

**ENSIGN GLOBAL COLLEGE
KPONG, EASTERN REGION**

**ADHERENCE TO TREATMENT AMONG ADULTS LIVING WITH HYPERTENSION,
DIABETES AND STROKE IN GHANA**

BY

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**A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH,
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ENSIGN GLOBAL COLLEGE, KPONG

**FACULTY OF PUBLIC HEALTH
DEPARTMENT OF COMMUNITY HEALTH**

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DECLARATION

I, Matilda W. Obeng, hereby certify that except for reference to other people’s work, which I have duly cited, this Project submitted to the Department of Community Health, Ensign Global College, Kpong is the result of my own investigation and has not been presented for any other degree elsewhere.

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(Head of Academic Programme)	Signature	Date

DEDICATIONS

I first and foremost dedicate this work to God Almighty.

Also to my husband, Mr. Charles K. Adu and my children, Meck and Enoch.

ACKNOWLEDGEMENT

My sincere gratitude goes to God Almighty, for the source of my knowledge and overall health during my studies. Surely, it is the Lord who gives victory.

I am also grateful to my dedicated supervisor, Dr. Sandra Kushitor for her exceptional contributions towards this work and the entire faculty members of Ensign Global College for the knowledge impacted in me.

The Sage Wave 2 Data release couldn't have happened sooner, so I wish to thank Emeritus Professor Richard Biritwum and his group for their quick response and cooperation.

Finally, my profound gratitude goes to my husband and children and my entire family for their words of encouragement and support. Also to my colleagues and friends, I say God richly bless you.

ABSTRACT

Introduction: Poor adherence to chronic disease treatment has been characterized by the World Health Organization (WHO) as a worldwide problem of striking magnitude. Many patients have trouble adhering to treatment guidelines. It creates disease-related medical and psychological difficulties, lowers patients' quality of life, and expends healthcare resources. The main purpose of this study was to evaluate adherence to treatment among people living with non-communicable diseases in Ghana, using evidence from the World Health Organization Study of Global Ageing and Adult Health Wave 2.

Methods: A quantitative cross-sectional study design was employed in the study using a secondary dataset. A total of 445 people who responded they have been diagnosed with hypertension, stroke and diabetes were selected from the SAGE Wave 2 data. Descriptive statistics and chi-square analysis were performed with a $p < 0.05$ was considered statistically significant. Adherence was measured by asking the question 'have you taken your prescribed medication within the last two weeks?' This was used to categorize the level of adherence to 'adhered to treatment' and 'not adhered to treatment'.

Results: The most common chronic disease among adults in Ghana is Hypertension (67.42%). Majority of the respondents (76.18%) did not adhere to their treatment plan with only (26.08%) adhering to their treatment. Females, married, and people below age 60 years were significantly more likely to adhere to their treatment plan than males, currently not married and those above the age of 60 years.

Conclusion: Treatment adherence is generally low among adults living with Hypertension, Diabetes and Stroke in Ghana. Health practitioners should identify what hinders males from

adhering to treatment and also intensify education and screening to identify early diagnosis of chronic diseases.

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LIST OF ABBREVIATIONS

CVD	Cardiovascular Diseases
DALYs	Disability-Adjusted Life Years
IMB	Information Motivation Behavioral skills
LMICs	Low and Middle Income Countries
MOH	Ministry of Health
MRCI	Medication Regimen Complexity Index
NCDs	Non-communicable Diseases
NHIS	National Health insurance Scheme
OECD	Organization for Economic Co-operation and Development
SAGE	Study of Global AGEing and Adult Health
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Chronic diseases are long-term illnesses that are brought about by a confluence of genetic, physiological, environmental, and behavioral characteristics (WHO, 2021). Cardiovascular diseases (CVDs) (coronary and congenital heart diseases), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes are the most common NCDs ((Budreviciute *et al.*, 2020);WHO, 2021)). NCDs are the largest cause of mortality globally, according to the WHO, accounting for 71% (41 million) of all mortality annually. Cardiovascular diseases (17.9 million deaths per year), malignancies (9.0 million), respiratory illnesses (4.1 million), and diabetes (1.5 million) are the four leading causes of mortality among NCDs (WHO, 2021). NCDs largely wreak persons in low- and Middle-Income Countries (LMICs), where 31.4 million (77% of NCD deaths, worldwide) people die from NCDs (Ndubuisi, 2021).

NCDs are known to impair people's physical and socio-economic capabilities, as well as the well-being, life quality, and financial viability of health services (WHO/OECD, 2018). They have an impact on diverse people; including age groups, sex, occupation, ethnicity, race, and nationality (Kufe *et al.*, 2016). Despite the fact that research shows that more than 15 million of all NCD-related fatalities occur in people between the ages of 30 and 69, these illnesses have traditionally been associated with the elderly population. (PAHO, 2022). LMICs account for 85% of these "untimely" deaths (Kassa & Grace, 2019). Youngsters, adults, and the aged are all prone to the risk factors that contribute to NCDs, such as poor nutrition, lack of physical activity, cigarette smoke inhalation, and excessive alcohol consumption (Budreviciute *et al.*, 2020).

Poor adherence to chronic disease treatment has been characterized by the World Health Organization (WHO) as a worldwide problem of striking magnitude' (WHO, 2021). Treatment adherence, which is a public health concern, is especially important in chronic illness regimens. As the global burden of chronic disease conditions rises, so does the impact of poor adherence (Danielson et al., 2019; Fernandez-Lazaro et al., 2019).

Even though several studies have concentrated on medication therapy, adherence involves a wide range of health-related behaviors that transcend using prescribed pharmaceuticals (Khabala et al., 2015; Mohamad et al., 2021; Nakajima et al., 2021; Raj & Mathews, 2020; Xu et al., 2021; Yuvaraj et al., 2019). This is because multiple factors affect adherence at the same time. Patients' capacity to commit to treatment programs optimally is sometimes hampered by more than one impediment, which is usually connected to multiple aspects of their health condition. Though many of these elements are connected to the patient, the features of the disease and its treatment, as well as the peculiarities of the healthcare delivery system, have a significant impact. Social and economic variables, the health-care team/system, illness features, disease treatments, and patient-related variables are among them (Budreviciute et al., 2020; Mwangi et al., 2020).

Adherence boosts the efficiency of both dietary and pharmacological-based risk-reduction programs targeted at encouraging healthy behaviors, like physical health, non-smoking, and safer sexual behaviors (Chan & Perry, 2012; Spring et al., 2012). Through primary prevention (of risks) and secondary prevention (of undesirable health repercussions), interventions aiming at promoting adherence would give a considerable positive return on health outcomes for people living with NCDs (Okuboyejo & Eyesan, 2014).

In Ghana, NCDs are shown to play a substantial role in morbidity, impairment, and mortality (Owusu *et al.*, 2021). Cardiovascular diseases, malignancies, diabetes, chronic respiratory

illnesses, and sickle cell disease used to be the leading NCDs in Ghana, as reported in Ghana's "National Policy for the Prevention and Control of Chronic Non-Communicable Diseases (MOH, 2012). However, in recent times, hypertension has taken over as the most prevalent NCD in the country (Sanuade, Boatemaa and Kushitor, 2018). In addition, lifestyle risk factors such as smoking, harmful alcohol use, unhealthy diet, and physical inactivity are on the rise (Owusu-Dabo *et al.*, 2009; Afrifa-Anane *et al.*, 2015).

Thus, the preceding discussion warrants more investigations into this global issue in different contexts, as it holds the prospect of improved health outcomes and economic efficiencies. In light of this, the purpose of this study is to evaluate adherence to treatment among adults living with hypertension, diabetes and stroke in Ghana, using evidence from the Wave 2 of the World Health Organization Study of Global Ageing and Adult Health.

1.2 Statement of the Problem

The epidemiological transition from acute to chronic disease in advanced nations over the last 50 years has left acute care approaches to healthcare provision unsuitable to meet the public health demands. This change is happening considerably faster in the developing world, according to a Lancet report on acute and chronic diseases and injuries in 188 countries, 1990 - 2013 (Vos, Barber, Bertozzi-Villa, & Biryukov, 2015).

LMICs like Ghana account for four out of every five chronic illness fatalities worldwide today (Amu *et al.*, 2021). According to WHO, NCDs are responsible for 34% of deaths and 31% of disease burden in Ghana. Ghana's Ministry of Health (MOH, 2012) reports that NCDs kill an estimated 86,200 individuals per year, with 55.5 % of those under the age of 70 and 58 percent of men being affected. Males have an age-standard NCD death rate of 817 per 100,000, while females have a rate of 595 per 100,000. They account for 2.32 million DALYs or 10,500 DALYs

per 100,000 people. The burden of the leading NCDs in Ghana is predicted to grow as a result of aging, urbanization, and unhealthy lifestyles.

In affluent nations, adherence to long-term therapy for chronic disorders averages 50% owing to a lack of healthcare resources and inequality in healthcare access, the scale, and severity of poor adherence in developing nations are expected to be substantially greater (Lam & Paula, 2015). Economic poverty and chronic illness have a two-way interdependent link (Whittle et al., 2017). Whittle et al. (2017) argue further that despite regional variations in location, lifestyle, and trade, most of the world's poor people go through the same painful cycle over and over again: health needs money for food, sanitation and medical care, and health needs money to make money. Lack of proper treatment for chronic diseases places a particularly high pressure on impoverished families to care for their near and dear ones, jeopardizing the fulfillment of their most fundamental duties. Jayathilaka et al., also reported that low-income households are at the greatest risk of getting chronic illnesses and dying prematurely (2020). For a variety of reasons, such as their inability to fund medical bills and limited access to healthcare services, such households are particularly susceptible.

The needs of chronically poor communities undermine efforts to meet the needs of patients with long-term care needs, including medication and adherence issues. Adherence to treatment is higher in patients with an acute illness than with chronic diseases (Majeed *et al.*, 2021). Poor adherence exacerbates the difficulties of improving health in low-income communities, resulting in waste and underuse of already few treatment resources (Benjamin, Edwards, Ploeg, & Legault, 2014). Adherence difficulties are seen in all scenarios requiring self-administration of therapy, irrespective of the kind of condition, the severity of the condition, or the availability of

healthcare support. Even if it seems like a simple problem, compliance issues arise for a number of reasons. (Luga & McGuire, 2014).

Poor adherence reduces the maximum therapeutic benefit and opens the door to problems, making it a key predictor of therapy efficacy (Rao et al., 2014). Many patients have trouble adhering to treatment guidelines (Lam & Paula, 2015). Many people with chronic conditions such as asthma, high blood pressure, diabetes and HIV/AIDS struggle to stick to their prescribed treatment plan. As a result, the disease cannot be treated effectively. Poor adherence is the major cause of poor clinical outcomes (Konstantinou et al., 2020; Viswanathan et al., 2012). This causes medical and psychological problems related to the disease, reduces the quality of life of patients and wastes medical resources. (Wilder, Clays, Devleeschauwer, & Pype, 2020). These immediate implications, taken collectively, limit the capacity of healthcare delivery systems to meet public health goals (Silina & Kalda, 2018).

According to Bosu and Bosu, a lesser number of persons with NCDs in Ghana, between 1.7 and 12.7%, have their disease condition under control (2021). An introduction to the problems and priorities of Ghana's health service delivery system is required to offer a detailed awareness of the different challenges connected with controlling NCDs in Ghana (Amu et al., 2021). Even though the sector views NCDs as a new public health concern, long-standing health issues such as infectious illnesses, maternity, neonatal, and newborn fatalities, malaria, and sanitation continue to get major health-system funding (Laar et al., 2019). Aside from priority and system-level difficulties, there is a recognized discrepancy in health care delivery or receipt, which the National Health Insurance Scheme (NHIS) ineffectively addresses (Blanchet et al., 2012). Therefore, further studies are needed to assess these factors among Ghanaians living with NCDs.

1.3 Rationale of Study

NCDs threaten a major milestone in the 2030 Agenda for Sustainable Development, which calls for reducing premature deaths from NCDs by a third by 2030. As a result, NCDs have been recognized as an important task for sustainable development in the 2030 Agenda for Sustainable Development. (WHO, 2022). The main goal of the project is to improve adherence with treatment methods commonly used for the treatment of chronic diseases. in Ghana, which will among many things, benefit patients, the Ghanaian health system, and its society with better health outcomes and economic efficiency. Summarizing existing knowledge on adherence can further inform policy development and raise awareness among health stakeholders and managers of the issue of non-adherence and its health and economic consequences for Ghana and the world. It will also promote scientific discussion of issues related to adherence and add to lay the foundation for future research in the academic community.

1.4 Conceptual Framework

A very recent and useful model that provides general theoretical perspectives on adherence is the Information–Motivation–Behavioral Skills Model (IMB model) recommended by the WHO (Figure 2). The IMB model included aspects from prior models such as biomedical, behavioral, communication, and cognitive perspectives, to provide a conceptually based, widely applicable, and easy model for understanding complicated health behaviors (Kisa & Roberto , 2003).

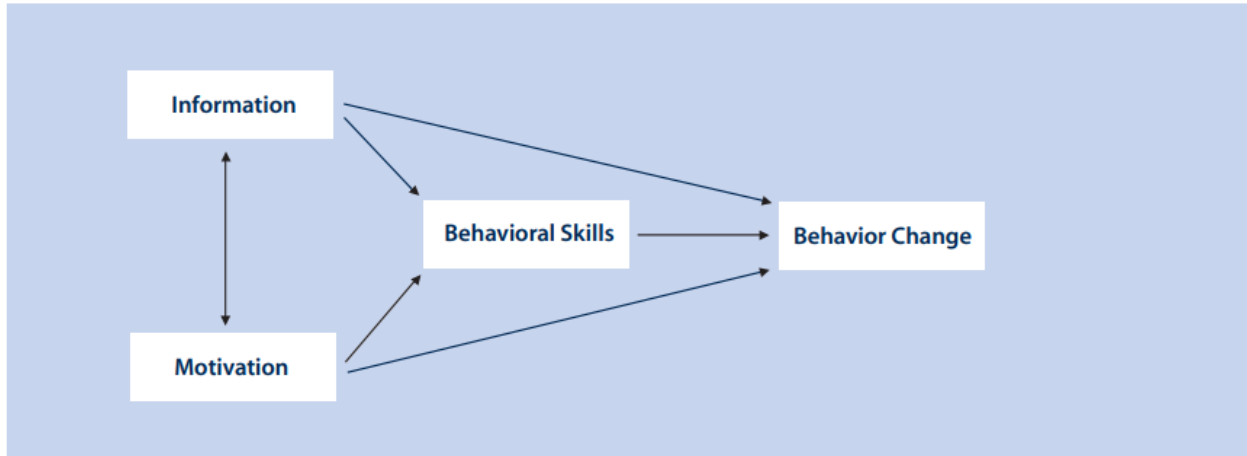


Figure 1.1 – WHO's Information-Motivation-Behavioral Skills Model on Adherence. Source (Kisa & Roberto , 2003)

Below are **the IMB** structures and how they relate to patient adherence.

- **Information** refers to the fundamental understanding regarding a medical problem, such as how the illness arises, its projected course, and successful management options.
- Personal attitudes toward adherence behavior perceived social support for such behavior and the patient's subjective norms or senses about how others with the medical condition will behave are all factors that go into **motivation**.
- **Behavioral skills** involve ensuring that the patient has the specific behavioral skills or techniques required to perform the adherence behavior, such as support networks and other self-control procedures.

The IMB model indicates that while information is necessary for modifying behavior, it is insufficient in and of itself. Motivation and behavioral skills are both important factors of behavior modification. Information and motivation influence behavior primarily through behavioral skills; but, when behavioral skills are simple and basic, information and motivation can have direct impacts on behavior (see figure 2). In this case, the patient can fill a prescription

(routine care) based on the information provided by the healthcare provider. Informational and motivational structures are poorly connected. In fact, both highly motivated people with little information and highly informed people with little motivation are possible. In the IMB model, the presence of information and motivation increases the likelihood of adherence to a treatment plan. (Kisa & Roberto , 2003).

WHO’s Five Dimensions to Adherence

The WHO made a more important contribution to the understanding of compliance by stating that compliance is a multidimensional phenomenon governed by the interaction of a set of five factors, also referred to as "dimensions". Socioeconomic variables, patient-related factors, clinical situation-related factors, treatment-related factors and health system-related factors are among the five interconnected dimensions (figure 3) (Perez-Ruiz & Desideri, 2018).

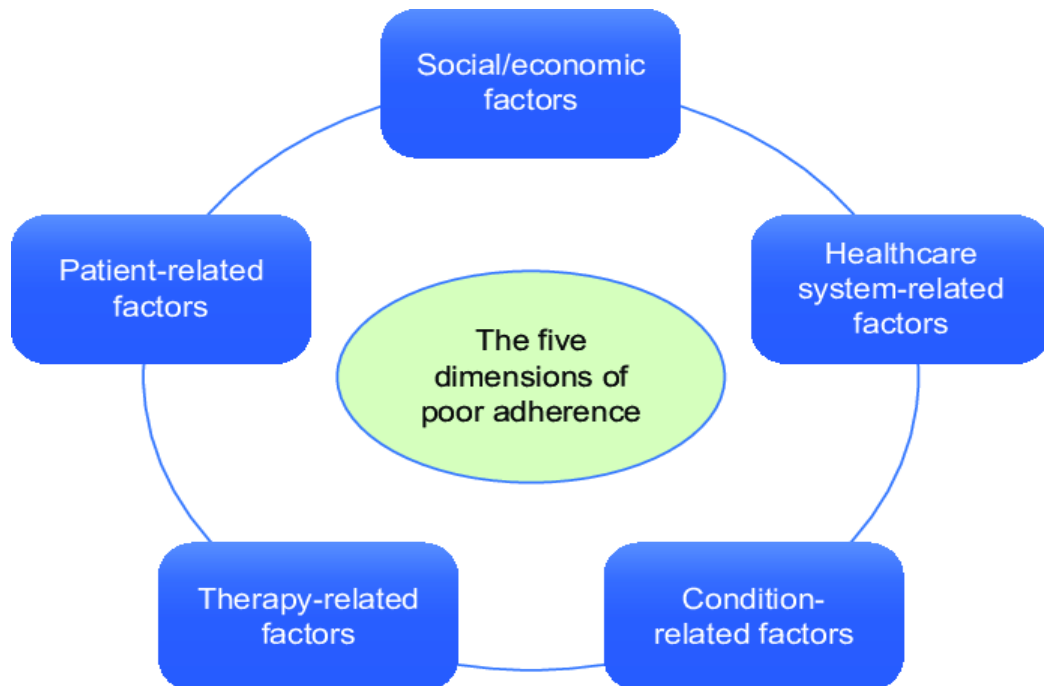


Figure 1.2 - The Five dimensions of Poor Adherence. Adopted image from (Perez-Ruiz & Desideri, 2018)

These factors are considered in detail in chapter two – the Literature Review section of this report. Each of the factors in isolation and how they collectively affect the treatment adherence.

1.5 Research Questions

1. What are the types of non-communicable diseases adults in Ghana are living with?
2. What is the level of adherence to treatment among adults living with hypertension, diabetes and stroke in Ghana?
3. What characteristics of respondents are associated with adherence to hypertension, diabetes and stroke in Ghana?

1.6 General Objective

The general objective of this research is to assess adherence to treatment among people living with hypertension, diabetes and stroke in Ghana, using evidence from the World Health Organization Study of Global Ageing and Adult Health Wave 2.

1.7 Specific Objectives

1. To assess the types of non-communicable diseases adults are living with in Ghana.
2. To determine the level of adherence to treatment adults living with hypertension, diabetes and stroke in Ghana.
3. To assess the characteristics of respondents associated with adherence to hypertension, diabetes and stroke in Ghana.

1.8 Profile of Study Area

Ghana is located on the west coast of Africa and has a total area of 238,540 km². The total length in the north-south direction is 670 km, and the longest in the east-west direction is 560

km. It borders Ivory Coast to the west, Burkina Faso to the north and Togo to the east. To the south is the Atlantic Ocean and the Gulf of Guinea. (Worldometer, 2022).

According to Figure 1.1, the country is divided into 16 administrative areas. Also, because the secondary dataset utilized in this study spans times before the introduction of the new regions in 2018, the analysis will focus on the former ten (10) regions rather than the presently sixteen (16) regions. The methodology portion of this paper goes into further discussion on this.

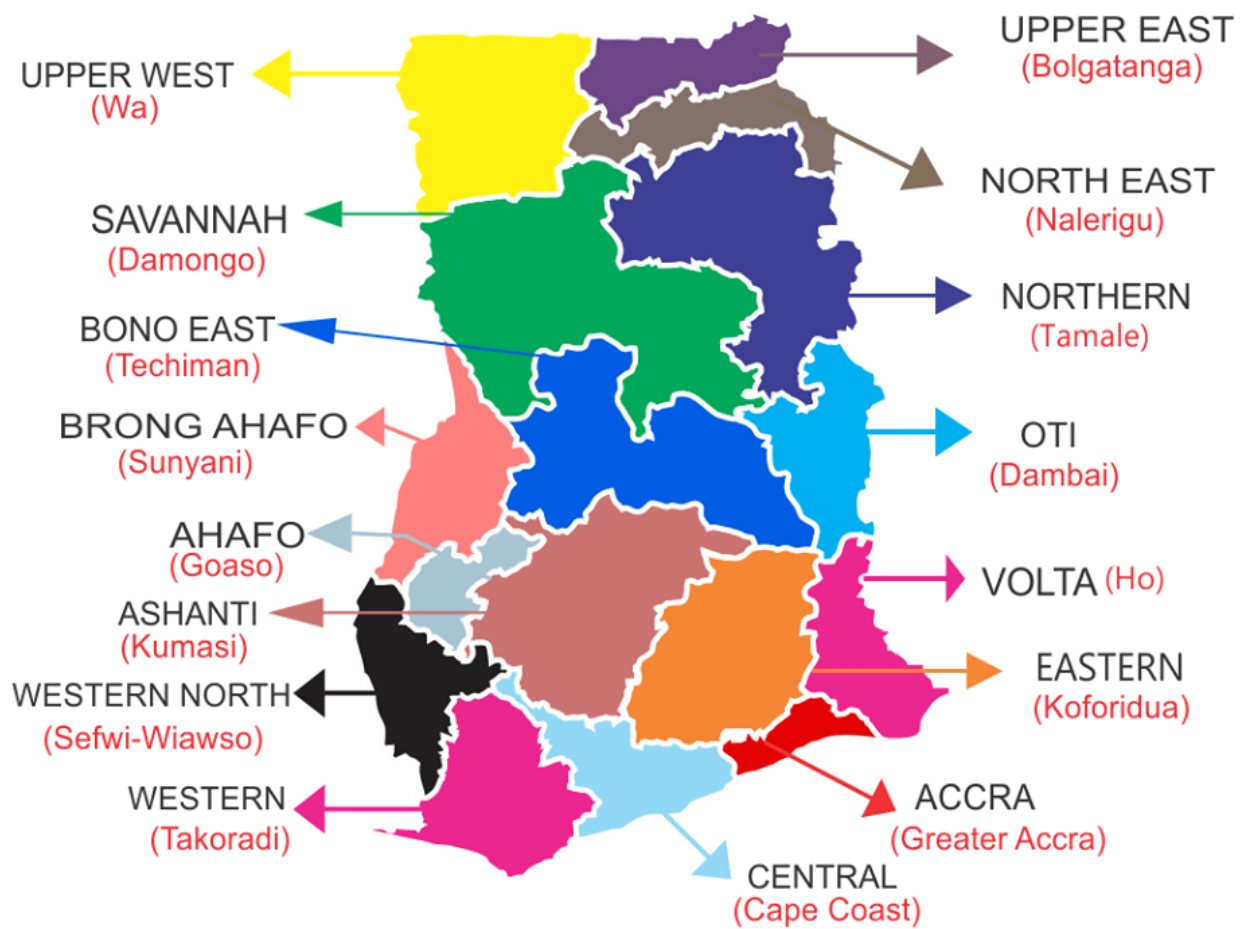


Figure 1.3 - The New Ghana Map Showing Regions and Their Capitals

According to the latest United Nations’ data collected by Worldometer, as of Friday, May 20, 2022, the current population of Ghana is 32,289,496. (Worldometer, 2022). Ghana is rated

number 47 on the list of nations (including dependent territories) by population, with a population of 0.4% of the global population. With a median age of 21.5 years and a Total Fertility Rate (TFR) of 2.1, urbanization accounts for 56.7 % (17,625,567 people in 2020). Replacement-Level Fertility is defined as the average number of children per woman required for each generation to exactly replace itself without requiring international immigration. The total life expectancy of both sexes at birth is 64.9 years. The current infant mortality rate is 30.8 deaths per 1000 live births, with 44.7 fatalities per 1000 live births for children under the age of five (Worldometer, 2022). Non-communicable diseases are responsible for 43% of all deaths in Ghana (Musah, 2019).

1.9 Scope of Study

The scope of any study defines the contextual boundaries covered by the research as the researcher engages in the study. Studies have been conducted on NCD treatment in Ghana and beyond. Yuvaraj et al. (2019) looked at the prevalence of medication adherence and its associated factors among patients with noncommunicable diseases in rural Puducherry, South India. In Ghana, Amu et al. (2021) conducted a qualitative study on the management of chronic non-communicable diseases among 82 patients. Laar et al. (2019) also researched health system challenges to hypertension and related non-communicable diseases prevention and treatment from the perspectives of Ghanaian stakeholders.

The focus of this study will be on adherence to treatment among people living with non-communicable diseases in Ghana, using evidence from the World Health Organization study of Global Ageing and Adult Health Wave 2.

1.10 Organization of study

Chapter One displays the introduction, which comprises the background of the study, the problem statement, the rationale of the study, the conceptual framework, research questions, and objectives, profile of study area and scope of study. Chapter Two entails the literature review: the selection and analysis of available published works concerning the topic under study. Chapter Three describes the methodology followed by Chapter Four which presents the analysis of data as presented according to the study objectives. Chapter Five consists of the discussion of results using existing information. Chapter Six finally provides conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature on adherence to treatment among people living with non-communicable diseases is carefully examined in this chapter to identify empirical gaps to be filled by this study. This review is driven by the study's objectives and conceptual framework. The chapter ends with a summary of the gaps in the literature that this research aims to fill.

2.2.0 Non-Communicable Diseases

2.2.1 NCDs, what are they?

The term "NCDs" refers to a group of illnesses that typically require long-term care, are not primarily brought on by an acute infection, and have long-term health repercussions.(WHO, 2021) . Cancers, cardiovascular disease, diabetes, and chronic lung diseases are among these conditions. Many other important conditions, such as injuries and mental health disorders, are also classified as NCDs. The main types of NCD (figure 2.1) are cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes (Budreviciute et al., 2020; PAHO, 2022). In addition to being long-lasting, NCDs are also brought on by a combination of genetic, physiological, environmental, and behavioral factors. (PATH, 2020).

Poor diets, lack of physical activity, cigarette smoke exposure, and excessive alcohol intake are all risk factors that contribute to NCDs in children, adults, and the elderly. These conditions are caused by rapid unplanned urbanization, globalization of unhealthy lifestyles, and population aging (WHO, 2021).

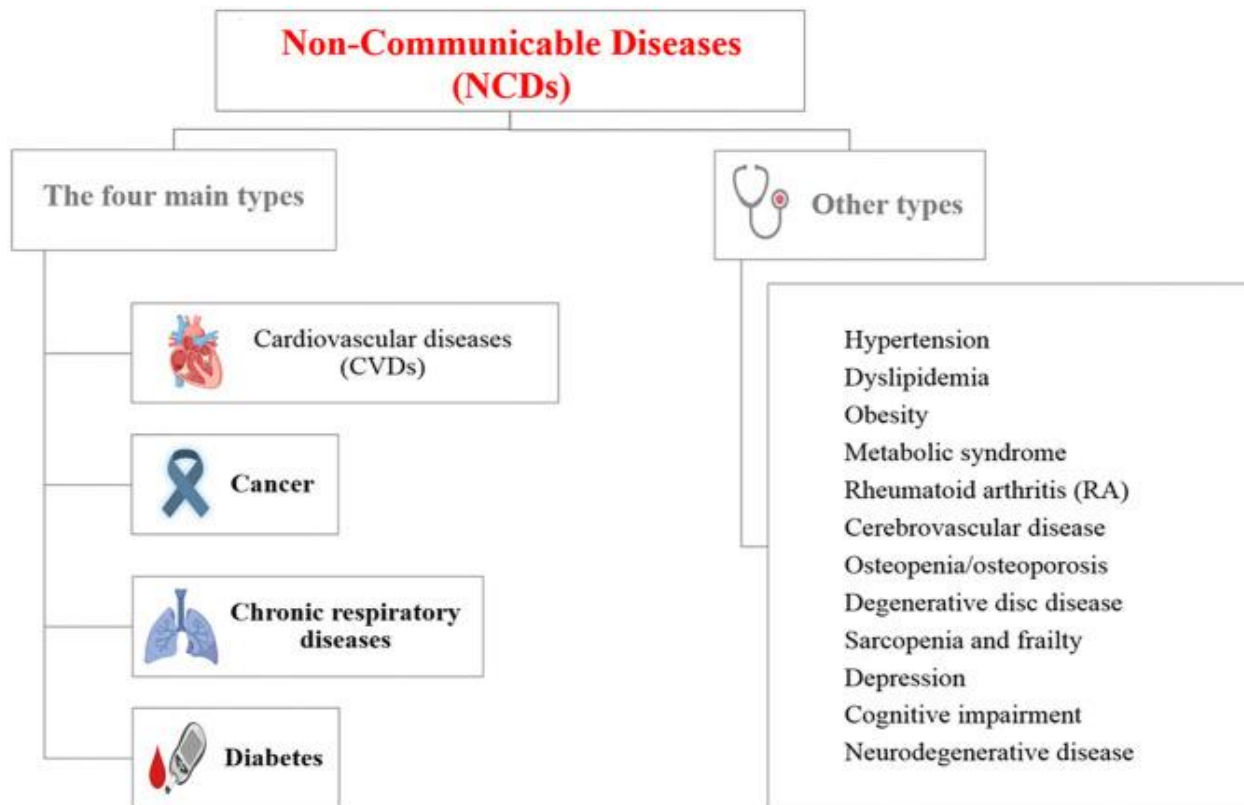


Figure 2.1 - List of non-communicable diseases. Source (Budreviciute, Damiati, Sabir, & Onder, 2020)

2.2.2 Risk Factors of NCDs

Tobacco use, lack of exercise, an unhealthy diet, and excessive use of alcohol are all controllable actions that raise the risk of NCDs (WHO, 2021). Tobacco kills more than 8 million people per year (more than 7 million of the cases are from indirect smoking), and the number is expected to rise dramatically in the future years (WHO, 2022). Excess salt/sodium intake has been linked to 4.1 million fatalities per year. NCDs, such as cancer, account for more than half of the 3.3 million yearly mortality caused by alcohol consumption. Inadequate regular exercise is responsible for 1.6 million deaths per year (Carlson et al., 2018; PAHO, 2022; WHO, 2021).

2.2.3 Prevalence of NCDs

Everyone, regardless of age, background, or country is affected by NCDs.(WHO, 2021). Although these illnesses are typically associated with older age groups, data estimates that more than 15 million of all NCD-related deaths occur between the ages of 30 and 69, with low- and middle-income countries accounting for 80% of these "untimely" mortalities. People in low- and middle-income countries, which account for 31.4 million of the world's NCD mortality, are disproportionately affected by NCDs (Ginsburg, 2013; Martinez et al., 2020). Non-communicable diseases like cancer, cardiovascular disease, and diabetes are increasingly becoming Sub-Saharan Africa's leading cause of death, where they accounted for 37% of deaths in 2019, up from 24% in 2000, owing to flaws in the implementation of critical control measures like prevention, diagnosis, and care (WHO Africa, 2022).

According to Ghana's Ministry of Health (MOH, 2012), NCDs are responsible for 34% of fatalities and 31% of the disease burden in Ghana. The ministry reports that each year, NCDs kill an estimated 86,200 people in Ghana, with 55.5 % of those under the age of 70 and 58 % of men affected. Males have an age-standardized NCD mortality rate of 817 per 100,000, while females have an age-standardized NCD death rate of 595 per 100,000. They result in a loss of 10.500 DALYs per 100,000 people, resulting in 2.32 million DALYs.

2.2.4 The socioeconomic impact of NCDs

NCDs have the potential to devastate personal financial security as well as national economic progress. NCDs commonly strike persons during their most productive years in low- and middle-income nations. NCD-related healthcare expenses swiftly deplete household resources in low-resource settings. NCDs' costly expenses, which include sometimes extensive and expensive

medication as well as lost income, push millions of people into poverty each year and hinder growth (CDC, 2021; Kazibwe et al., 2021).

NCDs and poverty are inextricably related (Niessen, Mohan, Akuoku, & Mirelman, 2018). The fast growth in NCDs is expected to stymie poverty reduction efforts in low-income nations, notably by raising family healthcare expenses (WHO, 2021). Vulnerable and socially disadvantaged individuals are sicker and die sooner than persons in better social positions, owing to their increased risk of exposure to dangerous items like nicotine and bad eating patterns, as well as their constrained access to health care services (Pampel, Krueger, & Denney, 2011).

When people with NCDs have high healthcare bills and a limited capacity to work, their families are put in a bad financial situation. High healthcare costs and lower productivity put pressure on emerging nations, obstructing social and economic growth (Kazibwe, Tran, & Annerstedt, 2021). NCDs are jeopardizing progress toward the 2030 Agenda for Sustainable Development, which calls for a one-third reduction in premature deaths from NCDs by 2030 (WHO, 2021).

2.2.5 Prevention and control of NCDs

Focusing on lowering the risk factors linked with NCDs is an essential method of managing these illnesses (Budreviciute, Damiani, Sabir, & Onder, 2020). Many NCDs may be averted by avoiding common risk factors including smoking, drinking too much alcohol, being inactive, and eating unhealthy foods (PAHO, 2022). Governments and other stakeholders may lower the prevalent modifiable risk factors using low-cost alternatives. It is critical to track the progress and trends of NCDs and associate them to guide policy and priorities (WHO, 2021).

To decrease the burden of NCDs on people and society, a broad strategy is required, involving collaboration from many industries, spanning health, finance, transportation, education,

agriculture, management, and many others to lower NCD risks and implement measures to prevent and mitigate them (Budreviciute, Damiani, Sabir, & Onder, 2020). NCD control includes identifying, diagnosing, and managing these diseases, as well as providing palliative care to those who require it (WHO, 2021). To increase earlier diagnosis and timely treatment, high-impact critical NCD therapies may be offered through a primary care strategy. Hague et al. (2020) noted that such therapies are good financial expenditures because, if given to patients early enough, they can prevent the need for more expensive therapy.

2.3.0 Adherence

2.3.1 What is Adherence to treatment?

Although the majority of research (Khabala et al., 2015; Konstantinou et al., 2020; Lam & Paula, 2015; Viswanathan et al., 2012; Xu et al., 2021; Yuvaraj et al., 2019) has focused on “medication” adherence involves a wide range of health-related behaviors that go beyond taking medications as recommended. WHO defines adherence as “the extent to which a person's behavior-taking medication, following a diet, and executing lifestyle changes corresponds with agreed recommendations from a healthcare provider (Brown & Bussel, 2011; Kisa & Roberto , 2003). As a result, the concept of adherence to "medication" is insufficient to describe the wide range of therapies utilized to treat non-communicable illnesses. For instance, managing diabetes needs more than simply taking medication (Kassahun, Gesesew, Mwanri, & Eshetie, 2016). Other parts of diabetic self-management, like blood glucose self-monitoring, dietary limitations, frequent foot care, and ocular exams, have all been found to significantly minimize the occurrence and severity of diabetes (Takele, Weharei, Gebrekidan, & Gebregiorgis, 2021).

Effective adherence enhances the efficiency of both dietary and pharmacological-based risk-reduction programs aimed at encouraging healthier choices, such as regular physical exercise,

non-smoking, and safe sexual conduct (Artinian, Fletcher, Mozaffarian, & Kris-Etherton, 2010). It also has an impact on secondary prevention and illness treatment strategies (Koh, Cheng, Yap, & Haldane, 2018). Considering that poor adherence reduces maximum therapeutic benefits (Brown & Bussel, 2011), adherence is suggested as a key predictor of therapy efficacy (Fernandez-Lazaro, García-González, Adams, & Fernandez-Lazaro, 2019). With a better knowledge of whether poor adherence is primary (pharmacotherapy commencement) or secondary (implementation of the recommended regime), as well as the circumstances that contribute to it, an appropriate intervention may be personalized to each patient's treatment behavior for optimum therapeutic benefits (Lam & Paula, 2015).

Adherence in this study is based on the respondents' action in taking their medications in the past two weeks to the time of the study. Respondents who have taken their prescribed medication within this time are said to have adhered to the treatment while those who have not taken their medications within the same time frame are said not to adhere to treatment. This is a binary variable of one (1) for adherence and zero (0) for not adherence.

2.3.2 Measurement of Adherence

For successful and efficient treatment planning, as well as to ensure that improvements in health outcomes can be linked to a proposed regimen, a holistic assessment of adherence behavior is crucial (Lam & Paula, 2015). Furthermore, a rigorous and reliable assessment of the adherence construct is required for considerations to adjust recommendations, drugs, and/or communication styles to enhance patient engagement (Agala, Fried, Thomas, & Reynolds, 2020).

According to the WHO (Kisa & Roberto , 2003), there is no "gold standard" or optimal measurement for evaluating adherence behavior, but instead, the literature has documented the use of a range of methodologies. One method of measurement is asking clinicians and patients

for their subjective judgments of adherence behavior through a standardized patient-administered questionnaire (Anghel, Farcas, & Oprean, 2019). This method is problematic, according to Bemt et al. (2012), as healthcare providers tend to overestimate patient adherence when rating the degree to which they follow their advice. Likewise, Lam & Paula (2015) also noted the difficulties in analyzing patients' subjective reports, as patients who admit to not following treatment instructions tend to describe their conduct correctly, while those who deny not following guidelines tended to describe their behavior incorrectly. This notwithstanding, Cook et al. (2017) indicated that survey evaluates certain behaviors and specific medical advice may be stronger predictors of adherence behavior. For instance, food frequency surveys for monitoring dietary activity and boosting overweight management

No particular measurement method is effective. The current state-of-the-art in adherence behavior evaluation is a multi-method that integrates practicable self-reporting and realistic assessment methods such as changes in reasoning (Phillips, Brittain, Mellins, & Zerbe, 2017).

2.3.3 The Nature of Adherence to Treatment

Patients are given different therapies depending on the scope of the requirements expected of them. They can range from very simple and well-known actions to more sophisticated and unique ones. Some therapies just need one activity, whereas others require many behaviors. The amount of time for which a regimen must be completed varies as well. This means that the extent and scope of adherence vary depending on the regimen's unique treatment requirements (Cave, 2020; Davies, 2020).

Patients' capacity to satisfy such expectations varies, as do the available resources and the contextual circumstances described previously (Berhane & Enquesselassie, 2016). Presumably, adherence is better seen as the way of trying to satisfy the treatment-related

behavioral expectations presented by a disease condition over the duration of that sickness (Molina-Mula & Gallo-Estrada, 2020). This behavioral paradigm enables us to more precisely define adherence in terms of the type of activity, permissible regularity, continuity, severity, and/or correctness (Kisa & Roberto , 2003).

Regardless of the evidence to the contrary, there is still a tendency to blame difficulties with adherence on patient-related attributes, while caregiver and health-system-related factors are largely ignored (Kardas, Lewek, & Matyjaszczyk, 2013). Nevertheless, these components also contribute to the healthcare milieu in which patients are treated and have a significant impact on adherence (Nduaguba, Soremekun, Olugbake, & Barner, 2017). The widely held notion that patients are completely responsible for adhering to their therapy is mistaken, and it frequently demonstrates a lack of comprehension of how other variables influence individual choices and the ability to adhere to their treatment (Rogliani, Ora, Puxeddu, & Matera, 2017).

Adherence is a multifaceted phenomenon influenced by the interaction of five sets of elements, referred to as "dimensions" by the WHO (Kisa & Roberto , 2003), of which patient-related characteristics are only one (Figure 2.2). The five dimensions are explored briefly below.

Poor socioeconomic status, poverty, illiteracy, low levels of education, unemployment, lack of effective social support networks, unstable living conditions, a long distance from the treatment center, high transportation costs, high medication costs, changing environmental situations, culture, and lay beliefs about illness and treatment, and family dysfunction are all **social and economic factors** (Kisa & Roberto , 2003).

Health care team and system-related factors on adherence include, inadequate or non-existent reimbursement from health insurance plans, poor health care services, poor drug delivery

systems, lack of education and training of providers in chronic disease management, overworked providers, lack of incentives and performance feedback, short consultations , patient education and poor follow-up systems capacity, inability to build community support and self-management capacity, and lack of knowledge about effective interventions to improve adherence. (Kisa & Roberto , 2003).

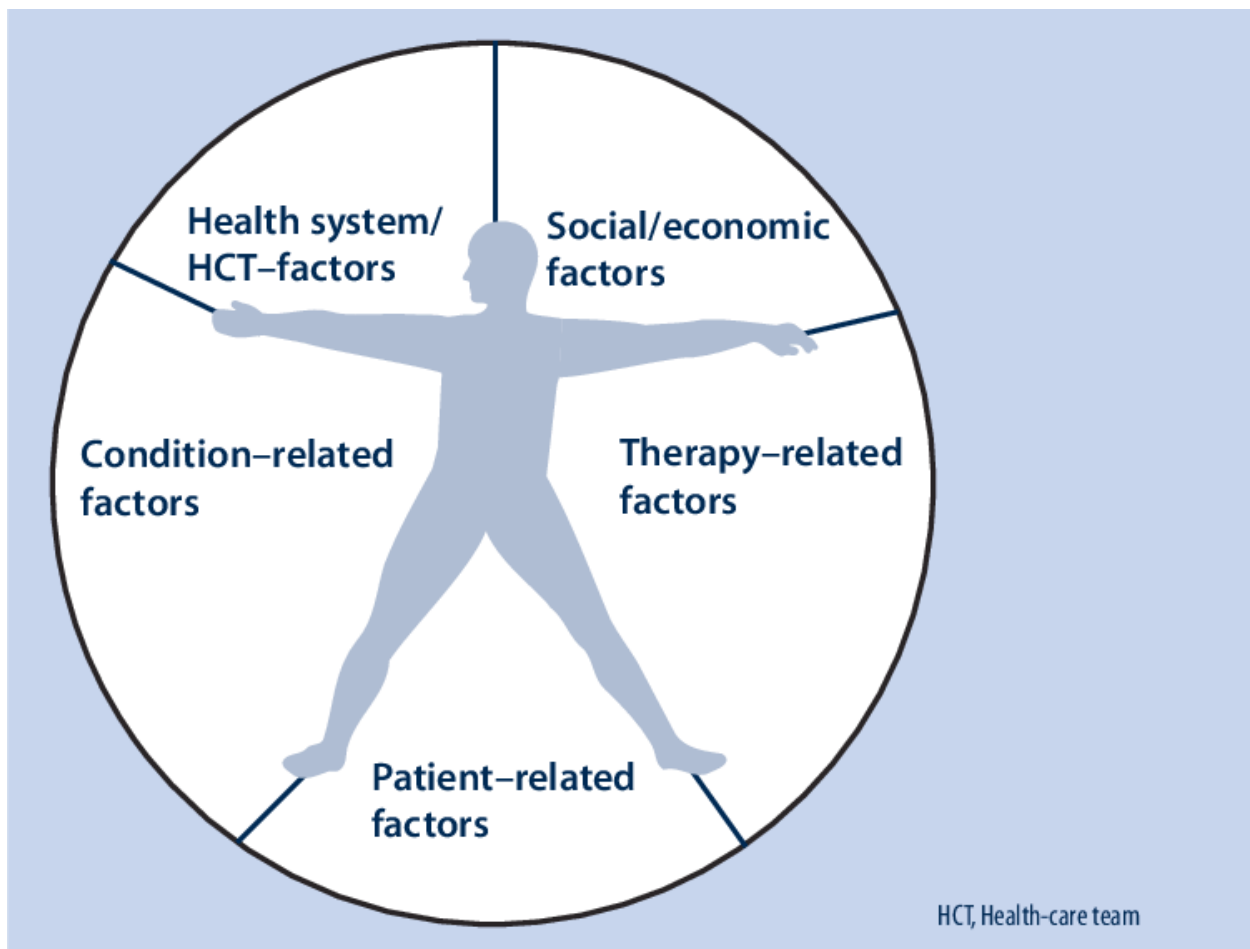


Figure 2.2 - The five dimensions of Adherence. Source (Kisa & Roberto , 2003)

The patient's illness-related demands are represented by **condition-related factors**. The degree of symptoms, level of impairment (physical, psychological, social, and vocational), the pace of illness progression and severity, and the availability of effective therapies are all major factors of adherence. Their impact is determined by how they influence patients' perception of risk, the

significance of adhering to therapy, and how high adherence is prioritized. Depression (in diabetes or HIV/AIDS), as well as drug and alcohol misuse, are significant moderators of adherence behavior (Kisa & Roberto , 2003).

Adherence is influenced by a variety of **therapy-related factors**. Those linked to the medical regimen's complexity, duration, prior treatment failures, frequent changes in treatment, the immediacy of therapeutic benefits, side effects, and the availability of medical help to deal with them are the most significant. The effect of common factors on adherence is modified by the unique characteristics of illnesses and/or therapy. To have the most impact, adherence treatments should be personalized to the patient's needs (Kisa & Roberto , 2003).

The patient's resources, knowledge, attitudes, beliefs, perceptions, and expectations are referred to as **patient-related factors**. Patients' knowledge and beliefs about the disease, their coping motivations, confidence in their ability to manage the disease (self-efficacy), and their expectations about treatment outcomes and the consequences of poor adherence influence adherent behavior. in a way that is not fully understood (Kisa & Roberto , 2003).

2.3.4 Adherence in elderly patients

Some obstacles to therapeutic adherence are more frequent in elderly patients and require special care (Fernandez-Lazaro, García-González, Adams, & Fernandez-Lazaro, 2019). Gellad et al. (2011) carried out a systematic review of the challenges to medication adherence in the elderly, which included nine publications. Although there was substantial variability among the studied populations, the research indicates that patient-related factors such as disease knowledge, health literacy, and cognitive function; drug-related factors such as side effects and multiple medications; and other factors such as patient-provider relationships and various logistical barriers to drug procurement were all potential barriers. For instance, while patients of any age

may forget to take their prescription, concomitant drugs or early dementia may increase memory problems in some older people (Friedman, Applegate and Grant, 2007). Furthermore, elderly people are frequently treated for many NCD conditions at the same time. For many older patients, the ensuing polypharmacy is a well-known concern, posing both pharmacological and adherence problems. Treatment for several disorders can lead to intricate and time-consuming pharmaceutical regimens that require many doses throughout the day (Lim & Sharmeen, 2018; Raj & Mathews, 2020). Clinicians managing older patients with NCDs should assess all given drugs closely and be aware of any possible cognitive impairments (Kisa & Roberto , 2003).

2.4.0 Factors that influence adherence to treatment of NCDs

Peh et al. (2021) recently conducted a systematic review of 102 conceptual models and classified the factors influencing medication adherence using the WHO's five dimensions of medication adherence. Based on age and NCD condition, eight patient groups were defined. Patient-related conditions were the most often mentioned. Depending on the patient group, medication-related, condition-related, healthcare-system-related, and socioeconomic characteristics were all reflected in varying degrees. This study reviews empirical evidence of the determinants of adherence to the treatment of NCDs.

2.4.1 Regimen complexity

Several studies including Brennan et al., 2021; Kuna et al., 2006; Pantuzza et al., 2017) have demonstrated that specific aspects of the specified treatment protocol are highly linked to patient adherence in a variety of NCD conditions. Generally, the patient's adherence is worsened by the length of therapy, the frequency of dose, and the complexity of the regimen (e.g., many devices or activities). The adverse effects of treatment, whether real or imagined, as well as the expense

of treatment, can all contribute to low adherence (Fernandez-Lazaro et al., 2019; Jimmy & Jose, 2011).

Pantuzza et al. (2017) conducted a thorough analysis of the relationship between regimen complexity and treatment adherence in NCD patients. In 35 of the 44 studies that were included, regimen complexity was linked to adherence. Twenty-eight of the studies reported that participants with more complicated regimens were less inclined to keep to their medication; seven research established a direct link. Others discovered equivocal findings or no link between complexity and adherence. The researchers concluded that, while there was some diversity in the findings on the relationship between complexity and adherence, the majority of studies revealed that higher regimen complexity reduced drug adherence.

In recent years, among asthma patients, because of the perceived advantage of once-daily medication in increasing patient adherence, a lot of work has been put into finding an effective and safe once-daily asthma therapy (Brennan, Mulvey, & Costello, 2021). An early study (Kuna, Creemers, Vondra, Black, & Lindqvist, 2006) reported that Dosing regimens that are simplified have the potential to enhance adherence and asthma-related morbidity. According to the research, 61 % of the patients wanted once-daily therapy, 12 % preferred twice-daily treatment, and 27 % had a choice. While the choice may not always lead to better adherence, it can help lessen the therapeutic burden and improve patients' quality of life (Kisa & Roberto , 2003).

In a qualitative study involving 27 asthma patients in New Zealand, Baggott et al. (2020) investigated patient preferences for asthma management and found key areas that described preferences for asthma management. Need for self-management: Participants sought out individual strategies to manage their asthma. Preference for specific treatments or medications: Participants favored treatment plans that were practical and efficient at symptom relief.

Preferences for inhaler devices included those with dosage counters, as well as those that were simple to use and transportable. Participants desired better access to their inhalers and to feel empowered by their healthcare professionals when it came to asthma treatments.

Among diabetes patients also, Ayele et al. (2019) reported that the prevalence of high medication regimen complexity index (MRCI) was high among patients with type 2 diabetes Mellitus (T2DM). Adherence was better in patients with low and intermediate regimen complexity. Poor glycemic control was linked to a high level of diabetes-specific drug regimen complexity. The researchers concluded that physicians and pharmacists should seek to simplify a complex drug regimen for discounts to enhance medication adherence and, as a result, glycemic control. Patients with diabetes usually have co-morbid conditions, which complicates their treatment plans further. Low adherence rates are reported in other closely linked conditions like depression, hypertension, and obesity, which raise the possibility of unsuccessful treatment outcomes. (Naha et al., 2021; Markowitz et al., 2011).

2.4.2 Patient-related factors

In research by Lui et al. (2020), the relationship between asthma beliefs and adherence to preventive medication was strongly demonstrated. In two Singaporean public primary care clinics, the researchers examined 323 elderly multi-ethnic Asian individuals aged 60 years with physician-diagnosed asthma. Analyses of the 323 participants (Chinese 73.7 %, Malaysia 12.7 %, and Indian 12.4%) revealed that good adherence to asthma medication was linked to perceptions of asthma as an NCD, belief in inhaled corticosteroids as a crucial medication, and fewer anxieties about their use. This is consistent with Baggott et al. (2020) findings in New Zealand, where the impact of asthma on participants' lives, their health beliefs, the emotional

implications of asthma, and perceived impediments to asthma management all affected participant choices in each of these four domains.

Likewise, Lycett et al. (2018) also used a systematic review of 36 previous types of research from the United Kingdom, the United States, Australia, Taiwan, Iran, Denmark, France, the Netherlands, and Sweden to show the link between asthma beliefs and adherence to preventive treatment. Concerns regarding the course of treatment, including worries about safety (19%), potential addiction to asthma medications (31%), and short- and long-term negative consequences (58%), perceived social stigma: According to 22% of research, shame plays a part in poor adherence. The results show that while creating asthma adherence treatments, patient treatment attitudes and perceptual barriers to adherence are understood and addressed.

Aboagye et al. (2021) observed similar findings in Ghana in a cross-sectional study of the predictors of proper asthma medication usage. Respondents with favorable attitudes and views about asthma and asthma medications were more likely to utilize them correctly, according to the study (OR 3.88 [CI 95 percent 1.44-10.44]). Patients must understand the necessity of sticking to their asthma treatment schedule even if they don't have any symptoms, according to the researchers to clinical outcomes.

Sarkodie et al. (2020) looked at adherence to pharmacological therapy among hypertensive patients at two district hospitals in Ghana. Knowledge of hypertension and perception of the severity of the illness was the most highly predictive of adherence. The findings are congruent with an online survey of non-adherence and belief in medicines in the US (Unni & Farris, 2011) involving 1220 older adults with hypertension. The researchers found a strong association between patient belief in medications and non-adherence in older adults.

2.4.3 Pattern of Health care delivery

Treatment adherence is also influenced by the structure of clinical services, which includes the availability of expertise, access to patient support networks and flexible working hours (Mosadeghrad, 2014). Most ambulatory care units responsible for monitoring NCDs are set up to treat patients with short-term diseases, and staff may not have the skills to develop long-term care plans with patients. As a result, patient participation in self-care is difficult and monitoring is inconsistent. (Dineen-Griffin et al., 2019; Hague et al., 2020).

Peck et al. (2014) conducted a cross-sectional survey of a representative sample of 24 public and non-profit health institutions in urban and rural Tanzania between November 2012 and May 2013 to assess their preparation for primary treatment of hypertension and diabetes. Guidelines, diagnostic equipment, and first-line pharmacological therapy for the primary care of NCDs were found to be insufficient in many facilities, as were management, training, and reporting systems. HIV services accounted for the majority of chronic illness visits and seemed to be more effective than NCD care. Guidelines for HIV were found in ten (42%) facilities, whereas guidelines for NCDs were found in three (13%) facilities. 261 (78%) health workers had a reasonable understanding of HIV, whereas 198 (59%) had a fair understanding of hypertension, and 187 (56%) had a fair understanding of diabetes. The data also found that health systems in lower-level facilities were often poorer. NCD knowledge and experience was lacking among frontline health workers (eg non-physicians and nurses). Only 74 of 150 nurses (49%) had reasonable knowledge of diabetes management, 85 of 150 hypertension nurses (57%), 119 of 150 HIV nurses (79%) and 31 of 150 nurses (21%). Compared to 150 nurses who saw 5 or more diabetic patients in the previous 3 months, 50 of 150 nurses (33%) and 111 of 150 nurses (74%) had HIV.

These findings are similar to PATH (2020) landscape analysis of non-communicable diseases in Ghana. The PATH research revealed that there was little attention paid to NCDs at all levels of health care. Physician assistants and community health officers were frequently in charge of lower-level institutions (health centers and CHPS), and they were restricted by rules to specific duties in the identification and treatment of hypertension and diabetes. Medication options were likewise restricted by legislation, with health center pharmacies reporting the availability of Nifedipine and occasionally Amlodipine for hypertension and solely Metformin for diabetes. Staff lacks specialized training in the control of NCDs, thus they rely on the national Standard Treatment Guidelines as a guide for patient care. Similarly, Amu et al. (2021) reported patients' ability to afford the cost of managing their condition, insufficient logistics, work-related stress due to heavy workloads, poor utility are problems affecting effective treatment of chronic non-communicable diseases in a qualitative study involving 30 health professionals in Ghana.

2.4.4 Socio-economic and structural factors

Socio-economic factors are referred to as social determinants. The World Health Organization (WHO, 2013) defines the social determinants of health as “the conditions or circumstances in which a person is born, grows up, lives, works and ages”. These institutions are subject to political, social and economic influences. Social determinants interact at different levels. Upstream variables, such as socioeconomic policies or income disparity, are sometimes referred to as structural issues. While 'downstream' issues like smoking or stress affect individuals on a personal level, they can be impacted by upstream factors (WHO/AFRO, 2014). These negative circumstances may be the result of a toxic confluence of ineffective policies and programs, unfair economic systems, and poor governance. (Islam, 2019).

In a study examining the prevalence, knowledge, management, and risk factors for diabetes and concomitant hypertension in South Africa, Kushitor et al. (2021) indicated that Comorbid hypertension and diabetes affected 6% of the population, with rates notably higher among women, the elderly, the obese, and those who had previously been married than their counterparts. In cross-sectional research (Liu, Lv, Li, & He, 2018) to assess the prevalence and management of diabetes in 4196 Chinese older males, aged 80 years old Diabetes therapy was linked to age, marital status, physical activity, body mass index (BMI), combined chronic illnesses, and polypharmacy. Diabetes control was shown to be inversely related to age. The diabetes management of participants who were divorced/widowed, overweight/obese, had more combined chronic conditions, and had polypharmacy was poorer.

Okeke et al. (2019) found variations in the degree of adherence to antihypertensive therapy amongst patients with different socio-demographic characteristics in the southern senatorial district of Cross River State, Nigeria. Age, marital status, and location of residence were shown to have significant associations with levels of adherence. Similarly, in Kenaa, Mwangi et al. (2020) reported that the prevalence of NCD risk factors was high and varied across socio-demographic attributes. The report noted that respondents with less than 12 years of formal education were more likely not to wear a helmet (81.7% vs. 54.1%) and not to wear a seat belt (73.0% vs. 53.9%). Respondents in the richest quintile had a higher prevalence of type 2 diabetes than respondents in the lowest quintile (5.2% vs. 1.6%). Rural residents were 35% less likely to smoke than urban residents, those with 12 or more years of formal education were 89% less likely to smoke than those under 12, and the wealthiest quintiles had were 64% more likely to smoke. tobacco use. Junk food. Only 44% of respondents with type 2 diabetes and 16% of respondents with high blood pressure know about their. diagnosis. Socio-demographic issues

should be part of a multisectoral, integrated approach to reducing the burden of NCDs in Kenya, researchers say.

2.5 Conceptual Framework

This shows how the variables of the study are arranged. Two sets of variables, thus dependent variable and the explanatory variables at the other end with arrows indicating the relationship.

The conceptual framework of this study is presented in figure 2.3 below:

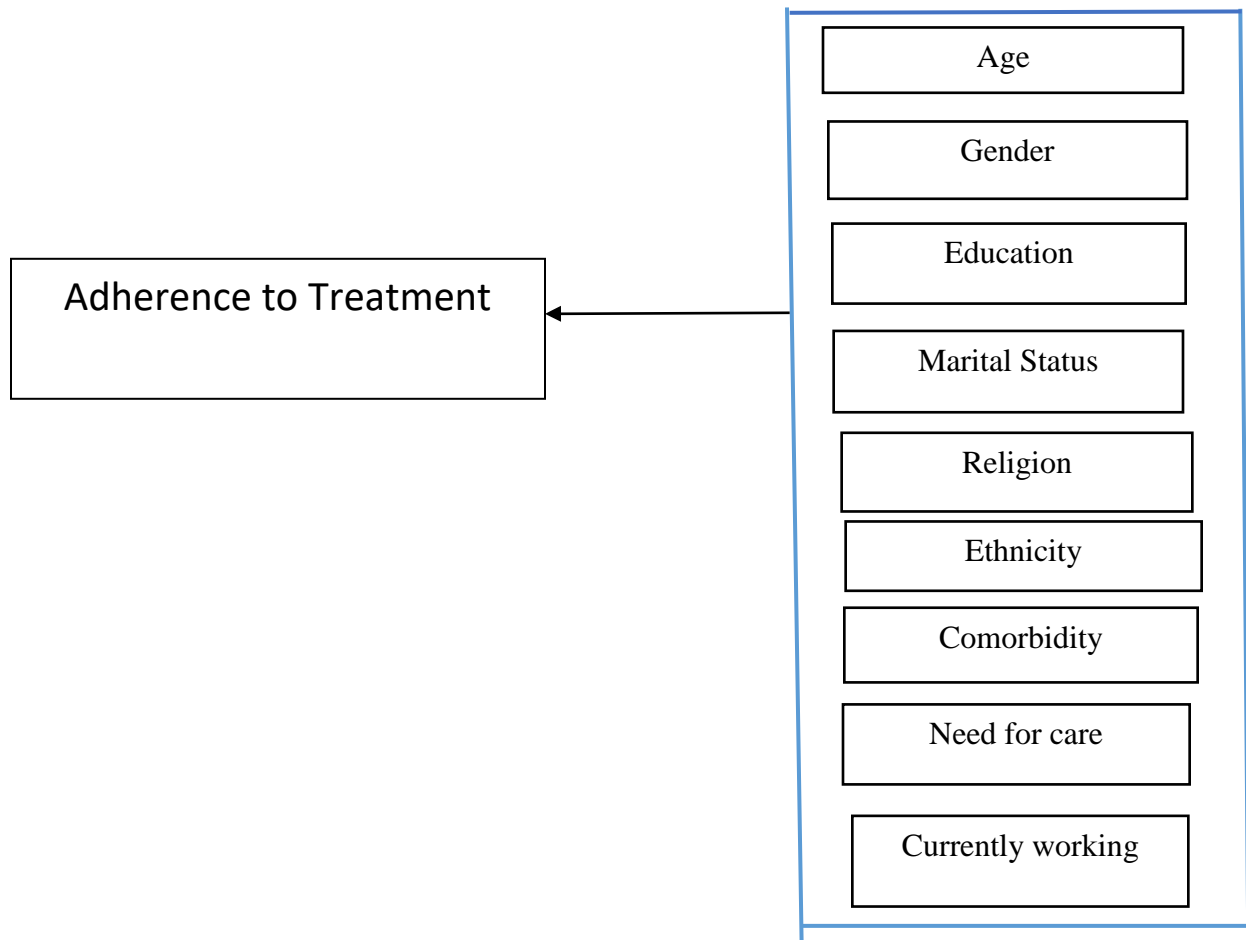


Figure 2.3 Conceptual Framework

Source: Author's construct using the ecological model as a guide

2.6 Chapter Summary

In this chapter, relevant literature was reviewed. on Non-communicable diseases, Adherence to treatment of NCDs, as well as the factors influencing treatment adherence. From the reviewed literature in this section, the empirical evidence favorably multi-factorial approach to patient adherence to NCD treatments. This study was therefore designed to contribute to the evidence of multifactorial characteristics of adherence to NCDs treatment by assessing the WHO SAGE wave 2 data in Ghana. The ensuing chapter discusses the methods used in this study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the research methodology and shows the type of data collected, how it was collected, and the sample size. It discusses the population and the sampling method used.

This helps to arrive at the recommendation expected for the study.

3.2 Research Methods and Design

A quantitative cross-sectional study design was employed in the study using a secondary dataset. The term secondary analysis is the process of analyzing data that was initially gathered by another researcher, usually for a different reason.

3.3 Source of data

The Second wave of the World Health Organization SAGE Study (WHO SAGE) is a longitudinal study that collected data on adults aged 50 and over and a small comparative sample aged 18 to 49 in -a nationally representative sample. from China, Ghana, India, Mexico, Russian Federation and South Africa.

The US National Institute on Aging's Division of Behavioral and Social Research, as well as national governments, supported SAGE. The study gathered information from both households and individuals. The poll had a total sample size of 4,704 people. Sample data, geocoding or GPS data, re-contact data, household contact record, household roster, roster from the household, housing, networks and transfers of household and family assistance, assets, household income, and household expenditure, interviewer observations, and verbal autopsy were all included in the household survey.

Sociodemographic information, employment history and benefits, health state descriptions, anthropometric measurements, performance tests, and biomarkers, risk factors and preventive health behaviors, chronic conditions and access to healthcare, health care utilization, social networks, subjective well-being and quality of life, the effect of caregiving, and interviewer assessment were all included in each individual's dataset. (Kowal et al., 2012).

3.4 Sampling

The sample for this study is a subset of the participants interviewed for the SAGE study. The study population consisted of respondents who reported living with hypertension, diabetes and strokes during the survey. Due to the complexity of data analysis, adherence is measured only for hypertension, stroke and diabetes. These NCDs are the top leading causes of death in Ghana (Owusu *et al.*, 2021). During the survey the respondents were asked to indicate whether they have been diagnosed with a chronic disease condition by a healthcare professional/doctor and whether they had been on treatment within the last two weeks. Participants who said yes to any of these questions were included in this study.

A sample of 1016 respondents who had been diagnosed with a chronic disease confirmed by a healthcare professional/doctor were drawn from the total 4,704 survey respondents. Of these, 266 had arthritis, 55 had stroke, 65 had angina, 99 had diabetes, 21 had chronic lung cancer, 102 had asthma, 30 had depression, and 378 had hypertension.

Table 3.1 Study Variables

EXPLANATORY VARIABLES

AGE	Participants were asked, “How old are you now?” This was to be the age at my last birthday. This variable is then recoded to include only
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	participants over 60 years of age and those below age 60 years.
EDUCATION	“What is the highest level of education that you have completed? Was asked. Education level was determined by the highest attained level of the participants. The options available in this variable as a response will be recorded to include: “None”, “primary”, “education”, “Completed secondary school”, “and “Completed tertiary education.
SEX	Participants were asked if they were male or female.
ETHNIC GROUPS	This was assessed based on reported ethnic groups from the participants. It was recorded to include “Akan”, “Ga-Adangbe”, “Ewe”, “Guan” and “Other” to measure participants’ association with an ethnic group.
RELIGION	The participants' self-reported affiliation with a particular religion was used to assess this. Additionally, this was coded to include None, Christianity, Islam, and other.
CURRENTLY EMPLOYED	Current working status was assessed with the question “Have you Worked for at least 2 days during the last 7 days?” The response options were “Yes” and “No”.
FINANCIAL SOURCES FOR WORKING ELDERLY (INDIVIDUAL)	A list of five responses was read to the participants. Each of them has a yes and no answer. Participants indicated what sources of income they earned as a result of their work. Sources were salary/salary, trade income, rental income, social security benefits, interest/savings account deposits. These sources became the basis for measuring the income sources of the working elderly.

NEED OF CARE	The survey asks, "Since we last spoke to you, when was the last time you needed care?" The Measured using questions option was to allow participants to indicate the day, month or year. The answers were coded to be "yes" and "no".
COMMUNITY SUPPORT	It was also assessed based on responses indicating whether or not community support was received (a club or group received from the community). In particular, responses to types of support (money, credit, animals, and housekeeping/maintenance/transport) were considered. When measuring this variable
FAMILY SUPPORT	Whether or not support was received from family members (children, siblings, parents) and relatives (other relatives) was assessed as a response. Specifically, responses to types of support (money/tuition/loan/cash, food/land/animals and housework/care/transportation) were considered when measuring this variable.
GOVERNMENT SUPPORT	This was rated based on responses whether or not public assistance was received. Responses to types of assistance (money/tuition/loan/cash and food/land/animals) were considered when measuring this variable.
HOUSEHOLD FINANCIAL SOURCES	To assess this: "During the past 12 months, which of the following financial sources did your household use to pay for all medical expenses?" was asked. The frequency of each item was measured as 'yes', 'no' and 'don't know' using 'family member's current income',

	'savings', 'health insurance premium' and 'item sold', 'family or friends outside the home', 'borrowed from a financial institution or agency', 'other'.
MARITAL STATUS	This was to find out if the participants were married at the time of the interview. Ranking is based on responses to single, currently married, cohabiting, separated/divorced and widowed. This was recoded to be “currently married” and “currently not married.”
DEPENDENT VARIABLE	
ADHERENCE TO TREATMENT	<p>This will include questions on adherence to taking prescribed pharmaceuticals (medication) as well as any health-related behaviors (like a special diet, exercise regime in case of diabetics) that extend beyond taking prescribed pharmaceuticals.</p> <p>The question for each of the person’s living with any NCD is “have you take your prescribed medication within last two weeks?” This will be used to categorize the level of adherence to “adhered to treatment” and “not adhered to treatment”.</p>

Table 3.1 List of explanatory variables

3.5 Data Handling

The lead investigator coded the data as needed to suit the descriptions already provided in the literature. Supervision was done by the primary investigator’s designated thesis supervisor, Dr. Sandra Kushitor – a Population Scientist. Ensign Global College provided training on using STATA to analyze the data as planned for inclusion in the program.. Data and analyses drawn is kept confidential via safekeeping in secure folders.

3.6 Data Analysis

Data were analyzed with Stata version 17.0. Appropriate descriptive statistics were used to describe the outcome variables (adherence to treatment) and predictor variables (age, gender, religion, education level, current occupational status, socioeconomic status, family type, NCD status, etc.). After eliminating possible multicollinearity (variance expansion factor > 5), predictors of chronic disease treatment adherence were analyzed with a significance test (P value <0.05) using chi-square analysis.

3.7 Ethical Considerations

The WHO SAGE protocol was reviewed and approved by the Ethical Review Committee of Ensign Global College. A formal request for the SAGE Wave 2 data set for Ghana was made to the World Health Organization, Ghana office. The principal researcher made sure that all information gained and data obtained from the data collection were kept confidential.

3.8 Limitations of the Study

Typical of large secondary datasets, there were many of the questions and data to be modified to suit the current study. It is understood that different data serve different purposes as a results, the current study would have been a lot better had it been conducted using primary data.

3.9 Expected Outcome

The study anticipates patient non-adherence to hypertension, stroke and diabetes medication and related treatments due to low socioeconomic status and lack of family/community support systems.

3.10 Dissemination of Results

The results of the analysis will be shared with Ensign Global College, WHO, Ghana Office, Center for Aging Studies, health financing workshops and seminars, geriatric platforms and journals.

CHAPTER FOUR

RESULTS OF THE STUDY

4.1 Introduction

In this chapter, the results of the study are presented. It includes the demographic characteristics of the sample and the other results from the chi-square test. The data analyzed was in line with the set research objectives; to assess the level of adherence to treatment among people living with non communicable diseases in Ghana. Results are presented in graphs, charts, tables and percentages.

4.2 Results

Results of the current study include figures, tables, and charts depicting the responses from the respondents and how these factors affect adherence to treatment of stroke, hypertension, and diabetes respectively.

4.2.1 Demographic Characteristics of the Respondents

A total of 445 respondents who indicated they have been diagnosed with hypertension, diabetes, or stroke were included in the study. Out of the sample, 268 (64.27%) were 60 years and above. Similarly, 300 (67.4%) of all respondents were females and 145 (32.6%) were males. With regards to education, 148 (33.2%) had no formal education, 118 (26.52%) had primary education, 152 (34.16%) attained secondary education and 27 (6.07%) attended school up to the tertiary level. About half of the respondents 243 (54.61%) were Akans with 79 (17.75%) being Ga-Adangbe, 83 (18.65%) being Mole-Dagbani and 40 (9.0%) being Ewe. Most of the respondents indicated they were Christians (82.02%) with (11.69%) representing Muslim and others making up to 6.29%. Currently not married respondents were found to be 249 (55.96%).

They included divorced and widowed individuals. Out of the 445 respondents 55.96% of them indicated they are currently not working (Table 4.1).

Table 4.1 Characteristics of respondents

Variable	Frequency	Percentage
Sex		
Male	145	32.58%
Female	300	67.42%
Age		
60yrs and above	286	64.27%
Below 60yrs	159	35.73%
Educational background		
No Formal Education	148	33.25%
Primary Education	118	26.52%
JHS/SHS	152	34.16%
Tertiary Education	27	6.07%
Ethnicity		
Akan	243	54.61%
Ewe	40	8.99%
Ga-Adangbe	79	17.75%
Mole Dagbani	83	18.65%
Religion of affiliation		
None	11	2.50%

Christians	365	82.02%
Muslims	52	11.69%
Others	28	6.29%
Marital status		
Married	196	44.04%
Currently not married	249	55.96%
Currently working		
Yes	226	49.21%
No	219	50.79%
Comorbidity		
Has comorbidity	78	17.53%
Do not have comorbidity	367	82.47%
Total for each Variable	445	100%

4.3 Types of non-communicable diseases the respondents are living with

Table 4.2 shows the type of non-communicable diseases, people in Ghana are living with such as hypertension, diabetes, and stroke as well as a combination of these diseases as captured in the WHO, SAGE Wave 2 dataset. From the table, the number of people living with hypertension, diabetes, and stroke was found to be 300 (67.42%), 44 (9.89%), and 23 (5.17%) respectively. Respondents with both hypertension and diabetes represented 48 (10.79%) and those with both hypertension and stroke were made up of about (23) 5.17%. Those with all three diseases were 7 representing (1.57%) of the respondents. There was no respondent with both diabetes and stroke. This corresponds to the fact that clinically, most strokes are linked to hypertensive crisis. The

intersections created is referred in this study as co-morbidity that shows a situation in which a respondent who suffer from more than one of the non-communicable diseases (Table 4.2)

Table 4.2: Type of Non-Communicable Diseases

Diseases	Frequency	Percentage %
Hypertension	300	67.42
Diabetes	44	9.89
Stroke	23	5.17
Hypertension and Diabetes	48	10.79
Hypertension and stroke	23	5.17
Stroke and Diabetes	0	0.00
Stroke, hypertension and diabetes	7	1.57
Total	445	100

4.4 Adherence to Treatment

In this study, treatment adherence was measured as a binary variable created using the responses of the respondents on whether they took their medications within the last two weeks or not. Persons living with any of the non-communicable diseases who have been put on a treatment plan and who have taken their medications in that period are said to have adhered to the treatment plan and are assigned the value one (1), others who have not taken theirs in the same period are said not to adhere to treatment and are assigned the value zero (0).

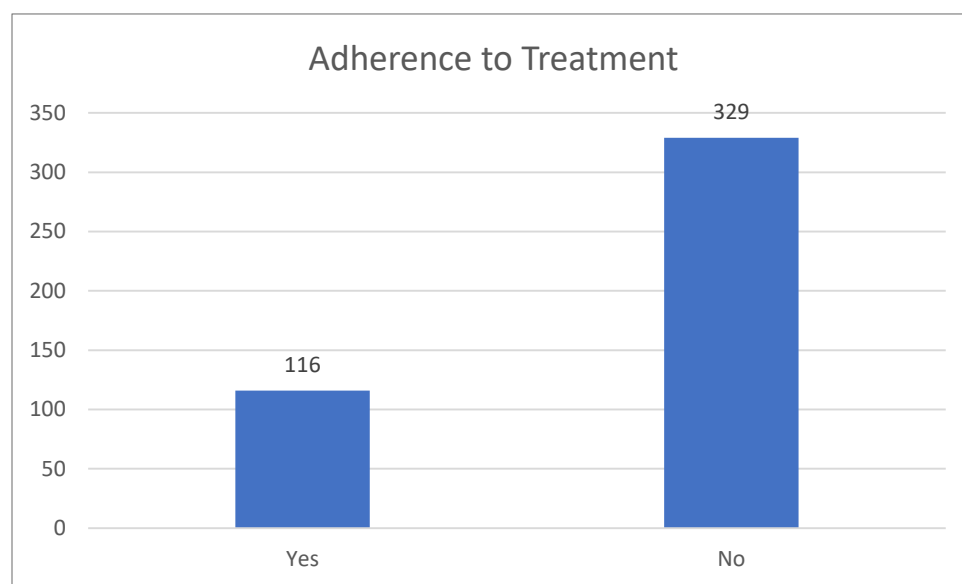
Table 4.3 Adherence to Treatment

NCDs	Adherent		Non Adherent	
	Number	Percentage (%)	Number	Percentage (%)
Hypertension	114	30.16	264	69.84
Diabetes	24	24.00	76	76.00
Stroke	8	72.73	3	27.27

The above table (Table 4.3), displays the frequency and the percentage of the respondents who adhered to treatment of the individual disease condition under study. Stroke had the highest adherent respondents with 72.73% followed by Hypertension with 30.16% and diabetes (24.00%). In total, there was a low adherence level of 26.07% among respondents.

The bar chart shows that majority of the respondents did not adhere to treatment, 329 (73.18%) whereas those who adhered to treatment were 116 (26.07%).

Figure 4.1 Adherence to treatment among people living with Non-communicable diseases



4.6 Factors affecting Treatment Adherence

The following table displays the results of the study when each variable is considered in isolation.

For example, one of the factors affecting the respondents' adherence to treatment is education. Respondents who attained a primary level of formal education were more likely to adhere to treatment as compared to those who had no formal education. Other factors such as age, gender, marital status, religion, ethnicity and the presence of co-morbidities are presented in the table 4.4 below.

Table 4. 4 Factors affecting Treatment Adherence

Variables	Adherence to Treatment		P-value
	Adhere = 329 (73.93) n (%)	Did not adhere = 116 (26.07) n (%)	
Age Group			<0.000
<60yrs	61 (38.36)	98 (61.64)	
60yrs and above	55 (19.23)	231 (80.77)	
Sex			0.0013
Male	27 (18.62)	118 (81.38)	
Female	89 (29.67)	211 (70.33)	
Education			0.766
None	37 (25.00)	111 (75.00)	

Primary	32 (27.12)	86 (72.88)	
JHS/SHS	42 (27.63)	110 (72.37)	
Tertiary	5 (18.52)	22 (81.48)	
Ethnicity			0.160
Akan	66 (27.16)	177 (72.84)	
Ewe	11 (27.50)	29 (72.50)	
Ga-Adangbe	13 (16.46)	66 (83.54)	
Mole-Dagbani	26 (31.33)	57(68.67)	
Religion			0.458
Christianity	93 (25.48)	272 (74.52)	
Islam	17 (32.69)	35 (67.31)	
Others	6 (21.43)	22 (78.57)	
Currently working			0.272
Yes	64 (28.32)	162 (71.68)	
No	52 (23.74)	167 (76.26)	
Marital Status			0.010
Currently married	63 (32.14)	133 (67.86)	
Not married	53 (21.29)	196 (78.71)	

Table 4.4 shows the factors associated with adherence to treatment among people who have been diagnosed with chronic disease. Respondents aged less than 60 years are more likely to adhere to treatment as compared to those aged 60 years and above and this was found to be statistically significant [95% CI: 0.10 -0.39, $p < 0.000$].

Sex of the respondents was found to be associated with adherence. Females were more likely to adhere to treatment compared to their male counterparts and this was found to be statistically significant [95% CI: 2.74-21.37, $p < 0.0013$]. Respondents with primary education adhered more to treatment as compared to those with no education, however this was statistically insignificant in the study. [95% CI: 0.07-0.90, $p = 0.766$].

Religion has no association with adherence to treatments. However, the results revealed that 93 (25.48%) of Christians adhere to treatment while 272 (74.52%) did not adhere to treatment.

Married respondents were more likely to adhere to treatment as compared to the currently not married and this was also found to be statistically significant [95% CI: 3.83-22.26, $p < 0.001$].

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter discusses the findings in the previous one. It focuses on the general and specific findings as follows

5.2. Summary

First, the common types of non-communicable diseases people are living with in Ghana were found in the study to be hypertension, diabetes and stroke. Out of the 445 respondents 300 of them which represent 67.42% has hypertension only, 44 of the respondents thus 9.89% has diabetes only and 23 has only stroke making up 5.17% of the respondents. With regards to co-morbidities 48 (10.79%) has both hypertension and diabetes, 23 (5.17%) had both hypertension and stroke. None of the respondents were found to have both stroke and diabetes. However 7 people were found to have all three conditions representing 1.57%.

The current study also revealed that over two-thirds of the respondents, 329 (73.93%) did not adhere to treatment whereas the remaining 116 (23.82%) did adhere to the required treatment plan. Using a chi square test, it was found that age group, sex and marital status significantly determined the level of adherence to treatment as in the case of Okeke et al. (2019) whose study established significant associations with levels of adherence and age, marital status, as well as location.

The study showed, however, that only one variable that promotes not adhering to treatment and that is the age group above 60yrs. A possible explanation for this is that older persons' adherence to treatment is often aided by the assistance of a primary caregiver (Ben-Natan & Noselozich,

2011; Cárdenas-Valladolid et al., 2010). A contributing factor to this result could also be that older people are more likely to adhere to their medications with a simple dosing schedule than with a complex dosing schedule. as established by Uchmanowicz et al. (2018). The younger persons below 60yrs are more likely to have greater cognitive functional abilities and therefore tend to easily stick to the given treatment plan.

Females were more likely to adhere to treatment than their male counterparts. Although, this finding differs from some published studies where low adherence to treatment (Park et al., 2008; Uchmanowicz, et al. 2018), they are consistent with that of Hyre et al. (2007) and Friedman et al. (2010) who reported women had better adherence for treatment than males. Friedman et al. (2007) also found in a study on weight loss that whereas 31% of the male respondents adhered to their treatment plan, 63% of the females did adhere to treatment. The researchers provide a tentative explanation in which they claimed that women are able to cope with routine activities than men because their activities are usually routine in nature.

Respondents who were married were also more likely to adhere to treatment than respondents who were not married. There are similarities between the attitudes expressed by Uchmanowicz et. al. (2018) in his study and those revealed in this study. This may be due to the extra support that patients receive from their spouses. With the help of their spouses, they are reminded to stick to the treatment plan. This is exactly the opposite for those widowed, divorced, or not married as there may be little or no reminders from other people.

The results of this study show that respondents with one or two co morbidities were more likely to adhere to treatment than those with no co morbidity. This finding, however, contrasts that of Saadat et al. (2015) who found that treatment adherence decreased as the number of

comorbidities increased. However, it can be assumed that the presence of many diseases in one person increases pain and discomfort that they are unable to forget their treatment plan.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter draws conclusions from the study, as well as recommendations, and some limitations associated with the current study.

6.2 Conclusion

Treatment adherence was generally low for all non-communicable diseases with only 23.82% properly adhering to the treatment of non-communicable diseases. Stroke and hypertension had the highest percentage of respondents who properly adhered to treatment thus 72.73% and 72.15% respectively whereas Diabetes had the highest percentage (57.14%) of diabetic respondents who properly adhered to treatment.

The study also showed that respondents who were females, married, and below age 60 years were significantly more likely to adhere to their treatment plan than males, currently not married and those above the age of 60 years.

6.3 Recommendations

Firstly, the study recommends that health care workers managing the cases of non-communicable diseases help their patients identify and involve a primary caregiver or spouse where applicable in administering medications as there is substantive evidence in the literature on their role with regards to older persons' adherence to treatment. If the patients do not have spouses, other family members should be encouraged to play the role of helping these persons to stick to their treatment plans. Whether or not persons living with non-communicable diseases as

discussed above will be treated depends to a large extent, on their ability to stick to the treatment plan with all the prescribed medications.

Secondly, the study found that females adhered to treatment better than their male counterparts. To bring balance and ensure that casualties are reduced among males living with non-communicable diseases, health practitioners should attempt to identify what hinders males from adhering to treatment and curb it before it causes more mayhem. This can be done through intensified education and increased screening to help diagnose such diseases at their onset rather than wait until the end stages.

Again, as a significant determinant of treatment adherence, education should be encouraged among younger people. Given that younger people are not able to stick to the discipline of a treatment plan, they should be encouraged to be educated so they may give up lifestyles that may lead to the emergence of the said diseases. Educators should increase the importance of subjects such as Science that explain the causes and prevention of many diseases including diabetes, stroke, and hypertension.

6.4 Limitations of the Study

Firstly, future studies should explore the type, number, and dosing schedule of medications among those living with these non-communicable diseases to ascertain their influence on adherence to treatment. A larger sample may be more representative and trusted to give even better results.

Secondly, the current study was limited with the number of activities that affect adherence to treatments. For instance, other factors such as nearness of a respondent to a health facility or the fear of taking medication could affect the level of adherence to treatment.

Again, adherence to treatment might also be traced in parts to the beliefs of the respondents. In some communities especially where there are no modern health facilities, people turn to not agree to the use of modern treatment plans. They may choose to abandon the modern treatment plan in favor of local herbs. This could impact how they adhere to treatment a plan.

Finally, the length of time the study covers affects the accuracy of its findings. against this background, it is advised that future researchers use time series data covering longer periods to improve the quality of its findings.

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APPENDICES

Appendix 1: Ethical Clearance



OUR REF: ENSIGN/IRB/EL/SN-188
YOUR REF:

July 08, 2022.

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Matilda Wonkyiwa Obeng
Ensign Global College
Kpong.

Dear Matilda,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Tuesday, June 21, 2022, your research proposal entitled “**Adherence to Treatment among People Living With Non- Communicable Diseases in Ghana: Evidence from the World Health Organization Study Of Global Ageing and Adult Health Wave 2**” was considered.

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

We wish you all the best.

Sincerely,

A handwritten signature in black ink, appearing to read "Rebecca Acquah-Arhin".

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