org/10.1016/S2214-109X(19)30374-2

University of Ghana http://ugspace.ug.edu.gh

Government of Ghana. (1994). *Government of Ghana National Population Policy (Revised Edition, 1994) National Population Council*.

Grenard, J. L., Munjas, B. A., Adams, J. L., Suttorp, M., Maglione, M., McGlynn, E. A., & Gellad, W. F. (2011). Depression and Medication Adherence in the Treatment of Chronic Diseases in the United States: A Meta-Analysis. *Journal of General Internal Medicine*, *26*(10), 1175–1182. https://doi.org/10.1007/s11606-011-1704-y

Grundy, S. M. (2006). Drug therapy of the metabolic syndrome: minimizing the emerging crisis in polypharmacy. *Nature Reviews. Drug Discovery*, *5*(4), 295–309. https://doi.org/10.1038/NRD2005

Guasch-Ferré, M., Salas-Salvadó, J., Nutrition, E. R.-, Metabolism, undefined, & 2017, undefined. (n.d.). The PREDIMED trial, Mediterranean diet and health outcomes: how strong is the evidence? *Elsevier*.

Haenfler, R., Johnson, B., Studies, E. J.-S. M., & 2012, undefined. (2012). Lifestyle movements: Exploring the intersection of lifestyle and social movements. *Taylor & FrancisR Haenfler, B Johnson, E JonesSocial Movement Studies, 2012•Taylor & Francis*, *11*(1), 1–20. https://doi.org/10.1080/14742837.2012.640535

Hamid, S., Groot, W., & Pavlova, M. (2019). Trends in cardiovascular diseases and associated risks in sub-Saharan Africa: a review of the evidence for Ghana, Nigeria, South Africa, Sudan and Tanzania. *The Aging Male*, *22*(3), 169–176. https://doi.org/10.1080/13685538.2019.1582621

Hayfron-Benjamin, C. F., van den Born, B.-J., Maitland-van der Zee, A. H., Amoah, A. G. B., van der Linden, E. L., Stronks, K., Klipstein-Grobusch, K., Bahendeka, S., Danquah, I., Beune, E., Smeeth, L., & Agyemang, C. (2020). Higher prevalence of peripheral arterial disease in Ghana compared to Ghanaian migrants in Europe: The RODAM study. *International Journal of Cardiology*, *305*, 127–134. https://doi.org/10.1016/j.ijcard.2019.12.028

Hivert, M.-F., Arena, R., Forman, D. E., Kris-Etherton, P. M., McBride, P. E., Pate, R. R., Spring, B., Trilk, J., Van Horn, L. V., & Kraus, W. E. (2016). Medical Training to Achieve Competency in Lifestyle Counseling: An Essential Foundation for Prevention and Treatment of Cardiovascular Diseases and Other Chronic Medical Conditions: A Scientific Statement From the American Heart Association. *Circulation*, *134*(15). https://doi.org/10.1161/CIR.0000000000000442

Horne, R., Chapman, S. C. E., Parham, R., Freemantle, N., Forbes, A., & Cooper, V. (2013). Understanding Patients' Adherence-Related Beliefs about Medicines Prescribed for Long-Term Conditions: A Meta-Analytic Review of the Necessity-Concerns Framework. *PLoS ONE*, *8*(12), e80633. https://doi.org/10.1371/journal.pone.0080633

Ienca, M., Schneble, C., Kressig, R. W., & Wangmo, T. (2021). Digital health interventions for healthy ageing: a qualitative user evaluation and ethical assessment. *BMC Geriatrics*, *21*(1). https://doi.org/10.1186/S12877-021-02338-Z

Ihm, S. H., Kim, K.-I., Lee, K. J., Won, J. W., Na, J. O., Rha, S.-W., Kim, H.-L., Kim, S.-H., & Shin, J. (2022). Interventions for Adherence Improvement in the Primary Prevention

University of Ghana http://ugspace.ug.edu.gh

of Cardiovascular Diseases: Expert Consensus Statement. *Korean Circulation Journal*, *52*(1), 1. https://doi.org/10.4070/kcj.2021.0226

Jaam, M., Awaisu, A., Mohamed Ibrahim, M. I., & Kheir, N. (2018). A holistic conceptual framework model to describe medication adherence in and guide interventions in diabetes mellitus. *Research in Social and Administrative Pharmacy*, *14*(4), 391–397. https://doi.org/10.1016/j.sapharm.2017.05.003

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A Decade Later. *Health Education & Behavior*, *11*(1), 1–47. https://doi.org/10.1177/109019818401100101

Jarrah, M., Khader, Y., Alkouri, O., Al-Bashaireh, A., Alhalaiqa, F., Al Marzouqi, A., Qaladi, O. A., Alharbi, A., Alshahrani, Y. M., Alqarni, A. S., & Oweis, A. (2023). Medication Adherence and Its Influencing Factors among Patients with Heart Failure: A Cross Sectional Study. *Medicina*, *59*(5), 960. https://doi.org/10.3390/medicina59050960

Jin, J., Sklar, G. E., Min, V., Oh, S., & Li, S. C. (2008). Factors affecting therapeutic compliance: A review from the patient's perspective. *Taylor & FrancisJ Jin, GE Sklar, V Min Sen Oh, S Chuen LiTherapeutics and Clinical Risk Management, 2008•Taylor & Francis*, *4*(1), 269–286. https://doi.org/10.2147/tcrm.s1458

Johnson, J. A., Al Sayah, F., Wozniak, L., Rees, S., Soprovich, A., Chik, C. L., Chue, P., Florence, P., Jacquier, J., Lysak, P., Opgenorth, A., Katon, W. J., & Majumdar, S. R. (2012). Controlled trial of a collaborative primary care team model for patients with diabetes and depression: Rationale and design for a comprehensive evaluation. *BMC Health Services Research*, *12*(1), 258. https://doi.org/10.1186/1472-6963-12-258

Jolles, E., Clark, A., hypertension, B. B.-J. of, & 2012, undefined. (n.d.). Getting the message across: opportunities and obstacles in effective communication in hypertension care. *Journals.Lww.ComEP Jolles, AM Clark, B BraamJournal of Hypertension, 2012•journals.Lww.Com*. Retrieved November 13, 2023, from https://journals.lww.com/jhypertension/fulltext/2012/08000/getting_the_message_across__opportunities_and.2.aspx

Jørgensen, M. E., Borch-Johnsen, K., & Bjerregaard, P. (2006). Lifestyle modifies obesity-associated risk of cardiovascular disease in a genetically homogeneous population. *The American Journal of Clinical Nutrition*, *84*(1), 29–36. https://doi.org/10.1093/AJCN/84.1.29

Jr, R. S., Makoul, G., Arora, N., and, R. E.-P. education, & 2009, undefined. (n.d.). How does communication heal? Pathways linking clinician–patient communication to health outcomes. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0738399108006319?casa_token=_uUm96Wz398AAAAA:GBuls5BS-9VCQ1Vl07avNG2bL9LtMBdSdD99MeceZX7l16gy_BDdbAlpettY5lf-7PwICf_jORA

Kaminsky, L. A., German, C., Imboden, M., Ozemek, C., Peterman, J. E., & Brubaker, P. H. (2022). The importance of healthy lifestyle behaviors in the prevention of cardiovascular disease. *Progress in Cardiovascular Diseases*, *70*, 8–15. https://doi.org/10.1016/j.pcad.2021.12.001

University of Ghana http://ugspace.ug.edu.gh

Kende, M. (2001). Superiority of traditional village diet and lifestyle in minimizing cardiovascular disease risk in Papua New Guineans. *Papua and New Guinea Medical Journal*, *44*(3–4), 135–150.

Kgatla, M. N., Mothiba, T. M., Sodi, T., & Makgahlela, M. (2021). Nurses' Experiences in Managing Cardiovascular Disease in Selected Rural and Peri-Urban Clinics in Limpopo Province, South Africa. *International Journal of Environmental Research and Public Health*, *18*(5), 2570. https://doi.org/10.3390/ijerph18052570

Khan, N., Marvel, F. A., Wang, J., & Martin, S. S. (2017). Digital Health Technologies to Promote Lifestyle Change and Adherence. *Current Treatment Options in Cardiovascular Medicine*, *19*(8). https://doi.org/10.1007/S11936-017-0560-4

Kreatsoulas, C., & Anand, S. S. (2010). The impact of social determinants on cardiovascular disease. *Canadian Journal of Cardiology*, *26*, 8C-13C. https://doi.org/10.1016/S0828-282X(10)71075-8

Kretchy, I. A. kwo, Owusu-Daaku, F. T. helma, & Danquah, S. (2014). Locus of control and anti-hypertensive medication adherence in Ghana. *The Pan African Medical Journal*, *17*, 13. https://doi.org/10.11694/pamj.supp.2014.17.1.3433

Kreyenbuhl, J., Record, E. J., & Palmer-Bacon, J. (2016). A review of behavioral tailoring strategies for improving medication adherence in serious mental illness. *Dialogues in Clinical Neuroscience*, *18*(2), 191–201. https://doi.org/10.31887/DCNS.2016.18.2/jkreyenbuhl

Krist, A. H., Tong, S. T., Aycock, R. A., & Longo, D. R. (2017). Engaging patients in decision-making and behavior change to promote prevention. *Information Services and Use*, *37*(2), 105–122. https://doi.org/10.3233/ISU-170826

Laar, A. K., Adler, A. J., Kotoh, A. M., Legido-Quigley, H., Lange, I. L., Perel, P., & Lamptey, P. (2019). Health system challenges to hypertension and related non-communicable diseases prevention and treatment: Perspectives from Ghanaian stakeholders. *BMC Health Services Research*, *19*(1). https://doi.org/10.1186/s12913-019-4571-6

Laddu, D., diseases, M. H.-P. in cardiovascular, & 2019, undefined. (n.d.). Addressing the nutritional phenotype through personalized nutrition for chronic disease prevention and management. *Elsevier*. Retrieved November 11, 2023, from https://www.sciencedirect.com/science/article/pii/S0033062018302470

Lechner, K., von Schacky, C., McKenzie, A. L., Worm, N., Nixdorff, U., Lechner, B., Kränkel, N., Halle, M., Krauss, R. M., & Scherr, J. (2020). Lifestyle factors and high-risk atherosclerosis: Pathways and mechanisms beyond traditional risk factors. *European Journal of Preventive Cardiology*, *27*(4), 394–406. https://doi.org/10.1177/2047487319869400

Li, D., Jia, Y., Yu, J., Liu, Y., Li, F., Liu, Y., Wu, Q., Liao, X., Zeng, Z., Wan, Z., & Zeng, R. (2021). Adherence to a Healthy Lifestyle and the Risk of All-Cause Mortality and Cardiovascular Events in Individuals With Diabetes: The ARIC Study. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.698608

University of Ghana http://ugspace.ug.edu.gh

Lim, R. (2015). *Clinical manual of cultural psychiatry*. https://books.google.com/books?hl=en&lr=&id=DXHBBwAAQBAJ&oi=fnd&pg=PP1&dq=68.%09Lim,+R.+F.+(Ed.).+(2015).+Clinical+manual+of+cultural+psychiatry.+American+Psychiatric+Pub.&ots=wCRZxTyCW5&sig=KP8QSe2mh4l2EQlctxrVUWUHF5Y

Lindstrom, M., DeCleene, N., Dorsey, H., Fuster, V., Johnson, C. O., LeGrand, K. E., Mensah, G. A., Razo, C., Stark, B., Varieur Turco, J., & Roth, G. A. (2022). Global Burden of Cardiovascular Diseases and Risks Collaboration, 1990-2021. *Journal of the American College of Cardiology*, *80*(25), 2372–2425. https://doi.org/10.1016/j.jacc.2022.11.001

Lloyd-Jones, D. M., Hong, Y., Labarthe, D., Mozaffarian, D., Appel, L. J., Van Horn, L., Greenlund, K., Daniels, S., Nichol, G., Tomaselli, G. F., Arnett, D. K., Fonarow, G. C., Ho, P. M., Lauer, M. S., Masoudi, F. A., Robertson, R. M., Roger, V., Schwamm, L. H., Sorlie, P., … Rosamond, W. D. (2010). Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*, *121*(4), 586–613. https://doi.org/10.1161/CIRCULATIONAHA.109.192703

Lv, J., Yu, C., Guo, Y., Bian, Z., Yang, L., Chen, Y., Tang, X., Zhang, W., Qian, Y., Huang, Y., Wang, X., Chen, J., Chen, Z., Qi, L., Li, L., Chen, J., Chen, Z., Collins, R., Li, L., … Qiu, Z. (2017). Adherence to Healthy Lifestyle and Cardiovascular Diseases in the Chinese Population. *Journal of the American College of Cardiology*, *69*(9), 1116–1125. https://doi.org/10.1016/J.JACC.2016.11.076

MacKinnon, G., Chest, E. B.-, & 2020, undefined. (n.d.). Mobile health technologies in cardiopulmonary disease. *Elsevier*.

Martin, L., Haskard-Zolnierek, K., & DiMatteo, M. (2010). *Health behavior change and treatment adherence: Evidence-based guidelines for improving healthcare*. https://books.google.com/books?hl=en&lr=&id=rKKDK5AxcjIC&oi=fnd&pg=PR9&dq=61.+Martin,+L.+R.,+Haskard-Zolnierek,+K.+B.,+%26+DiMatteo,+M.+R.+(2010).+Health+behavior+change+and+treatment+adherence:+Evidence-based+guidelines+for+improving+healthcare.+Oxford+University+Press,+USA&ots=DgXHF1JLeS&sig=paKDP8qHfSDCDwkRbBGh-R71MIc

Martínez-González, M., … J. S.-S.-P. in, & 2015, undefined. (n.d.). Benefits of the Mediterranean diet: insights from the PREDIMED study. *Elsevier*.

McDonagh, T. A., Metra, M., Adamo, M., Gardner, R. S., Baumbach, A., Böhm, M., Burri, H., Butler, J., Čelutkienė, J., Chioncel, O., Cleland, J. G. F., Coats, A. J. S., Crespo-Leiro, M. G., Farmakis, D., Gilard, M., Heymans, S., Hoes, A. W., Jaarsma, T., Jankowska, E. A., … Skibelund, A. K. (2021). Corrigendum to: 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) With the special contribution of the Heart Failure Association (HFA) of the ESC. *European Heart Journal*, *42*(48), 4901A. https://doi.org/10.1093/EURHEARTJ/EHAB670

University of Ghana http://ugspace.ug.edu.gh

Mekonnen, H. S., Gebrie, M. H., Eyasu, K. H., & Gelagay, A. A. (2017). Drug adherence for antihypertensive medications and its determinants among adult hypertensive patients attending in chronic clinics of referral hospitals in Northwest Ethiopia. *BMC Pharmacology and Toxicology*, *18*(1). https://doi.org/10.1186/s40360-017-0134-9

Mensah, G. A., Roth, G. A., Sampson, K. A., Moran, A. E., Feigin, V. L., Forouzanfar, M. H., Naghavi, M., & Murray, C. J. (n.d.). *Cardiovascular Topics Mortality from cardiovascular diseases in sub-Saharan africa, 1990-2013: a systematic analysis of data from the Global Burden of disease Study 2013*. *26*(2). https://doi.org/10.5830/CVJA-2015-036

Minja, N. W., Nakagaayi, D., Aliku, T., Zhang, W., Ssinabulya, I., Nabaale, J., Amutuhaire, W., de Loizaga, S. R., Ndagire, E., Rwebembera, J., Okello, E., & Kayima, J. (2022). Cardiovascular diseases in Africa in the twenty-first century: Gaps and priorities going forward. *Frontiers in Cardiovascular Medicine*, *9*. https://doi.org/10.3389/fcvm.2022.1008335

Mishra, P., Vamadevan, A. S., Roy, A., Bhatia, R., Naik, N., Singh, S., Amevinya, G. S., Ampah, E. A., Fernandez, Y., Free, C., Laar, A., Prabhakaran, D., Perel, P., & Legido-Quigley, H. (2021). Exploring barriers to medication adherence using COM-B Model of Behaviour among patients with cardiovascular diseases in low-and middle-income countries: a. *Taylor & FrancisP Mishra, AS Vamadevan, A Roy, R Bhatia, N Naik, S Singh, GS Amevinya, EA AmpahPatient Preference and Adherence, 2021•Taylor & Francis*, *15*, 1359–1371. https://doi.org/10.2147/PPA.S285442

Mogre, V., Johnson, N. A., Tzelepis, F., Hall, A., & Paul, C. (2020). Barriers to self-care and their association with poor adherence to self-care behaviours in people with type 2 diabetes in Ghana: A cross sectional study. *Obesity Medicine*, *18*, 100222. https://doi.org/10.1016/j.obmed.2020.100222

Mozaffarian, D., Wilson, P. W. F., & Kannel, W. B. (2008). Beyond established and novel risk factors lifestyle risk factors for cardiovascular disease. In *Circulation* (Vol. 117, Issue 23). https://doi.org/10.1161/CIRCULATIONAHA.107.738732

Muniz, D. D., Siqueira, K. S., Cornell, C. T., Fernandes-Silva, M. M., Muniz, P. T., & Silvestre, O. M. (2018). Ideal Cardiovascular Health and Job Strain: A Cross-Sectional Study from the Amazon Basin. *Arquivos Brasileiros de Cardiologia*. https://doi.org/10.5935/abc.20190005

Nieuwlaat, R., Schwalm, J., … R. K.-E. heart, & 2013, undefined. (n.d.). Why are we failing to implement effective therapies in cardiovascular disease? *Academic.Oup.ComR Nieuwlaat, JD Schwalm, R Khatib, S YusufEuropean Heart Journal, 2013•academic.Oup.Com*. Retrieved November 11, 2023, from https://academic.oup.com/eurheartj/article-abstract/34/17/1262/442360

Noncommunicable Disease Surveillance, Monitoring and Reporting. (2021). World Health Organisation. https://www.who.int/teams/noncommunicable-diseases/surveillance/data/profiles-ncd

University of Ghana http://ugspace.ug.edu.gh

Nyaaba, G. N., Masana, L., de-Graft Aikins, A., Beune, E., & Agyemang, C. (2020). Factors hindering hypertension control: perspectives of front-line health professionals in rural Ghana. *Public Health*, *181*, 16–23. https://doi.org/10.1016/j.puhe.2019.11.007

Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., Amehere, J. A. E., Batu, E. N., Brenya, P. K., Amankwaa, B., Adu, E. A., Akwasi, A. G., & Asiwu, R. Y. (2018). Adherence to Lifestyle Modification among Hypertensive Clients: A Descriptive Cross-Sectional Study. *OALib*, *05*(02), 1–13. https://doi.org/10.4236/oalib.1104375

Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., Amehere, J. A. E., Batu, E. N., Brenya, P. K., Amankwaa, B., Adu, E. A., Akwasi, A. G., Asiwu, R. Y., Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., … Asiwu, R. Y. (2018). Adherence to Lifestyle Modification among Hypertensive Clients: A Descriptive Cross-Sectional Study. *Open Access Library Journal*, *5*(2), 1–13. https://doi.org/10.4236/OALIB.1104375

Ofori-Asenso, R., & Garcia, D. (2016). Cardiovascular diseases in Ghana within the context of globalization. In *Cardiovascular Diagnosis and Therapy* (Vol. 6, Issue 1, pp. 67–77). AME Publishing Company. https://doi.org/10.3978/j.issn.2223-3652.2015.09.02

Ojangba, T., Boamah, S., Miao, Y., Guo, X., Fen, Y., Agboyibor, C., Yuan, J., & Dong, W. (2023). Comprehensive effects of lifestyle reform, adherence, and related factors on hypertension control: A review. *The Journal of Clinical Hypertension*, *25*(6), 509–520. https://doi.org/10.1111/jch.14653

Paterick, T. E., Patel, N., Tajik, A. J., & Chandrasekaran, K. (2017). Improving health outcomes through patient education and partnerships with patients. In *Baylor University Medical Center Proceedings* (Vol. 30, Issue 1, pp. 112–113). Taylor and Francis Ltd. https://doi.org/10.1080/08998280.2017.11929552

Paulweber, B., Valensi, P., Lindström, J., Lalic, N. M., Greaves, C. J., McKee, M., Kissimova-Skarbek, K., Liatis, S., Cosson, E., Szendroedi, J., Sheppard, K. E., Charlesworth, K., Felton, A. M., Hall, M., Rissanen, A., Tuomilehto, J., Schwarz, P. E., Roden, M., Paulweber, M., … Yilmaz, T. (2010). A European evidence-based guideline for the prevention of type 2 diabetes. *Hormone and Metabolic Research*, *42*(SUPPL. 1). https://doi.org/10.1055/S-0029-1240928

Pedretti, R., Hansen, D., … M. A.-E. journal of, & 2023, undefined. (n.d.). How to optimize the adherence to a guideline-directed medical therapy in the secondary prevention of cardiovascular diseases: a clinical consensus statement from. *Academic.Oup.ComRFE Pedretti, D Hansen, M Ambrosetti, M Back, T Berger, MC Ferreira, V CornelissenEuropean Journal of Preventive Cardiology, 2023•academic.Oup.Com*. Retrieved November 11, 2023, from https://academic.oup.com/eurjpc/article-abstract/30/2/149/6696608

Qu, C., Liao, S., Zhang, J., Cao, H., Zhang, H., Zhang, N., Yan, L., Cui, G., Luo, P., Zhang, Q., & Cheng, Q. (2023). Burden of cardiovascular disease among elderly: based on the Global Burden of Disease Study 2019. *European Heart Journal - Quality of Care and Clinical Outcomes*. https://doi.org/10.1093/ehjqcco/qcad033

University of Ghana http://ugspace.ug.edu.gh

Rich, A., Brandes, K., Mullan, B., medicine, M. H.-J. of behavioral, & 2015, undefined. (2015). Theory of planned behavior and adherence in chronic illness: a meta-analysis. *SpringerA Rich, K Brandes, B Mullan, MS HaggerJournal of Behavioral Medicine, 2015•Springer*, *38*(4), 673–688. https://doi.org/10.1007/s10865-015-9644-3

Roman, W. P., Martin, H. D., & Sauli, E. (2019). Assessment of risk factors for cardiovascular diseases among patients attending cardiac clinic at a referral hospital in Tanzania. *Journal of Xiangya Medicine*, *4*. https://doi.org/10.21037/jxym.2019.03.05

Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, H. T., Abebe, M., Abebe, Z., Abejie, A. N., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018a). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1736–1788. https://doi.org/10.1016/S0140-6736(18)32203-7

Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, H. T., Abebe, M., Abebe, Z., Abejie, A. N., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018b). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1736–1788. https://doi.org/10.1016/S0140-6736(18)32203-7

Roth, G. A., Johnson, C., Abajobir, A., Abd-Allah, F., Abera, S. F., Abyu, G., Ahmed, M., Aksut, B., Alam, T., Alam, K., Alla, F., Alvis-Guzman, N., Amrock, S., Ansari, H., Ärnlöv, J., Asayesh, H., Atey, T. M., Avila-Burgos, L., Awasthi, A., … Murray, C. (2017). Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. *Journal of the American College of Cardiology*, *70*(1), 1–25. https://doi.org/10.1016/j.jacc.2017.04.052

Ruppar, T. M., Cooper, P. S., Mehr, D. R., Delgado, J. M., & Dunbar-Jacob, J. M. (2016). Medication Adherence Interventions Improve Heart Failure Mortality and Readmission Rates: Systematic Review and Meta-Analysis of Controlled Trials. *Journal of the American Heart Association*, *5*(6). https://doi.org/10.1161/JAHA.115.002606

Sabaté, E. (2003). *Adherence to long-term therapies: evidence for action*. https://books.google.com/books?hl=en&lr=&id=kcYUTH8rPiwC&oi=fnd&pg=PR5&dq=67.%09Sabat%C3%A9,+E.+(Ed.).+(2003).+Adherence+to+long-term+therapies:+evidence+for+action.+World+Health+Organization&ots=tC8Rmw2ht-&sig=-ZobTqoyUWXgGMeJZohlLe7JKTY

Sacco, R. L., Roth, G. A., Reddy, K. S., Arnett, D. K., Bonita, R., Gaziano, T. A., Heidenreich, P. A., Huffman, M. D., Mayosi, B. M., Mendis, S., Murray, C. J. L., Perel, P., Piñeiro, D. J., Smith Jr., S. C., Taubert, K. A., Wood, D. A., Zhao, D., & Zoghbi, W. A. (2016). The Heart of 25 by 25: Achieving the Goal of Reducing Global and Regional Premature Deaths From Cardiovascular Diseases and Stroke: A Modeling Study From the American Heart Association and World Heart Federation. *Global Heart*, *11*(2), 251. https://doi.org/10.1016/j.gheart.2016.04.002

University of Ghana http://ugspace.ug.edu.gh

Sacks, F. M., Svetkey, L. P., Vollmer, W. M., Appel, L. J., Bray, G. A., Harsha, D., Obarzanek, E., Conlin, P. R., Miller, E. R., Simons-Morton, D. G., Karanja, N., Lin, P.-H., Aickin, M., Most-Windhauser, M. M., Moore, T. J., Proschan, M. A., & Cutler, J. A. (2001). Effects on Blood Pressure of Reduced Dietary Sodium and the Dietary Approaches to Stop Hypertension (DASH) Diet. *New England Journal of Medicine*, *344*(1), 3–10. https://doi.org/10.1056/NEJM200101043440101

Sanches Machado d'Almeida, K., Ronchi Spillere, S., Zuchinali, P., & Corrêa Souza, G. (2018). Mediterranean Diet and Other Dietary Patterns in Primary Prevention of Heart Failure and Changes in Cardiac Function Markers: A Systematic Review. *Nutrients*, *10*(1), 58. https://doi.org/10.3390/nu10010058

Sanuade, O., Anarfi, J., Aikins, A. de-G., disease, K. K.-E. &, & 2014, undefined. (n.d.). Patterns of Cardiovascular Disease Mortality in Ghana. *JSTOROA Sanuade, JK Anarfi, A de-Graft Aikins, KA KoramEthnicity & Disease, 2014•JSTOR*. Retrieved November 11, 2023, from https://www.jstor.org/stable/48668074

Sarfo, F. S., Akassi, J., Awuah, D., Adamu, S., Nkyi, C., Owolabi, M., & Ovbiagele, B. (2015). Trends in stroke admission and mortality rates from 1983 to 2013 in central Ghana. *Journal of the Neurological Sciences*, *357*(1–2), 240–245. https://doi.org/10.1016/j.jns.2015.07.043

Sarfo, F. S., Mobula, L. M., Plange-Rhule, J., Ansong, D., & Ofori-Adjei, D. (2018). Incident stroke among Ghanaians with hypertension and diabetes: A multicenter, prospective cohort study. *Journal of the Neurological Sciences*, *395*, 17–24. https://doi.org/10.1016/j.jns.2018.09.018

Sarfo-Kantanka, O., Kyei, I., Mbanya, J. C., & Owusu-Ansah, M. (2018). Diabetes-related foot disorders among adult Ghanaians. *Diabetic Foot & Ankle*, *9*(1), 1511678. https://doi.org/10.1080/2000625X.2018.1511678

Sarkodie, E., Afriyie, D. K., Hutton-Nyameaye, A., & Amponsah, S. K. (2020). Adherence to drug therapy among hypertensive patients attending two district hospitals in Ghana. *African Health Sciences*, *20*(3), 1355–1367. https://doi.org/10.4314/ahs.v20i3.42

Schulz, L. O., Bennett, P. H., Ravussin, E., Kidd, J. R., Kidd, K. K., Esparza, J., & Valencia, M. E. (2006). Effects of traditional and western environments on prevalence of type 2 diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care*, *29*(8), 1866–1871. https://doi.org/10.2337/DC06-0138

Schwalm, J. D., McKee, M., Huffman, M. D., & Yusuf, S. (2016). Resource Effective Strategies to Prevent and Treat Cardiovascular Disease. *Circulation*, *133*(8), 742–755. https://doi.org/10.1161/CIRCULATIONAHA.115.008721

Schwarzer, R., Lippke, S., Kwon, S., Luszczynska, A., Mallach, N., Renner, B., Reuter, T., Scholz, U., Schüz, B., Sniehotta, F., Wiedemann, A., & Ziegelmann, J. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Wiley Online LibraryR SchwarzerApplied Psychology, 2008•Wiley Online Library*, *57*(1), 1–29. https://doi.org/10.1111/j.1464-0597.2007.00325.x

University of Ghana http://ugspace.ug.edu.gh

Solomon, D., Rheumatology, R. R.-N. R., & 2020, undefined. (n.d.). Digital health technologies: opportunities and challenges in rheumatology. *Nature.ComDH Solomon, RS RudinNature Reviews Rheumatology, 2020•nature.Com*. Retrieved November 13, 2023, from https://www.nature.com/articles/s41584-020-0461-x

Suggate, S. P. (2016). A Meta-Analysis of the Long-Term Effects of Phonemic Awareness, Phonics, Fluency, and Reading Comprehension Interventions. *Journal of Learning Disabilities*, *49*(1), 77–96. https://doi.org/10.1177/0022219414528540

Tam, H. L., Wong, E. M. L., & Cheung, K. (2020). Effectiveness of Educational Interventions on Adherence to Lifestyle Modifications Among Hypertensive Patients: An Integrative Review. *International Journal of Environmental Research and Public Health*, *17*(7), 2513. https://doi.org/10.3390/ijerph17072513

Tulu, S. N., Al Salmi, N., & Jones, J. (2021). Understanding cardiovascular disease in day-to-day living for African people: a qualitative metasynthesis. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-10781-1

Vanzella, L. M., Rouse, V., Ajwani, F., Deilami, N., Pokosh, M., Oh, P., & Ghisi, G. L. D. M. (2021). Barriers and facilitators to participant adherence of dietary recommendations within comprehensive cardiac rehabilitation programmes: A systematic review. In *Public Health Nutrition* (Vol. 24, Issue 15, pp. 4823–4839). Cambridge University Press. https://doi.org/10.1017/S1368980021002962

VizHub - GBD Compare. (n.d.). Retrieved December 29, 2023, from https://vizhub.healthdata.org/gbd-compare/

World Health Organisation. Adherence to long-term... - Google Scholar. (n.d.). Retrieved November 11, 2023, from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=38.%09World+Health+Organiz+Adherence+to+Long-term+Therapy%3A+Evidence+for+Action.+Geneva%3A+WHO%3B2003.&btnG=

World Health Organization. (2021). *Cardiovascular-Diseases-(Cvds) @ Www.Who.Int*. http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

Yusuf, S., Hawken, S., Ôunpuu, S., Dans, T., Avezum, A., Lanas, F., McQueen, M., Budaj, A., Pais, P., Varigos, J., & Lisheng, L. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *The Lancet*, *364*(9438), 937–952. https://doi.org/10.1016/S0140-6736(04)17018-9

Yusuf, S., Hawken, S., Ôunpuu, S., Dans, T., lancet, A. A.-T., & 2004, undefined. (n.d.). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Thelancet.ComS Yusuf, S Hawken, S Ôunpuu, T Dans, A Avezum, F Lanas, M McQueen, A Budaj, P PaisThe Lancet, 2004•thelancet.Com*.

Ziaeian, B., & Fonarow, G. C. (2016). Epidemiology and aetiology of heart failure. *Nature Reviews. Cardiology*, *13*(6), 368–378. https://doi.org/10.1038/NRCARDIO.2016.25

University of Ghana http://ugspace.ug.edu.gh

Zolnierek, K., care, M. D.-M., & 2009, undefined. (n.d.). Physician communication and patient adherence to treatment: a meta-analysis. *Ncbi.Nlm.Nih.GovKBH Zolnierek, MR DiMatteoMedical Care, 2009•ncbi.Nlm.Nih.Gov*. Retrieved November 13, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2728700/

Abate, N. (2000a). Obesity and cardiovascular disease. Pathogenetic role of the metabolic syndrome and therapeutic implications. *Journal of Diabetes and Its Complications*, *14*(3), 154–174. https://doi.org/10.1016/S1056-8727(00)00067-2

Abate, N. (2000b). Obesity and cardiovascular disease. Pathogenetic role of the metabolic syndrome and therapeutic implications. *Journal of Diabetes and Its Complications*, *14*(3), 154–174. https://doi.org/10.1016/S1056-8727(00)00067-2

Addo, J., Smeeth, L., & Leon, D. A. (2007). Hypertension In Sub-Saharan Africa. *Hypertension*, *50*(6), 1012–1018. https://doi.org/10.1161/HYPERTENSIONAHA.107.093336

Aggarwal, M., Bozkurt, B., Panjrath, G., Aggarwal, B., Ostfeld, R. J., Barnard, N. D., Gaggin, H., Freeman, A. M., Allen, K., Madan, S., Massera, D., & Litwin, S. E. (2018). Lifestyle Modifications for Preventing and Treating Heart Failure. *Journal of the American College of Cardiology*, *72*(19), 2391–2405. https://doi.org/10.1016/j.jacc.2018.08.2160

Agyei-Mensah, S., & De-Graft Aikins, A. (2010). Epidemiological transition and the double burden of disease in Accra, Ghana. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, *87*(5), 879–897. https://doi.org/10.1007/S11524-010-9492-Y

Agyekum, F., Folson, A. A., Abaidoo, B., Appiah, L. T., Adu-Boakye, Y., Ayetey, H., & Owusu, I. K. (n.d.). *Behavioural and nutritional risk factors for cardiovascular diseases among the Ghanaian population-a cross-sectional study*. https://doi.org/10.1186/s12889-024-17709-5

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, *22*(5), 453–474. https://doi.org/10.1016/0022-1031(86)90045-4

Akumiah, P. O., Owusu-Akyem, S., Nayembil, D. A., Agyapong, G. O., & Fataw, P. (2017). Medicine and Nursing www.iiste.org ISSN. In *An International Peer-reviewed Journal* (Vol. 39). www.iiste.org

Al-Asmari, F., & Ismail, A. I. H. (2023). Evaluating food safety knowledge and practices among Saudi women in Al-Ahsa Region, Saudi Arabia. *Italian Journal of Food Safety*, *12*(1). https://doi.org/10.4081/ijfs.2023.10716

Alberti, K. G. M. M., Eckel, R. H., Grundy, S. M., Zimmet, P. Z., Cleeman, J. I., Donato, K. A., Fruchart, J.-C., James, W. P. T., Loria, C. M., Smith, S. C., International Diabetes Federation Task Force on Epidemiology and Prevention, Hational Heart, L. and B. I., American Heart Association, World Heart Federation, International Atherosclerosis Society, & International Association for the Study of

University of Ghana http://ugspace.ug.edu.gh

Obesity. (2009). Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation*, *120*(16), 1640–1645. https://doi.org/10.1161/CIRCULATIONAHA.109.192644

Al-Ganmi, A. H. A., Al-Fayyadh, S., Abd Ali, M. B. H., Alotaibi, A. M., Gholizadeh, L., & Perry, L. (2019). Medication adherence and predictive factors in patients with cardiovascular disease: A comparison study between Australia and Iraq. *Collegian*, *26*(3), 355–365. https://doi.org/10.1016/j.colegn.2018.10.002

Al-Ganmi, A., Perry, L., Gholizadeh, L., Collegian, A. A.-, & 2018, undefined. (n.d.). Behaviour change interventions to improve medication adherence in patients with cardiac disease: Protocol for a mixed methods study including a pilot. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S1322769617301816?casa_token=-ZgVnB431a8AAAAA:xoXx7qUvKXLLTtsD-mXFIe-DA4jZYEEFuD5kAuKTV8MNHM0BBgquWTF514G6RmtuHmh9IZnAYw

Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., Aldairem, A., Alrashed, M., Bin Saleh, K., Badreldin, H. A., Al Yami, M. S., Al Harbi, S., & Albekairy, A. M. (2023). Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC Medical Education*, *23*(1), 689. https://doi.org/10.1186/s12909-023-04698-z

Appiah, L. T., Sarfo, F. S., Agyemang, C., Tweneboah, H. O., Appiah, N. A. B. A., Bedu-Addo, G., & Opare-Sem, O. (2017). Current trends in admissions and outcomes of cardiac diseases in Ghana. *Clinical Cardiology*, *40*(10), 783–788. https://doi.org/10.1002/clc.22753

Armitage, C., psychology, M. C.-B. journal of social, & 2001, undefined. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *Wiley Online LibraryCJ Armitage, M ConnerBritish Journal of Social Psychology, 2001•Wiley Online Library*, *40*(4), 471. https://doi.org/10.1348/014466601164939

Atinga, R. A., Yarney, L., & Gavu, N. M. (2018). Factors influencing long-term medication non-adherence among diabetes and hypertensive patients in Ghana: A qualitative investigation. *PLoS ONE*, *13*(3). https://doi.org/10.1371/journal.pone.0193995

Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, *1*(3), 385–405. https://doi.org/10.1177/146879410100100307

Banerjee, S., Healthcare, S. H.-I. J. of, & 2020, undefined. (2020). Applying the theory of planned behavior: Examining how communication, attitudes, social norms, and perceived behavioral control relate to healthy lifestyle intention. *Taylor & FrancisS Banerjee, SS HoInternational Journal of Healthcare Management, 2020•Taylor & Francis*, *13*(S1), 496–503. https://doi.org/10.1080/20479700.2019.1605687

University of Ghana http://ugspace.ug.edu.gh

Barrera, M., Glasgow, R. E., McKay, H. G., Boles, S. M., & Feil, E. G. (2002). Do Internet-Based Support Interventions Change Perceptions of Social Support?: An Experimental Trial of Approaches for Supporting Diabetes Self-Management. *American Journal of Community Psychology*, *30*(5), 637–654. https://doi.org/10.1023/A:1016369114780

Baymot, A., Gela, D., & Bedada, T. (2022). Adherence to self-care recommendations and associated factors among adult heart failure patients in public hospitals, Addis Ababa, Ethiopia, 2021: cross-sectional study. *BMC Cardiovascular Disorders*, *22*(1), 275. https://doi.org/10.1186/s12872-022-02717-3

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, *51*(6), 843–857. https://doi.org/10.1016/S0277-9536(00)00065-4

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low Health Literacy and Health Outcomes: An Updated Systematic Review. *Annals of Internal Medicine*, *155*(2), 97. https://doi.org/10.7326/0003-4819-155-2-201107190-00005

Bissonnette, J. M., Bissonnette Mscn, J. M., & Acnp, R. N. (2008). Adherence: a concept analysis. *Wiley Online LibraryJM BissonnetteJournal of Advanced Nursing, 2008•Wiley Online Library*, *63*(6), 634–643. https://doi.org/10.1111/j.1365-2648.2008.04745.x

Bosu, W. K. (2010). Epidemic of hypertension in Ghana: a systematic review. *BMC Public Health*, *10*. https://doi.org/10.1186/1471-2458-10-418

Bosu, W. K. (2022). Accelerating the Control and Prevention of Non-communicable Diseases in Ghana: the Key Issues. *Postgraduate Medical Journal of Ghana*, *2*(1), 32–40. https://doi.org/10.60014/pmjg.v2i1.25

Bosworth, H. B., Granger, B. B., Mendys, P., Brindis, R., Burkholder, R., Czajkowski, S. M., Daniel, J. G., Ekman, I., Ho, M., Johnson, M., Kimmel, S. E., Liu, L. Z., Musaus, J., Shrank, W. H., Buono, E. W., Weiss, K., & Granger, C. B. (2011). Medication adherence: A call for action. *American Heart Journal*, *162*(3), 412–424. https://doi.org/10.1016/j.ahj.2011.06.007

Buja, L., Ottaviani, G., Pathology, R. M.-C., & 2019, undefined. (n.d.). Pathobiology of cardiovascular diseases: an update. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S1054880719302054?casa_token=S7A7hUFittMAAAAA:uWL8K17_LI8jmCmLOa0ZOIjyBPmffBe74AWLAD7aPOcujuUf49TICWV978Jfq4wJxIxSUNhqcA

Buttar, H., Li, T., cardiology, N. R.-E. & clinical, & 2005, undefined. (n.d.). Prevention of cardiovascular diseases: Role of exercise, dietary interventions, obesity and smoking cessation. *Ncbi.Nlm.Nih.GovHS Buttar, T Li, N RaviExperimental & Clinical Cardiology, 2005•ncbi.Nlm.Nih.Gov*. Retrieved November 13, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2716237/

Chan, R. H. M., Gordon, N. F., Chong, A., & Alter, D. A. (2008). Influence of Socioeconomic Status on Lifestyle Behavior Modifications Among Survivors of

University of Ghana http://ugspace.ug.edu.gh

Acute Myocardial Infarction. *American Journal of Cardiology*, *102*(12), 1583–1588. https://doi.org/10.1016/j.amjcard.2008.08.022

Chowdhury, R., Khan, H., Heydon, E., Shroufi, A., Fahimi, S., Moore, C., Stricker, B., Mendis, S., Hofman, A., Mant, J., & Franco, O. H. (2013). Adherence to cardiovascular therapy: a meta-analysis of prevalence and clinical consequences. *European Heart Journal*, *34*(38), 2940–2948. https://doi.org/10.1093/eurheartj/eht295

Clark, A. M., DesMeules, M., Luo, W., Duncan, A. S., & Wielgosz, A. (2009a). Socioeconomic status and cardiovascular disease: Risks and implications for care. In *Nature Reviews Cardiology* (Vol. 6, Issue 11, pp. 712–722). https://doi.org/10.1038/nrcardio.2009.163

Clark, A. M., DesMeules, M., Luo, W., Duncan, A. S., & Wielgosz, A. (2009b). Socioeconomic status and cardiovascular disease: Risks and implications for care. In *Nature Reviews Cardiology* (Vol. 6, Issue 11, pp. 712–722). https://doi.org/10.1038/nrcardio.2009.163

Correa, V. C., Lugo-Agudelo, L. H., Aguirre-Acevedo, D. C., Contreras, J. A. P., Borrero, A. M. P., Patiño-Lugo, D. F., & Valencia, D. A. C. (2020). Individual, health system, and contextual barriers and facilitators for the implementation of clinical practice guidelines: A systematic metareview. *Health Research Policy and Systems*, *18*(1). https://doi.org/10.1186/S12961-020-00588-8

Coventry, P. A., Fisher, L., Kenning, C., Bee, P., & Bower, P. (2014). Capacity, responsibility, and motivation: A critical qualitative evaluation of patient and practitioner views about barriers to self-management in people with multimorbidity. *BMC Health Services Research*, *14*(1). https://doi.org/10.1186/S12913-014-0536-Y

Creswell, J. W. (2011). Controversies in mixed methods research. In *The Sage handbook of qualitative research* (pp. 269–284).

De-Graft Aikins, A., Kushitor, M., Koram, K., Gyamfi, S., & Ogedegbe, G. (2014). Chronic non-communicable diseases and the challenge of universal health coverage: Insights from community-based cardiovascular disease research in urban poor communities in Accra, Ghana. In *BMC Public Health* (Vol. 14, Issue SUPPL. 2). BioMed Central Ltd. https://doi.org/10.1186/1471-2458-14-S2-S3

Deka, P., Pozehl, B., Williams, M. A., & Yates, B. (2017). Adherence to recommended exercise guidelines in patients with heart failure. *Heart Failure Reviews*, *22*(1), 41–53. https://doi.org/10.1007/s10741-016-9584-1

DiMatteo, M. R. (2004). Social Support and Patient Adherence to Medical Treatment: A Meta-Analysis. *Health Psychology*, *23*(2), 207–218. https://doi.org/10.1037/0278-6133.23.2.207

Ding, D., Chong, S., Jalaludin, B., Comino, E., & Bauman, A. E. (2015). Risk factors of incident type 2-diabetes mellitus over a 3-year follow-up: Results from a large Australian sample. *Diabetes Research and Clinical Practice*, *108*(2), 306–315. https://doi.org/10.1016/J.DIABRES.2015.02.002

University of Ghana http://ugspace.ug.edu.gh

Doku, A., Tuglo, L. S., Chilunga, F., Edzeame, J., Peters, R. J. G., & Agyemang, C. (2023). A multilevel and multicenter assessment of health care system capacity to manage cardiovascular diseases in Africa: a baseline study of the Ghana Heart Initiative. *BMC Cardiovascular Disorders*, *23*(1), 421. https://doi.org/10.1186/s12872-023-03430-5

Dunn, A., Andersen, R., preventive, J. J.-A. journal of, & 1998, undefined. (n.d.). Lifestyle physical activity interventions: History, short-and long-term effects, and recommendations. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0749379798000841

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Economic Burden of Cardiovascular Disease in Type 2 Diabetes: A Systematic Review. *Value in Health*, *21*(7), 881–890. https://doi.org/10.1016/j.jval.2017.12.019

European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). (2012a). *European Journal of Preventive Cardiology*, *19*(4), 585–667. https://doi.org/10.1177/2047487312450228

European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). (2012b). *European Journal of Preventive Cardiology*, *19*(4), 585–667. https://doi.org/10.1177/2047487312450228

Ferdinand, K. C., Senatore, F. F., Clayton-Jeter, H., Cryer, D. R., Lewin, J. C., Nasser, S. A., Fiuzat, M., & Califf, R. M. (2017). Improving Medication Adherence in Cardiometabolic Disease: Practical and Regulatory Implications. *Journal of the American College of Cardiology*, *69*(4), 437–451. https://doi.org/10.1016/J.JACC.2016.11.034

Fitz-Simon, N., Bennett, K., & Feely, J. (2005). Therapeutics and Clinical Risk Management ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/dtcr20 A review of studies of adherence with antihypertensive drugs using prescription databases. *Therapeutics and Clinical Risk Management*, *2*, 93–106. https://doi.org/10.2147/tcrm.s129362915

Fumagalli, L., Radaelli, G., Lettieri, E., policy, C. M.-H., & 2015, undefined. (n.d.). Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0168851014002814?casa_token=8BAAeuoVDv4AAAAA:Kf19W4LRvMhigVqFkpYhcy70WMCtmnIdRB1AXdDLJ2V_eCda8NQoJ08jFGBGJrdsqQ6VMp-56Yw

Gandhi, S., Chen, S., Hong, L., Sun, K., Gong, E., … C. L.-C. J. of, & 2017, undefined. (n.d.). Effect of mobile health interventions on the secondary prevention of cardiovascular disease: systematic review and meta-analysis. *Elsevier*.

Ghobadi, P., Gholami, M., Hasanvand, S., Toulabi, T., Moradifar, N., & Birjandi, M. (2022). Effects of a multidisciplinary management program on symptom burden and medication adherence in heart failure patients with comorbidities: A randomized controlled trial. *BMC Nursing*, *21*(1), 346. https://doi.org/10.1186/s12912-022-01130-7

University of Ghana http://ugspace.ug.edu.gh

Ghodeshwar, G. K., Dube, A., & Khobragade, D. (2023). Impact of Lifestyle Modifications on Cardiovascular Health: A Narrative Review. *Cureus*. https://doi.org/10.7759/cureus.42616

Glasgow, R. E., Connie, L., Davis, R. N., Martha, A. R. N. P., Funnell, M., & Beck, C. D. E. A. (2003). Implementing practical interventions to support chronic illness self-management. *Elsevier*, *29*(11). https://www.sciencedirect.com/science/article/pii/S1549374103290675

Gouda, H. N., Charlson, F., Sorsdahl, K., Ahmadzada, S., Ferrari, A. J., Erskine, H., Leung, J., Santamauro, D., Lund, C., Aminde, L. N., Mayosi, B. M., Kengne, A. P., Harris, M., Achoki, T., Wiysonge, C. S., Stein, D. J., & Whiteford, H. (2019). Burden of non-communicable diseases in sub-Saharan Africa, 1990–2017: results from the Global Burden of Disease Study 2017. *The Lancet Global Health*, *7*(10), e1375–e1387. https://doi.org/10.1016/S2214-109X(19)30374-2

Government of Ghana. (1994). *Government of Ghana National Population Policy (Revised Edition, 1994) National Population Council*.

Grenard, J. L., Munjas, B. A., Adams, J. L., Suttorp, M., Maglione, M., McGlynn, E. A., & Gellad, W. F. (2011). Depression and Medication Adherence in the Treatment of Chronic Diseases in the United States: A Meta-Analysis. *Journal of General Internal Medicine*, *26*(10), 1175–1182. https://doi.org/10.1007/s11606-011-1704-y

Grundy, S. M. (2006). Drug therapy of the metabolic syndrome: minimizing the emerging crisis in polypharmacy. *Nature Reviews. Drug Discovery*, *5*(4), 295–309. https://doi.org/10.1038/NRD2005

Guasch-Ferré, M., Salas-Salvadó, J., Nutrition, E. R.-, Metabolism, undefined, & 2017, undefined. (n.d.). The PREDIMED trial, Mediterranean diet and health outcomes: how strong is the evidence? *Elsevier*.

Haenfler, R., Johnson, B., Studies, E. J.-S. M., & 2012, undefined. (2012). Lifestyle movements: Exploring the intersection of lifestyle and social movements. *Taylor & FrancisR Haenfler, B Johnson, E JonesSocial Movement Studies, 2012•Taylor & Francis*, *11*(1), 1–20. https://doi.org/10.1080/14742837.2012.640535

Hamid, S., Groot, W., & Pavlova, M. (2019). Trends in cardiovascular diseases and associated risks in sub-Saharan Africa: a review of the evidence for Ghana, Nigeria, South Africa, Sudan and Tanzania. *The Aging Male*, *22*(3), 169–176. https://doi.org/10.1080/13685538.2019.1582621

Hayfron-Benjamin, C. F., van den Born, B.-J., Maitland-van der Zee, A. H., Amoah, A. G. B., van der Linden, E. L., Stronks, K., Klipstein-Grobusch, K., Bahendeka, S., Danquah, I., Beune, E., Smeeth, L., & Agyemang, C. (2020). Higher prevalence of peripheral arterial disease in Ghana compared to Ghanaian migrants in Europe: The RODAM study. *International Journal of Cardiology*, *305*, 127–134. https://doi.org/10.1016/j.ijcard.2019.12.028

Hivert, M.-F., Arena, R., Forman, D. E., Kris-Etherton, P. M., McBride, P. E., Pate, R. R., Spring, B., Trilk, J., Van Horn, L. V., & Kraus, W. E. (2016). Medical Training to Achieve Competency in Lifestyle Counseling: An Essential Foundation for

University of Ghana http://ugspace.ug.edu.gh

Prevention and Treatment of Cardiovascular Diseases and Other Chronic Medical Conditions: A Scientific Statement From the American Heart Association. *Circulation*, *134*(15). https://doi.org/10.1161/CIR.0000000000000442

Horne, R., Chapman, S. C. E., Parham, R., Freemantle, N., Forbes, A., & Cooper, V. (2013). Understanding Patients' Adherence-Related Beliefs about Medicines Prescribed for Long-Term Conditions: A Meta-Analytic Review of the Necessity-Concerns Framework. *PLoS ONE*, *8*(12), e80633. https://doi.org/10.1371/journal.pone.0080633

Ienca, M., Schneble, C., Kressig, R. W., & Wangmo, T. (2021). Digital health interventions for healthy ageing: a qualitative user evaluation and ethical assessment. *BMC Geriatrics*, *21*(1). https://doi.org/10.1186/S12877-021-02338-Z

Ihm, S. H., Kim, K.-I., Lee, K. J., Won, J. W., Na, J. O., Rha, S.-W., Kim, H.-L., Kim, S.-H., & Shin, J. (2022). Interventions for Adherence Improvement in the Primary Prevention of Cardiovascular Diseases: Expert Consensus Statement. *Korean Circulation Journal*, *52*(1), 1. https://doi.org/10.4070/kcj.2021.0226

Jaam, M., Awaisu, A., Mohamed Ibrahim, M. I., & Kheir, N. (2018). A holistic conceptual framework model to describe medication adherence in and guide interventions in diabetes mellitus. *Research in Social and Administrative Pharmacy*, *14*(4), 391–397. https://doi.org/10.1016/j.sapharm.2017.05.003

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A Decade Later. *Health Education & Behavior*, *11*(1), 1–47. https://doi.org/10.1177/109019818401100101

Jarrah, M., Khader, Y., Alkouri, O., Al-Bashaireh, A., Alhalaiqa, F., Al Marzouqi, A., Qaladi, O. A., Alharbi, A., Alshahrani, Y. M., Alqarni, A. S., & Oweis, A. (2023). Medication Adherence and Its Influencing Factors among Patients with Heart Failure: A Cross Sectional Study. *Medicina*, *59*(5), 960. https://doi.org/10.3390/medicina59050960

Jin, J., Sklar, G. E., Min, V., Oh, S., & Li, S. C. (2008). Factors affecting therapeutic compliance: A review from the patient's perspective. *Taylor & FrancisJ Jin, GE Sklar, V Min Sen Oh, S Chuen LiTherapeutics and Clinical Risk Management, 2008•Taylor & Francis*, *4*(1), 269–286. https://doi.org/10.2147/tcrm.s1458

Johnson, J. A., Al Sayah, F., Wozniak, L., Rees, S., Soprovich, A., Chik, C. L., Chue, P., Florence, P., Jacquier, J., Lysak, P., Opgenorth, A., Katon, W. J., & Majumdar, S. R. (2012). Controlled trial of a collaborative primary care team model for patients with diabetes and depression: Rationale and design for a comprehensive evaluation. *BMC Health Services Research*, *12*(1), 258. https://doi.org/10.1186/1472-6963-12-258

Jolles, E., Clark, A., hypertension, B. B.-J. of, & 2012, undefined. (n.d.). Getting the message across: opportunities and obstacles in effective communication in hypertension care. *Journals.Lww.ComEP Jolles, AM Clark, B BraamJournal of Hypertension, 2012•journals.Lww.Com*. Retrieved November 13, 2023, from https://journals.lww.com/jhypertension/fulltext/2012/08000/getting_the_message_across__opportunities_and.2.aspx

University of Ghana http://ugspace.ug.edu.gh

Jørgensen, M. E., Borch-Johnsen, K., & Bjerregaard, P. (2006). Lifestyle modifies obesity-associated risk of cardiovascular disease in a genetically homogeneous population. *The American Journal of Clinical Nutrition*, *84*(1), 29–36. https://doi.org/10.1093/AJCN/84.1.29

Jr, R. S., Makoul, G., Arora, N., and, R. E.-P. education, & 2009, undefined. (n.d.). How does communication heal? Pathways linking clinician–patient communication to health outcomes. *Elsevier*. Retrieved November 13, 2023, from https://www.sciencedirect.com/science/article/pii/S0738399108006319?casa_token=_uUm96Wz398AAAAA:GBuls5BS-9VCQ1Vl07avNG2bL9LtMBdSdD99MeceZX7l16gy_BDdbAlpettY5lf-7PwICf_jORA

Kaminsky, L. A., German, C., Imboden, M., Ozemek, C., Peterman, J. E., & Brubaker, P. H. (2022). The importance of healthy lifestyle behaviors in the prevention of cardiovascular disease. *Progress in Cardiovascular Diseases*, *70*, 8–15. https://doi.org/10.1016/j.pcad.2021.12.001

Kende, M. (2001). Superiority of traditional village diet and lifestyle in minimizing cardiovascular disease risk in Papua New Guineans. *Papua and New Guinea Medical Journal*, *44*(3–4), 135–150.

Kgatla, M. N., Mothiba, T. M., Sodi, T., & Makgahlela, M. (2021). Nurses' Experiences in Managing Cardiovascular Disease in Selected Rural and Peri-Urban Clinics in Limpopo Province, South Africa. *International Journal of Environmental Research and Public Health*, *18*(5), 2570. https://doi.org/10.3390/ijerph18052570

Khan, N., Marvel, F. A., Wang, J., & Martin, S. S. (2017). Digital Health Technologies to Promote Lifestyle Change and Adherence. *Current Treatment Options in Cardiovascular Medicine*, *19*(8). https://doi.org/10.1007/S11936-017-0560-4

Kreatsoulas, C., & Anand, S. S. (2010). The impact of social determinants on cardiovascular disease. *Canadian Journal of Cardiology*, *26*, 8C-13C. https://doi.org/10.1016/S0828-282X(10)71075-8

Kretchy, I. A. kwo, Owusu-Daaku, F. T. helma, & Danquah, S. (2014). Locus of control and anti-hypertensive medication adherence in Ghana. *The Pan African Medical Journal*, *17*, 13. https://doi.org/10.11694/pamj.supp.2014.17.1.3433

Kreyenbuhl, J., Record, E. J., & Palmer-Bacon, J. (2016). A review of behavioral tailoring strategies for improving medication adherence in serious mental illness. *Dialogues in Clinical Neuroscience*, *18*(2), 191–201. https://doi.org/10.31887/DCNS.2016.18.2/jkreyenbuhl

Krist, A. H., Tong, S. T., Aycock, R. A., & Longo, D. R. (2017). Engaging patients in decision-making and behavior change to promote prevention. *Information Services and Use*, *37*(2), 105–122. https://doi.org/10.3233/ISU-170826

Laar, A. K., Adler, A. J., Kotoh, A. M., Legido-Quigley, H., Lange, I. L., Perel, P., & Lamptey, P. (2019). Health system challenges to hypertension and related non-communicable diseases prevention and treatment: Perspectives from Ghanaian

University of Ghana http://ugspace.ug.edu.gh

stakeholders. *BMC Health Services Research*, *19*(1). https://doi.org/10.1186/s12913-019-4571-6

Laddu, D., diseases, M. H.-P. in cardiovascular, & 2019, undefined. (n.d.). Addressing the nutritional phenotype through personalized nutrition for chronic disease prevention and management. *Elsevier*. Retrieved November 11, 2023, from https://www.sciencedirect.com/science/article/pii/S0033062018302470

Lechner, K., von Schacky, C., McKenzie, A. L., Worm, N., Nixdorff, U., Lechner, B., Kränkel, N., Halle, M., Krauss, R. M., & Scherr, J. (2020). Lifestyle factors and high-risk atherosclerosis: Pathways and mechanisms beyond traditional risk factors. *European Journal of Preventive Cardiology*, *27*(4), 394–406. https://doi.org/10.1177/2047487319869400

Li, D., Jia, Y., Yu, J., Liu, Y., Li, F., Liu, Y., Wu, Q., Liao, X., Zeng, Z., Wan, Z., & Zeng, R. (2021). Adherence to a Healthy Lifestyle and the Risk of All-Cause Mortality and Cardiovascular Events in Individuals With Diabetes: The ARIC Study. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.698608

Lim, R. (2015). *Clinical manual of cultural psychiatry*. https://books.google.com/books?hl=en&lr=&id=DXHBBwAAQBAJ&oi=fnd&pg=PP1&dq=68.%09Lim,+R.+F.+(Ed.).+(2015).+Clinical+manual+of+cultural+psychiatry.+American+Psychiatric+Pub.&ots=wCRZxTyCW5&sig=KP8QSe2mh4l2EQlctxrVUWUHF5Y

Lindstrom, M., DeCleene, N., Dorsey, H., Fuster, V., Johnson, C. O., LeGrand, K. E., Mensah, G. A., Razo, C., Stark, B., Varieur Turco, J., & Roth, G. A. (2022). Global Burden of Cardiovascular Diseases and Risks Collaboration, 1990-2021. *Journal of the American College of Cardiology*, *80*(25), 2372–2425. https://doi.org/10.1016/j.jacc.2022.11.001

Lloyd-Jones, D. M., Hong, Y., Labarthe, D., Mozaffarian, D., Appel, L. J., Van Horn, L., Greenlund, K., Daniels, S., Nichol, G., Tomaselli, G. F., Arnett, D. K., Fonarow, G. C., Ho, P. M., Lauer, M. S., Masoudi, F. A., Robertson, R. M., Roger, V., Schwamm, L. H., Sorlie, P., … Rosamond, W. D. (2010). Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*, *121*(4), 586–613. https://doi.org/10.1161/CIRCULATIONAHA.109.192703

Lv, J., Yu, C., Guo, Y., Bian, Z., Yang, L., Chen, Y., Tang, X., Zhang, W., Qian, Y., Huang, Y., Wang, X., Chen, J., Chen, Z., Qi, L., Li, L., Chen, J., Chen, Z., Collins, R., Li, L., … Qiu, Z. (2017). Adherence to Healthy Lifestyle and Cardiovascular Diseases in the Chinese Population. *Journal of the American College of Cardiology*, *69*(9), 1116–1125. https://doi.org/10.1016/J.JACC.2016.11.076

MacKinnon, G., Chest, E. B.-, & 2020, undefined. (n.d.). Mobile health technologies in cardiopulmonary disease. *Elsevier*.

Martin, L., Haskard-Zolnierek, K., & DiMatteo, M. (2010). *Health behavior change and treatment adherence: Evidence-based guidelines for improving healthcare*.

University of Ghana http://ugspace.ug.edu.gh

https://books.google.com/books?hl=en&lr=&id=rKKDK5AxcjIC&oi=fnd&pg=PR9&dq=61.+Martin,+L.+R.,+Haskard-Zolnierek,+K.+B.,+%26+DiMatteo,+M.+R.+(2010).+Health+behavior+change+and+treatment+adherence:+Evidence-based+guidelines+for+improving+healthcare.+Oxford+University+Press,+USA&ots=DgXHF1JLeS&sig=paKDP8qHfSDCDwkRbBGh-R71MIc

Martínez-González, M., … J. S.-S.-P. in, & 2015, undefined. (n.d.). Benefits of the Mediterranean diet: insights from the PREDIMED study. *Elsevier*.

McDonagh, T. A., Metra, M., Adamo, M., Gardner, R. S., Baumbach, A., Böhm, M., Burri, H., Butler, J., Čelutkienė, J., Chioncel, O., Cleland, J. G. F., Coats, A. J. S., Crespo-Leiro, M. G., Farmakis, D., Gilard, M., Heymans, S., Hoes, A. W., Jaarsma, T., Jankowska, E. A., … Skibelund, A. K. (2021). Corrigendum to: 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) With the special contribution of the Heart Failure Association (HFA) of the ESC. *European Heart Journal*, *42*(48), 4901A. https://doi.org/10.1093/EURHEARTJ/EHAB670

Mekonnen, H. S., Gebrie, M. H., Eyasu, K. H., & Gelagay, A. A. (2017). Drug adherence for antihypertensive medications and its determinants among adult hypertensive patients attending in chronic clinics of referral hospitals in Northwest Ethiopia. *BMC Pharmacology and Toxicology*, *18*(1). https://doi.org/10.1186/s40360-017-0134-9

Mensah, G. A., Roth, G. A., Sampson, K. A., Moran, A. E., Feigin, V. L., Forouzanfar, M. H., Naghavi, M., & Murray, C. J. (n.d.). *Cardiovascular Topics Mortality from cardiovascular diseases in sub-Saharan africa, 1990-2013: a systematic analysis of data from the Global Burden of disease Study 2013*. *26*(2). https://doi.org/10.5830/CVJA-2015-036

Minja, N. W., Nakagaayi, D., Aliku, T., Zhang, W., Ssinabulya, I., Nabaale, J., Amutuhaire, W., de Loizaga, S. R., Ndagire, E., Rwebembera, J., Okello, E., & Kayima, J. (2022). Cardiovascular diseases in Africa in the twenty-first century: Gaps and priorities going forward. *Frontiers in Cardiovascular Medicine*, *9*. https://doi.org/10.3389/fcvm.2022.1008335

Mishra, P., Vamadevan, A. S., Roy, A., Bhatia, R., Naik, N., Singh, S., Amevinya, G. S., Ampah, E. A., Fernandez, Y., Free, C., Laar, A., Prabhakaran, D., Perel, P., & Legido-Quigley, H. (2021). Exploring barriers to medication adherence using COM-B Model of Behaviour among patients with cardiovascular diseases in low- and middle-income countries: a. *Taylor & FrancisP Mishra, AS Vamadevan, A Roy, R Bhatia, N Naik, S Singh, GS Amevinya, EA AmpahPatient Preference and Adherence, 2021•Taylor & Francis*, *15*, 1359–1371. https://doi.org/10.2147/PPA.S285442

Mogre, V., Johnson, N. A., Tzelepis, F., Hall, A., & Paul, C. (2020). Barriers to self-care and their association with poor adherence to self-care behaviours in people with

University of Ghana http://ugspace.ug.edu.gh

type 2 diabetes in Ghana: A cross sectional study. *Obesity Medicine*, *18*, 100222. https://doi.org/10.1016/j.obmed.2020.100222

Mozaffarian, D., Wilson, P. W. F., & Kannel, W. B. (2008). Beyond established and novel risk factors lifestyle risk factors for cardiovascular disease. In *Circulation* (Vol. 117, Issue 23). https://doi.org/10.1161/CIRCULATIONAHA.107.738732

Muniz, D. D., Siqueira, K. S., Cornell, C. T., Fernandes-Silva, M. M., Muniz, P. T., & Silvestre, O. M. (2018). Ideal Cardiovascular Health and Job Strain: A Cross-Sectional Study from the Amazon Basin. *Arquivos Brasileiros de Cardiologia*. https://doi.org/10.5935/abc.20190005

Nieuwlaat, R., Schwalm, J., … R. K.-E. heart, & 2013, undefined. (n.d.). Why are we failing to implement effective therapies in cardiovascular disease? *Academic.Oup.ComR Nieuwlaat, JD Schwalm, R Khatib, S YusufEuropean Heart Journal, 2013•academic.Oup.Com*. Retrieved November 11, 2023, from https://academic.oup.com/eurheartj/article-abstract/34/17/1262/442360

Noncommunicable Disease Surveillance, Monitoring and Reporting. (2021). World Health Organisation. https://www.who.int/teams/noncommunicable-diseases/surveillance/data/profiles-ncd

Nyaaba, G. N., Masana, L., de-Graft Aikins, A., Beune, E., & Agyemang, C. (2020). Factors hindering hypertension control: perspectives of front-line health professionals in rural Ghana. *Public Health*, *181*, 16–23. https://doi.org/10.1016/j.puhe.2019.11.007

Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., Amehere, J. A. E., Batu, E. N., Brenya, P. K., Amankwaa, B., Adu, E. A., Akwasi, A. G., & Asiwu, R. Y. (2018). Adherence to Lifestyle Modification among Hypertensive Clients: A Descriptive Cross-Sectional Study. *OALib*, *05*(02), 1–13. https://doi.org/10.4236/oalib.1104375

Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., Amehere, J. A. E., Batu, E. N., Brenya, P. K., Amankwaa, B., Adu, E. A., Akwasi, A. G., Asiwu, R. Y., Obirikorang, Y., Obirikorang, C., Acheampong, E., Anto, E. O., Amoah, B., Fosu, E., … Asiwu, R. Y. (2018). Adherence to Lifestyle Modification among Hypertensive Clients: A Descriptive Cross-Sectional Study. *Open Access Library Journal*, *5*(2), 1–13. https://doi.org/10.4236/OALIB.1104375

Ofori-Asenso, R., & Garcia, D. (2016). Cardiovascular diseases in Ghana within the context of globalization. In *Cardiovascular Diagnosis and Therapy* (Vol. 6, Issue 1, pp. 67–77). AME Publishing Company. https://doi.org/10.3978/j.issn.2223-3652.2015.09.02

Ojangba, T., Boamah, S., Miao, Y., Guo, X., Fen, Y., Agboyibor, C., Yuan, J., & Dong, W. (2023). Comprehensive effects of lifestyle reform, adherence, and related factors on hypertension control: A review. *The Journal of Clinical Hypertension*, *25*(6), 509–520. https://doi.org/10.1111/jch.14653

Paterick, T. E., Patel, N., Tajik, A. J., & Chandrasekaran, K. (2017). Improving health outcomes through patient education and partnerships with patients. In *Baylor*

University of Ghana http://ugspace.ug.edu.gh

University Medical Center Proceedings (Vol. 30, Issue 1, pp. 112–113). Taylor and Francis Ltd. https://doi.org/10.1080/08998280.2017.11929552

Paulweber, B., Valensi, P., Lindström, J., Lalic, N. M., Greaves, C. J., McKee, M., Kissimova-Skarbek, K., Liatis, S., Cosson, E., Szendroedi, J., Sheppard, K. E., Charlesworth, K., Felton, A. M., Hall, M., Rissanen, A., Tuomilehto, J., Schwarz, P. E., Roden, M., Paulweber, M., … Yilmaz, T. (2010). A European evidence-based guideline for the prevention of type 2 diabetes. *Hormone and Metabolic Research*, *42*(SUPPL. 1). https://doi.org/10.1055/S-0029-1240928

Pedretti, R., Hansen, D., … M. A.-E. journal of, & 2023, undefined. (n.d.). How to optimize the adherence to a guideline-directed medical therapy in the secondary prevention of cardiovascular diseases: a clinical consensus statement from. *Academic.Oup.ComRFE Pedretti, D Hansen, M Ambrosetti, M Back, T Berger, MC Ferreira, V CornelissenEuropean Journal of Preventive Cardiology, 2023•academic.Oup.Com*. Retrieved November 11, 2023, from https://academic.oup.com/eurjpc/article-abstract/30/2/149/6696608

Qu, C., Liao, S., Zhang, J., Cao, H., Zhang, H., Zhang, N., Yan, L., Cui, G., Luo, P., Zhang, Q., & Cheng, Q. (2023). Burden of cardiovascular disease among elderly: based on the Global Burden of Disease Study 2019. *European Heart Journal - Quality of Care and Clinical Outcomes*. https://doi.org/10.1093/ehjqcco/qcad033

Rich, A., Brandes, K., Mullan, B., medicine, M. H.-J. of behavioral, & 2015, undefined. (2015). Theory of planned behavior and adherence in chronic illness: a meta-analysis. *SpringerA Rich, K Brandes, B Mullan, MS HaggerJournal of Behavioral Medicine, 2015•Springer*, *38*(4), 673–688. https://doi.org/10.1007/s10865-015-9644-3

Roman, W. P., Martin, H. D., & Sauli, E. (2019). Assessment of risk factors for cardiovascular diseases among patients attending cardiac clinic at a referral hospital in Tanzania. *Journal of Xiangya Medicine*, *4*. https://doi.org/10.21037/jxym.2019.03.05

Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, H. T., Abebe, M., Abebe, Z., Abejie, A. N., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018a). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1736–1788. https://doi.org/10.1016/S0140-6736(18)32203-7

Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, H. T., Abebe, M., Abebe, Z., Abejie, A. N., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018b). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1736–1788. https://doi.org/10.1016/S0140-6736(18)32203-7

University of Ghana http://ugspace.ug.edu.gh

Roth, G. A., Johnson, C., Abajobir, A., Abd-Allah, F., Abera, S. F., Abyu, G., Ahmed, M., Aksut, B., Alam, T., Alam, K., Alla, F., Alvis-Guzman, N., Amrock, S., Ansari, H., Ärnlöv, J., Asayesh, H., Atey, T. M., Avila-Burgos, L., Awasthi, A., … Murray, C. (2017). Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. *Journal of the American College of Cardiology*, *70*(1), 1–25. https://doi.org/10.1016/j.jacc.2017.04.052

Ruppar, T. M., Cooper, P. S., Mehr, D. R., Delgado, J. M., & Dunbar-Jacob, J. M. (2016). Medication Adherence Interventions Improve Heart Failure Mortality and Readmission Rates: Systematic Review and Meta-Analysis of Controlled Trials. *Journal of the American Heart Association*, *5*(6). https://doi.org/10.1161/JAHA.115.002606

Sabaté, E. (2003). *Adherence to long-term therapies: evidence for action*. https://books.google.com/books?hl=en&lr=&id=kcYUTH8rPiwC&oi=fnd&pg=PR5&dq=67.%09Sabat%C3%A9,+E.+(Ed.).+(2003).+Adherence+to+long-term+therapies:+evidence+for+action.+World+Health+Organization&ots=tC8Rmw2ht-&sig=-ZobTqoyUWXgGMeJZohlLe7JKTY

Sacco, R. L., Roth, G. A., Reddy, K. S., Arnett, D. K., Bonita, R., Gaziano, T. A., Heidenreich, P. A., Huffman, M. D., Mayosi, B. M., Mendis, S., Murray, C. J. L., Perel, P., Piñeiro, D. J., Smith Jr., S. C., Taubert, K. A., Wood, D. A., Zhao, D., & Zoghbi, W. A. (2016). The Heart of 25 by 25: Achieving the Goal of Reducing Global and Regional Premature Deaths From Cardiovascular Diseases and Stroke: A Modeling Study From the American Heart Association and World Heart Federation. *Global Heart*, *11*(2), 251. https://doi.org/10.1016/j.gheart.2016.04.002

Sacks, F. M., Svetkey, L. P., Vollmer, W. M., Appel, L. J., Bray, G. A., Harsha, D., Obarzanek, E., Conlin, P. R., Miller, E. R., Simons-Morton, D. G., Karanja, N., Lin, P.-H., Aickin, M., Most-Windhauser, M. M., Moore, T. J., Proschan, M. A., & Cutler, J. A. (2001). Effects on Blood Pressure of Reduced Dietary Sodium and the Dietary Approaches to Stop Hypertension (DASH) Diet. *New England Journal of Medicine*, *344*(1), 3–10. https://doi.org/10.1056/NEJM200101043440101

Sanches Machado d'Almeida, K., Ronchi Spillere, S., Zuchinali, P., & Corrêa Souza, G. (2018). Mediterranean Diet and Other Dietary Patterns in Primary Prevention of Heart Failure and Changes in Cardiac Function Markers: A Systematic Review. *Nutrients*, *10*(1), 58. https://doi.org/10.3390/nu10010058

Sanuade, O., Anarfi, J., Aikins, A. de-G., disease, K. K.-E. &, & 2014, undefined. (n.d.). Patterns of Cardiovascular Disease Mortality in Ghana. *JSTOROA Sanuade, JK Anarfi, A de-Graft Aikins, KA KoramEthnicity & Disease, 2014•JSTOR*. Retrieved November 11, 2023, from https://www.jstor.org/stable/48668074

Sarfo, F. S., Akassi, J., Awuah, D., Adamu, S., Nkyi, C., Owolabi, M., & Ovbiagele, B. (2015). Trends in stroke admission and mortality rates from 1983 to 2013 in central Ghana. *Journal of the Neurological Sciences*, *357*(1–2), 240–245. https://doi.org/10.1016/j.jns.2015.07.043

University of Ghana http://ugspace.ug.edu.gh

Sarfo, F. S., Mobula, L. M., Plange-Rhule, J., Ansong, D., & Ofori-Adjei, D. (2018). Incident stroke among Ghanaians with hypertension and diabetes: A multicenter, prospective cohort study. *Journal of the Neurological Sciences*, *395*, 17–24. https://doi.org/10.1016/j.jns.2018.09.018

Sarfo-Kantanka, O., Kyei, I., Mbanya, J. C., & Owusu-Ansah, M. (2018). Diabetes-related foot disorders among adult Ghanaians. *Diabetic Foot & Ankle*, *9*(1), 1511678. https://doi.org/10.1080/2000625X.2018.1511678

Sarkodie, E., Afriyie, D. K., Hutton-Nyameaye, A., & Amponsah, S. K. (2020). Adherence to drug therapy among hypertensive patients attending two district hospitals in Ghana. *African Health Sciences*, *20*(3), 1355–1367. https://doi.org/10.4314/ahs.v20i3.42

Schulz, L. O., Bennett, P. H., Ravussin, E., Kidd, J. R., Kidd, K. K., Esparza, J., & Valencia, M. E. (2006). Effects of traditional and western environments on prevalence of type 2 diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care*, *29*(8), 1866–1871. https://doi.org/10.2337/DC06-0138

Schwalm, J. D., McKee, M., Huffman, M. D., & Yusuf, S. (2016). Resource Effective Strategies to Prevent and Treat Cardiovascular Disease. *Circulation*, *133*(8), 742–755. https://doi.org/10.1161/CIRCULATIONAHA.115.008721

Schwarzer, R., Lippke, S., Kwon, S., Luszczynska, A., Mallach, N., Renner, B., Reuter, T., Scholz, U., Schüz, B., Sniehotta, F., Wiedemann, A., & Ziegelmann, J. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Wiley Online LibraryR SchwarzerApplied Psychology, 2008•Wiley Online Library*, *57*(1), 1–29. https://doi.org/10.1111/j.1464-0597.2007.00325.x

Solomon, D., Rheumatology, R. R.-N. R., & 2020, undefined. (n.d.). Digital health technologies: opportunities and challenges in rheumatology. *Nature.ComDH Solomon, RS RudinNature Reviews Rheumatology, 2020•nature.Com*. Retrieved November 13, 2023, from https://www.nature.com/articles/s41584-020-0461-x

Suggate, S. P. (2016). A Meta-Analysis of the Long-Term Effects of Phonemic Awareness, Phonics, Fluency, and Reading Comprehension Interventions. *Journal of Learning Disabilities*, *49*(1), 77–96. https://doi.org/10.1177/0022219414528540

Tam, H. L., Wong, E. M. L., & Cheung, K. (2020). Effectiveness of Educational Interventions on Adherence to Lifestyle Modifications Among Hypertensive Patients: An Integrative Review. *International Journal of Environmental Research and Public Health*, *17*(7), 2513. https://doi.org/10.3390/ijerph17072513

Tulu, S. N., Al Salmi, N., & Jones, J. (2021). Understanding cardiovascular disease in day-to-day living for African people: a qualitative metasynthesis. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-10781-1

Vanzella, L. M., Rouse, V., Ajwani, F., Deilami, N., Pokosh, M., Oh, P., & Ghisi, G. L. D. M. (2021). Barriers and facilitators to participant adherence of dietary recommendations within comprehensive cardiac rehabilitation programmes: A

University of Ghana http://ugspace.ug.edu.gh

systematic review. In *Public Health Nutrition* (Vol. 24, Issue 15, pp. 4823–4839). Cambridge University Press. https://doi.org/10.1017/S1368980021002962

VizHub - GBD Compare. (n.d.). Retrieved December 29, 2023, from https://vizhub.healthdata.org/gbd-compare/

World Health Organisation. Adherence to long-term... - Google Scholar. (n.d.). Retrieved November 11, 2023, from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=38.%09World+Health+Organiz+Adherence+to+Long-term+Therapy%3A+Evidence+for+Action.+Geneva%3A+WHO%3B2003.&btnG=

World Health Organization. (2021). *Cardiovascular-Diseases-(Cvds) @ Www.Who.Int*. http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

Yusuf, S., Hawken, S., Ôunpuu, S., Dans, T., Avezum, A., Lanas, F., McQueen, M., Budaj, A., Pais, P., Varigos, J., & Lisheng, L. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *The Lancet*, *364*(9438), 937–952. https://doi.org/10.1016/S0140-6736(04)17018-9

Yusuf, S., Hawken, S., Ôunpuu, S., Dans, T., lancet, A. A.-T., & 2004, undefined. (n.d.). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Thelancet.ComS Yusuf, S Hawken, S Ôunpuu, T Dans, A Avezum, F Lanas, M McQueen, A Budaj, P PaisThe Lancet, 2004•thelancet.Com*.

Ziaeian, B., & Fonarow, G. C. (2016). Epidemiology and aetiology of heart failure. *Nature Reviews. Cardiology*, *13*(6), 368–378. https://doi.org/10.1038/NRCARDIO.2016.25

Zolnierek, K., care, M. D.-M., & 2009, undefined. (n.d.). Physician communication and patient adherence to treatment: a meta-analysis. *Ncbi.Nlm.Nih.GovKBH Zolnierek, MR DiMatteoMedical Care, 2009•ncbi.Nlm.Nih.Gov*. Retrieved November 13, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2728700/

University of Ghana http://ugspace.ug.edu.gh

APPENDICES

APPENDIX A: INFORMATION SHEET

Project Title: **Assessment of adherence to lifestyle modification plans and medication among patients with cardiovascular diseases in cape coast teaching hospital, Ghana**

I am Esther Gordon, a student of the School of Public Health, University of Ghana. Legon. I am here with my research assistants to carry out a study to find the adherence of the patients to lifestyle modification plan and medication. Specific study sites for this project is the special clinics (heart diseases, hypertension and diabetes clinics) at Cape Coast Teaching hospital . This is purely for research purposes and forms part of a requirement for an MPH degree.

Procedure

The study will involve taking of participants' clinical information and answering questions on socio-demographic factors, and treatment adherence. Duration for the study is four weeks. The information you provide will add to knowledge about the treatment behaviors among patients with CVD's.

Benefits and Risks

Findings from this study will inform policies that will support patients with diabetes live healthier lives with less risk of complications.

There will be no monetary or material compensation for the study. There are also no known risks associated with this study and I am always available to assist with any questions.

Confidentiality

No name will be recorded. Your name and identity are not needed in the study. However, the information you are going to provide will be coded and will be treated strictly confidential. You are assured of total confidentiality to the information you will give. Apart from the researcher and supervisor of this research, no one else will have access to information provided

University of Ghana http://ugspace.ug.edu.gh

whether in part or whole. Data collected will be stored under lock and key then destroyed after a minimum of three years as per research protocol.

Right to refuse

Participation in this study is voluntary. You are free to answer part or the entire questionnaire. You can choose to withdraw from the study or stop the interview at any time you want. You can also choose not to answer any question(s) you find uncomfortable about. No one will be coerced to obtain response from participants, and you are at liberty to withdraw from the study at any time and it will not affect you in any way. Taking part in the study would not affect the quality of care you receive in any way.

You are encouraged to participate fully in this study to help in finding the prevalence of CVD's in the Central Region.

Provision of Information sheet and Consent Forms

A copy of the information sheet and consent forms will be given to you after it has been signed or thumb-printed to take home.

Before Taking Consent

Do you have any questions you wish to ask about the study? Yes/No

If yes, please indicate the questions below.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………
....

Contacts

University of Ghana http://ugspace.ug.edu.gh

If you have any question(s) or further clarification concerning this study and/or the conduct of the researcher and research assistants, please do not hesitate to contact the following;

1. Miss Esther Gordon (Principal Investigator):

   Tel: 0248459511

   Email: effectiveesthergordon@gmail.com

   Or

2. Dr Leonard Baatiema (Supervisor):

   Tel: 0203960643

   Email: leobaatiema@ug.edu.gh

University of Ghana http://ugspace.ug.edu.gh

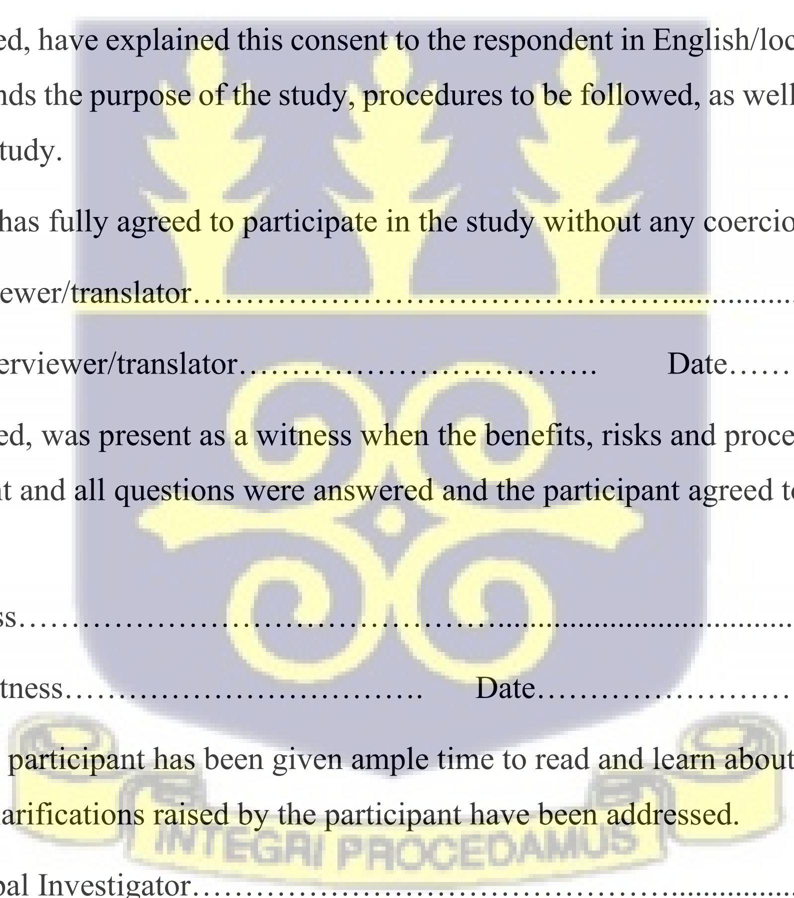
APPENDIX B: CONSENT FORM

I have read the information given above, and I understand. I have been given a chance to ask questions concerning this study and questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw at any time without it affecting my current or future use of health care services. I have been duly informed that a copy of the information sheet and consent forms will be given to me after it has been signed or thumb-printed to take home.

Name of participant: …………………………………………………………………

Signature/Thumb print: …………………………… Date: ………………………..

I, the undersigned, have explained this consent to the respondent in English/local language that he/she understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.



The participant has fully agreed to participate in the study without any coercion.

Name of Interviewer/translator……………………………………….....................

Signature of Interviewer/translator……………………………. Date……………

I, the undersigned, was present as a witness when the benefits, risks and procedures were read to the participant and all questions were answered and the participant agreed to take part in the research.

Name of Witness……………………………………………...............................

Signature of Witness……………………………. Date……………………

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Name of Principal Investigator……………………………………….........................

Signature of Principal Investigator ………………………… Date………

University of Ghana http://ugspace.ug.edu.gh

APPENDIX C: DATA COLLECTION TOOLS

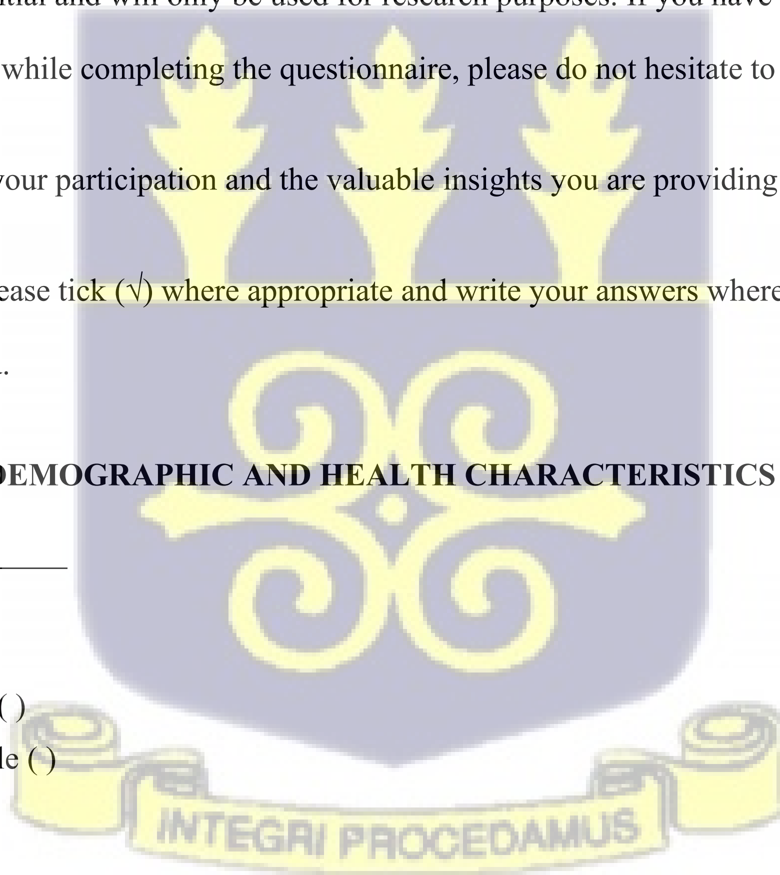
Questionnaires for quantitative data

This questionnaire is divided into nine (8) sections, each designed to gather specific information about your health and lifestyle. It includes questions about your demographic background, health characteristics, medication adherence, lifestyle modifications, social and emotional support, knowledge about cardiovascular health, and the effectiveness of various interventions.

Please take your time to answer each question as accurately as possible. Your responses will remain confidential and will only be used for research purposes. If you have any questions or need assistance while completing the questionnaire, please do not hesitate to ask.

We appreciate your participation and the valuable insights you are providing.

Instruction: Please tick (√) where appropriate and write your answers where necessary in the spaces provided.



SECTION 1: DEMOGRAPHIC AND HEALTH CHARACTERISTICS

1. Age:___________

2. Sex

a. Male ( )
b. Female ( )

3. Smoking

a. Yes ( )
b. No ( )

4. Duration of primary Heart diseases, hypertension or diabetes:___________

5. Presence of Comorbidities

University of Ghana http://ugspace.ug.edu.gh

a. Yes ( )

b. No ( )

6. Type of Comorbidities

a. COPD ( )

b. Depression ( )

c. Dyslipidemia ( )

d. Kidney disease ( )

e. Others ( )

7. Presence of Complications

a. Yes ( )

b. No ( )

8. Type of Complications

a. Retinopathy ( )

b. Neuropathy ( )

c. Nephropathy ( )

9. Fasting blood sugar: ____________

10. Blood Pressure levels: ____________

SECTION 2: MEDICATION ADHERENCE (MARS-10)

Instructions: Please answer the following questions by selecting 'Yes' or 'No'.

No.	Question	Yes (1)	No (0)
1	Do you ever forget to take your medication?	[ ]	[ ]
2	Are you careless at times about taking your medication?	[ ]	[ ]
3	When you feel better, do you sometimes stop taking your medication?	[ ]	[ ]
4	Sometimes, if you feel worse when you take the medication, do you stop taking it?	[ ]	[ ]
5	I take my medication only when I am sick.	[ ]	[ ]
6	It is unnatural for my mind and body to be controlled by medication.	[ ]	[ ]
7	My thoughts are clearer on medication.	[ ]	[ ]

University of Ghana http://ugspace.ug.edu.gh

No.	Question	Yes (1)	No (0)
8	By staying on medication, I can prevent getting sick.	[ ]	[ ]
9	I feel weird, like a 'zombie' on medication	[ ]	[ ]
10	Medication makes me feel tired and sluggish	[ ]	[ ]

University of Ghana http://ugspace.ug.edu.gh

SECTION 3: ADHERENCE TO LIFESTYLE MODIFICATIONS

Instructions: Please answer the following questions by selecting either 'Yes' or 'No'.

No.	Question	Yes (1)	No (0)
1	Did you quit smoking if you are a smoker?	[ ]	[ ]
2	Did you stop alcohol consumption?	[ ]	[ ]
3	Do you do physical activity for 30 minutes a day, 5 days a week?	[ ]	[ ]
4	Do you eat foods with high salt content?	[ ]	[ ]
5	Do you follow a balanced diet?	[ ]	[ ]
6	Do you cope easily with disturbances in your home or working environment?	[ ]	[ ]

SECTION 4.0: SUPPORT ASSESSMENT

Section 4.1: Social Support

No.	Question	Response Choices
1	How many close friends or family members do you feel comfortable confiding in?	None, 1-2, 3-5, More than 5
2	How often do you interact with friends or family members outside of your home?	Daily, Several times a week, Weekly, Less than once a week
3	How often do you participate in social or community activities?	Daily, Several times a week, Weekly, Less than once a week
4	Do you have someone who helps you with transportation to medical appointments or errands?	Yes, regularly; Yes, occasionally; No
5	Do you have someone who assists you with household chores or daily activities?	Yes, regularly; Yes, occasionally; No
6	Are you part of any support groups for individuals with cardiovascular disease or related conditions?	Yes; No
7	How satisfied are you with the support you receive from friends and family regarding your cardiovascular health?	Very satisfied; Somewhat satisfied; Neutral; Somewhat dissatisfied; Very dissatisfied

Section 4.2: Emotional Support

No.	Question	Response Choices
1	Do you have someone to talk to about your feelings regarding your cardiovascular health?	Yes, regularly; Yes, occasionally; No
2	How often do you receive encouragement or emotional support from friends or family regarding your cardiovascular health?	Daily; Several times a week; Weekly; Less than once a week

University of Ghana http://ugspace.ug.edu.gh

Section 4.3: Practical Support

No.	Question	Response Choices
1	Do you have someone who helps you manage your medications or treatment plan?	Yes, regularly; Yes, occasionally; No
2	Do you have someone who accompanies you to medical appointments?	Yes, regularly; Yes, occasionally; No
3	Do you have someone who helps you with meal preparation or dietary management?	Yes, regularly; Yes, occasionally; No

SECTION 5: THE HELM KNOWLEDGE SCALE

No.	Stem	Response Choices
1	A person is considered to have hypertension if either their systolic blood pressure is 140 or their diastolic is 90 or higher on two separate occasions.	True; False
2	Most people can tell when their blood pressure is high because they feel bad.	True; False
3	Uncontrolled hypertension can lead to which of the following:	Lung cancer; Kidney failure; High cholesterol; Diabetes
4	Which of the following increases your risk of having hypertension?	Weight lifting; Drinking >2 cups of coffee a day; Smoking a pack of cigarettes; Gaining 15 pounds
5	People with hypertension do not need to take medicine if they exercise regularly	True; False
6	Which of the following statements about alcohol and hypertension is true?	Alcohol has no effect on BP; Drinking alcohol in moderation can lower BP; Alcohol is good for the heart; Drinking too much can raise BP
7	Hypertension has been linked to a high sodium (salt) intake	True; False
8	To lose weight, you must consume fewer calories than you use	True; False
9	Regular exercise has been shown to lower BP	True; False
10	How many servings of fruits and vegetables do you need a day to maintain a healthy diet?	1-2 servings; 3-4 servings; 5-6 servings; 7-8 servings
11	Treatment of high blood pressure with medication usually continues for how long?	6 months; 1 year; 5 years; Lifelong
12	Which of the following is the most common symptom of high blood pressure?	Chest pain; Difficulty breathing; Dizziness; No symptom

University of Ghana http://ugspace.ug.edu.gh

SECTION 6: CHRONIC DISEASE SELF-EFFICACY QUESTIONNAIRE

Instructions: For each statement below, please select the number that best represents your confidence in your ability to perform the task. Use the following scale:

1 - Not at all confident | 2 - Somewhat confident | 3 - Moderately confident | 4 - Very confident | 5 - Completely confident

Statements	1	2	3	4	5
Managing Symptoms					
How confident are you that you can keep the fatigue caused by your disease from interfering with the things you want to do?					
Daily Activities					
How confident are you that you can keep the physical discomfort or pain of your disease from interfering with the things you want to do?					
Communication with Healthcare Providers					
How confident are you that you can do the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor?					
Maintaining a Healthy Lifestyle					
How confident are you that you can do the things other than just taking medication that can reduce how much your illness affects your everyday life?					
Handling Emotional Challenges					
How confident are you that you can manage your disease in a way that reduces the emotional distress or frustration caused by it?					
Adhering to Treatment Plans					
How confident are you that you can keep your disease from interfering with the things you want to do by following your treatment plan (medications, appointments, lifestyle changes)?					

SECTION 7: INTERVENTIONS AND STRATEGIES

1. **Have you participated in any educational programs about cardiovascular disease management?**
   - Yes
   - No
2. **If yes, how effective did you find these programs?**
   - Very effective
   - Effective
   - Somewhat effective
   - Not effective
3. **Which of the following strategies have been recommended to you by healthcare professionals?** *(Check all that apply)*
   - Regular physical activity
   - Healthy diet (e.g., low sodium, high fruits and vegetables)
   - Medication adherence

University of Ghana http://ugspace.ug.edu.gh

- Smoking cessation programs
- Stress management techniques
- Other (please specify): _______________

SECTION 8: EFFECTIVENESS AND CHALLENGES OF MODIFICATION PLAN

1. **How effective have you found the following strategies in managing your cardiovascular health?**

Regular physical activity:

- Very effective
- Effective
- Somewhat effective
- Not effective

Healthy diet:

- Very effective
- Effective
- Somewhat effective
- Not effective

Medication adherence:

- Very effective
- Effective
- Somewhat effective
- Not effective

University of Ghana http://ugspace.ug.edu.gh

Smoking cessation programs:

- Very effective
- Effective
- Somewhat effective
- Not effective

Stress management techniques:

- Very effective
- Effective
- Somewhat effective
- Not effective

2. **What challenges have you faced in adhering to these strategies?** *(Check all that apply)*
   - Lack of motivation
   - Lack of knowledge or information
   - Financial constraints
   - Lack of support from family/friends
   - Side effects of medication
   - Other (please specify): _______________

University of Ghana http://ugspace.ug.edu.gh

INTERVIEW GUIDE

Adherence to Healthy Lifestyles in Cape Coast Teaching Hospital, Ghana

Introduction

Principal investigator (PI) briefly introduce herself and the purpose of the study.

PI explains the importance of the interview and how the information will be used.

PI assures confidentiality and obtain consent for the interview and recording the interview.

Demographic Information

1. Could you please tell me your age, gender, and occupation?
2. How long have you been diagnosed with cardiovascular disease (CVD)?

Section 1: Current Level of Adherence to a Healthy Lifestyle

Diet

1. Can you describe your typical daily diet?
2. Have you made any changes to your diet since being diagnosed with CVD? If so, what changes have you made?

Exercise:

3. What kind of physical activities do you engage in regularly?

4. How often and for how long do you exercise each week?

Smoking Cessation:

5. Do you smoke? If yes, have you tried to quit smoking since your diagnosis? What methods have you used to quit?

Stress Management:

6. How do you usually manage stress?

7. Have you adopted any new stress management techniques since your diagnosis?

Section 2: Lifestyle Modifications Adopted

8. What specific lifestyle changes have you made since your diagnosis with CVD?
9. Which of these changes do you find most challenging to maintain?

University of Ghana http://ugspace.ug.edu.gh

Section 3: Strategies and Interventions for Promoting Adherence

10. Can you describe any interventions or support programs you have participated in to help manage your CVD?
11. How effective do you think these interventions have been in helping you maintain a healthy lifestyle?
12. What aspects of these interventions were particularly helpful or unhelpful?

Section 4: Barriers and Challenges

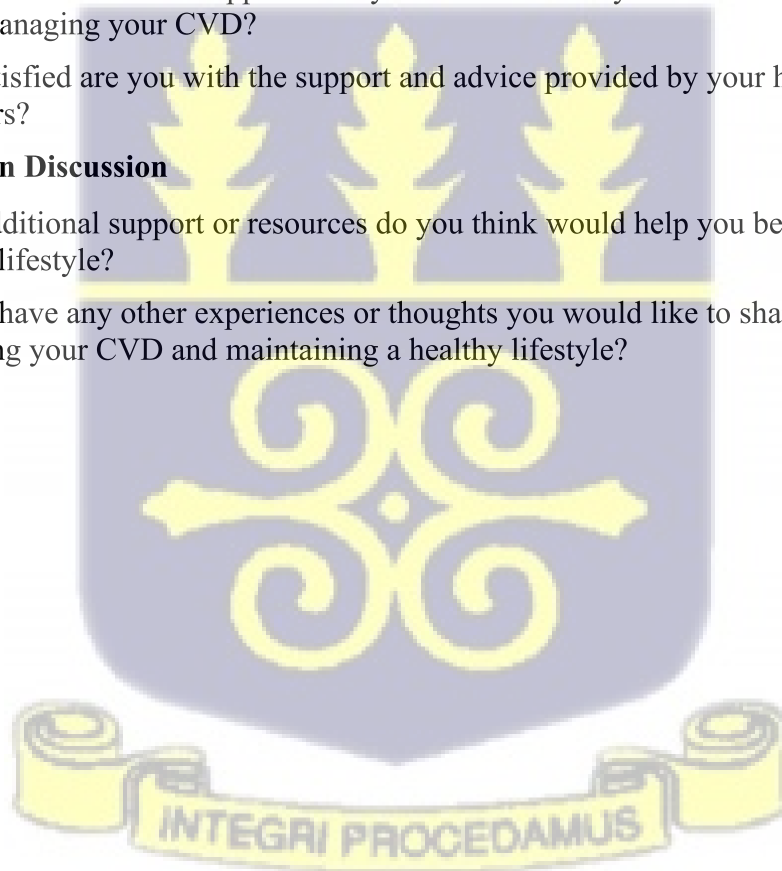
13. What difficulties do you face in trying to adhere to a healthy lifestyle?
14. Are there any cultural or social factors that make it difficult for you to stick to the recommended lifestyle changes?
15. How do financial constraints affect your ability to maintain a healthy lifestyle?

Section 5: Healthcare Providers' Support

16. How would you describe your interactions with healthcare providers regarding lifestyle modifications?
17. What kind of advice or support have you received from your healthcare providers about managing your CVD?
18. How satisfied are you with the support and advice provided by your healthcare providers?

Section 6: Open Discussion

19. What additional support or resources do you think would help you better adhere to a healthy lifestyle?
20. Do you have any other experiences or thoughts you would like to share regarding managing your CVD and maintaining a healthy lifestyle?



University of Ghana http://ugspace.ug.edu.gh

APPENDIX D: ETHICS APPROVAL LETTER

In case of reply the reference number and the date of this letter be quoted

Our Ref.: CCTHERC/EC/2024/111

Your Ref.:

P. O. Box CT.1363
Cape Coast
CC-071-9967
Tel: 03321-34010-14
Fax: 03321-34016
Website: www.ccthghana.org
email:info@ccthghana.com

17th July,2024

Esther Gordon
Dept. of Health Policy Planning and Management
School of Public Health
University of Ghana
Accra

Dear Madam,

ETHICAL CLEARANCE – REF: CCTHERC/EC/2024/111

The Cape Coast Teaching Hospital Ethical Review Committee (CCTHERC) has reviewed your research protocol titled, **"Assessment of Adherence to Lifestyle Modification Plans and Medication Among Patients with Cardiovascular Diseases in Cape Coast Teaching Hospital"** which was submitted for ethical clearance. The ERC is glad to inform you that you have been granted approval for implementation of your research protocol with effect from 17th July,2024 to 16th July, 2026.

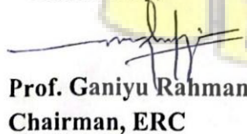
The CCTHERC requires that you submit periodic review of the protocol and a final full review to the ERC on completion of the research. The CCTHERC may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the CCTHERC for review and approval before its implementation.

You are required to report all serious adverse events related to this study to the CCTHERC within ten (10) days in writing. Also note that you are to submit a copy of your final report to the CCTHERC office.

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

Yours sincerely,



Prof. Ganiyu Rahman
Chairman, ERC

INTEGRI PROCEDAMUS