Educational Needs for Hypertension Control among Adult Ghanaians Diagnosed with Chronic Kidney Disease and Hypertension

by

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Abstract

The prevalence of uncontrolled hypertension is often higher among people living with chronic kidney disease (CKD) than among those with hypertension alone. This doctoral mixed-method study was conducted to identify and describe the educational needs for hypertension control among adult Ghanaians diagnosed with CKD and gain insights into their use of complementary health products and practices over or in addition to prescribed medications. Three hundred and fifty-one subjects for the quantitative and 12 participants for the qualitative components were recruited July through October 2022, from the renal outpatient unit at a large teaching hospital in the capital city of Accra. These participants/respondents were individuals diagnosed for one year or more with CKD and hypertension and were 18 or more years of age. Socio-demographic and blood pressure data were obtained from each person's hospital folder/chart. Quantitative data were collected through using the Hypertension Knowledge-Level Scale developed by Erkoc et al. (2014) and the Knowledge Subscale of the CKD Screening Index developed by Khalil et al. (2014). Semi-structured face-to-face audiotaped interviews were then conducted to collect qualitative data from select participants about their use of complementary health products or practices over or in addition to prescribed hypertensive medications.

The study revealed only 113 (32%) of the 351 subjects had controlled hypertension. An average knowledge of hypertension and CKD was found among them. A number of socio-demographic and other characteristics were associated with controlled hypertension. The interviews revealed all 12 participants used complementary health products and practices in addition to prescribed medications. Insights into their use of complementary health products and practices were gained. These findings inform

considerations for the development of educational interventions to increase hypertension control among individuals diagnosed with CKD in Ghana.

Keywords: chronic kidney disease, hypertension, educational needs, Ghana, mixed-methods research.

Preface

This dissertation is an original work by Frederick Anafi. The research study received ethics approval from the Research Ethics Board (The Health Research Ethics Board) of the University of Alberta, Edmonton, Canada (Pro00119894) on May 12, 2022 and the Ethical Review Board of the Korle-Bu Teaching Hospital in Accra, Ghana (KBTH-STC/IRB/00074/2022) on July 14, 2022, for the project “Educational Needs for Hypertension Control among Adult Ghanaians Diagnosed with Chronic Kidney Disease and Hypertension."

Dedication

This work is dedicated to my late mother, Mary Asare, who taught me how to read and write. It is also dedicated to Dr. Donna Wilson and Miss Nusrat Aboagyewa Mensah for their support and encouragement throughout my doctoral program. You two are the reason I kept pushing forward to completion.

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List of Abbreviations

BMI - Body Mass Index

CI - Confidence Interval

CIHR - Canadian Institute of Health Research

CKD - Chronic Kidney Disease

ESRD - End-stage Renal Disease

GHS - Ghana Health Service

MOH - Ministry of Health

MS - Microsoft

NGOs - Non-Governmental Organizations

OR - Odd's Ratio

SD - Standard Deviation

SPSS - Statistical Product and Service Solutions

UNICEF - United Nations International Children's Emergency Funds

WHO - World Health Organization

Educational Needs for Hypertension Control among Adult Ghanaians Living with Chronic Kidney Disease and Hypertension

Chapter One: Background

Hypertension is a significant public health challenge in both economically developed and developing countries (Bosu & Bosu, 2021; Mills et al., 2020). Ghana is a developing country with high rates of hypertension and chronic kidney disease (Atibila et al., 2021; Tannor, Sarfo, et al., 2019). This chapter provides a brief overview of Ghana, and the background for a mixed-methods research investigation to gain information on the educational needs for hypertension control among adult Ghanaians living with chronic kidney failure (CKD). A problem statement, purpose of this study, significance of this study, and a definition of terms follow.

Brief Overview of Ghana

Ghana is a sub-Saharan African country, the first in the region to gain independence in 1957 after 300 years of colonization, slavery trade, and economic exploitation by the Portuguese and British (Gocking, 2005). Ghana is located in West Africa and it was previously known as the Gold Coast before gaining independence from its colonial masters (Gocking, 2005). Ghana shares its borders on the west with the Ivory Coast, Togo on the east, Burkina Faso on the north, and the Gulf of Guinea and the Atlantic Ocean on the south (Briggs & Connolly, 2016). Ghana has 16 regions: Greater Accra, Ahafo, Ashanti, Bono, Bono East, Central, Eastern, Oti, Northern, North East, Savannah, Upper East, Upper West, Volta Western, and the Western North regions. The Greater Accra region has the capital city of Accra in it, along with the largest hospitals in Ghana, one of which has the most advanced renal program and renal services. This

hospital (Korle-Bu Teaching Hospital) is where this study was initiated. The Greater Accra region is multi-tribal, and many people from other regions visit hospitals in Accra or come to live and work in it (Ghana Statistical Services, 2019).

English is Ghana's official language for government transactions and also for formal kindergarten to university education (Gocking, 2005). However, there is a rich linguistic diversity in Ghana. There are about 250 spoken languages across the many distinct Ghanaian tribes. The "Akan" language is the most common and it could be said to dominate the country as Akan speakers are the majority, and they are in positions of power and authority (Embassy of the Republic of Ghana Hugue, 2017). In Ghana, three main faiths are practiced in the country: Christianity, Islam, and the Traditional (pagan) religion. Christianity is more common, with around 71% of citizens being practicing Christians (Ghana Statistical Services, 2019). Ghana spans a land area of 238,533 square meters, with a population of nearly 31 million in 2021, representing 0.39% of the total world population, and with an annual population growth of 2.19% (Ghana Statistical Services, 2022).

Ghana is classified as a developing country as it is gifted with natural resources such as gold, cocoa, diamonds, bauxite, manganese, and oil (Trading Economist, 2019). Ghana is among Africa's 10 most technologically advanced countries (Agom-Eze, 2020). However, Ghana still faces challenges such as infrastructure or building needs, water and sanitation development needs, energy security, road networks and transportation improvement requirements, a substantial government budgetary deficit, and a high inflation rate (Trading Economist, 2019). Some of the biggest issues are regional differences in local resources, unequal allocation of resources across regions by the

government with subsequent infrastructure differences, and variations in educational resources and educational opportunities across Ghana (United Nations Development Program, 2022).

Economically, urban residents tend to be more affluent than rural residents, with this poverty gap widening, especially in the northern end of the country, where the poverty rate is high (UNICEF, 2016). In 2018, the Ghanaian unemployment rate was 6.7%, with many earning 860 Ghana cedis per month, equivalent to approximately 86 USD or 117 CAD (Trading Economist, 2019). The most recent human development index for the country was set at 0.63, as compared to Canada's rate of 0.929 (United Nations Development Program, 2022).

The Ghana Health Service faces significant challenges with issues of inequity and inequality in health and healthcare services across Ghana, including differences in access to available healthcare services in Ghana (Adu-Gyamfi et al., 2020). Adu-Gyamfi et al. (2020) noted that Ghanaian people living in urban centers are more privileged as they have easier access to healthcare services at all levels, from preventive care to specialist care. The introduction of the National Health Insurance Scheme in 2006, which was designed to promote Ghanaian access to healthcare services, regardless of their economic status, has been met with numerous challenges (Adu-Gyamfi et al., 2020). Many Ghanaians are still unable to afford the annual health insurance premium that is close to 12 USD (16 CAD) for adults and 2 USD (3 CAD) for children aged 17 years and below (Nsiah-Boateng et al., 2019).

The average life expectancy in Ghana in 2018 was 64.4 for females and 62.5 for males (World Health Ranking, 2018). The Center for Disease Control and Prevention

(2019) recently indicated that the leading causes of death in the country are malaria, lower respiratory infections, neonatal disorders, cardiovascular disease and associated primary complications of stroke, diabetes, and CKD. However, HIV/AIDS, tuberculosis, diarrheal diseases, and road traffic accidents are additional common causes of death (Center for Disease Control and Prevention, 2019).

Background of the Research Investigation on Hypertension Control

Ghana is one of many countries where hypertension is a major population health concern. Mills et al. (2020) noted that the prevalence of hypertension is rising globally due to population aging and increased exposure to lifestyle risk factors, including unhealthy diets and a lack of physical activity. Mills et al. (2020) also indicated that the prevalence of hypertension among adults is higher in low and middle-income countries (31.5% among 1.04 billion people) as compared to high-income countries (28.5% among 349 million people). In the past two decades, high-income countries experienced a modest decrease in hypertension prevalence, whereas low and middle-income countries experienced a significant increase (Bosu & Bosu, 2021; Mills et al., 2020). This disparity in hypertension prevalence suggests that low and middle-income countries, including Ghana, are facing a high and increasing burden of hypertension and its related complications, such as stroke, heart failure, and kidney failure (Mills et al., 2020; WHO, 2021).

Kidney disease is another increasing public health concern (Bikbov et al., 2020; Foreman et al., 2018). Webster et al. (2017) defined CKD as "decreased kidney function shown by glomerular filtration rate of less than 60 mL/min per 1·73 m^2, or markers of kidney damage, or both, of at least three months duration irrespective of the underlying

cause" (p. 1238). CKD is typically described as a slowly progressive and generally irreversible reduction of renal function due to permanent renal cell damage (Fradelos et al., 2015). In a recent cross-sectional survey involving 2,782 adults, the prevalence of CKD in Ghana was estimated at 26.3% among adults who were also diagnosed with hypertension (Tannor, Sarfo, et al., 2019).

Hypertension and CKD

Worldwide, the prevalence of hypertension is believed to be two to three times higher among persons living with CKD, as compared to people who are only diagnosed with hypertension (Sata et al., 2018; Xie et al., 2019). Unfortunately, hypertension and CKD are doubly linked (Judd & Calhoun, 2015). CKD can result from uncontrolled hypertension and progressive CKD can lead to hypertension through a reduced blood pressure regulatory function of the impaired kidneys (Ku et al., 2019). Judd and Calhoun (2015) demonstrated that CKD and hypertension are closely related diseases with overlapping cause and effect associations, so it is sometimes difficult to determine which disease process precedes the other. Both CKD and hypertension share similar risk factors; including older age, obesity, high alcohol and sodium consumption, and comorbidities such as diabetes (Ku et al., 2019; Tannor, Norman, et al., 2019).

The prevalence of uncontrolled hypertension has been shown to be higher in people living with CKD than in the general hypertensive population, and this prevalence appears proportional to the degree of renal dysfunction (Georgianos & Agarwal, 2020; Wolley & Stowasser, 2016). In Ghana, the prevalence of hypertension among CKD-diagnosed individuals in Ghana is high, estimated at 26% in 2018 in a multicenter cross-sectional study involving 2,781 individuals (Tannor, Sarfo, et al., 2019). Various socio-

demographic, patient-related, healthcare providers-related, and health system-related factors have been shown to be associated with uncontrolled hypertension in Ghana (Agyei-Baffour et al., 2018; Asamani et al., 2019; Nyaaba et al., 2020; Okai et al., 2020; Sanuade et al., 2020).

Pugh et al. (2019) asserted that hypertension control requires a combination of educational interventions and antihypertensive medications. Also, Ku et al. (2019) reported that education interventions could improve hypertension control among CKD individuals, regardless of race, ethnicity, and geographical location. Targeted educational interventions could improve adherence to dietary restrictions, medications regimen, and reduction in alcohol consumption (Agyei-Baffour et al., 2018; Ku et al., 2019; Sanuade et al., 2020). These lifestyle modifications could potentially improve hypertension control among individuals with CKD (Ku et al., 2019; Sanuade et al., 2020). Ryan (2009) indicated that educational interventions are essential for individuals, so they learn about hypertension to help them overcome some of the preconceived ideas that may have contributed to their illness. Mason et al. (2007) also suggested that educational needs should be assessed to design effective educational interventions to control hypertension among persons living with CKD.

Empirical evidence shows social, economic, and cultural factors influence individual perceptions of health and illness (Agyei-Baffour et al., 2018). These factors also affect individual strategies for dealing with health problems and their choice of healthcare resources to use during periods of illness (Agyei-Baffour et al., 2018). Many Ghanaians are thought to use multiple and diverse approaches (i.e. biomedicine products, traditional herbal products, and faith healing) for hypertension control (Aziato & Antwi,

2016). Among these approaches, many Ghanaians are thought to prefer traditional herbal products and faith healing over conventional therapy, as 70% of individuals, including those with hypertension, are thought to use one or more herbal products (WHO, 2019). The success of these lay approaches for managing hypertension is not known, but uncontrolled hypertension continues to increase among Ghanaian people, including those that use diverse traditional healing systems (Agyei-Baffour et al., 2018). Boateng et al. (2016) noted that some of these traditional healing systems are implicated in avoidable complications (i.e., blindness, liver, and kidney failure) and deaths of individuals with hypertension.

Consequences of Uncontrolled Hypertension among CKD Individuals

Uncontrolled hypertension in individuals living with CKD commonly leads to rapid deterioration in renal function, culminating in end-stage kidney disease (Tannor, Sarfo, et al., 2019). Many other adverse health outcomes affecting individuals, families, and society have also been noted (Adjei et al., 2018; Tannor, 2018). These adverse outcomes include low quality of life, substantial personal and family economic burden, increased utilization pressures on the healthcare system, and high premature mortality rates (Adjei et al., 2018; Tannor, 2018). For instance, Kefale et al. (2019) found a progressive reduction in physical, psychological, spiritual, and social functioning among persons living with CKD and uncontrolled hypertension. Individuals living with both conditions have to deal with symptoms of hypertension (such as anemia, confusion, and fatigue), the cost and use of many medications, a strict diet to control hypertension and CKD, and changes in body image (Adjei et al., 2018; Kefale et al., 2019).

The management of CKD, including the type that results from uncontrolled

hypertension, is expensive as it can involve hemodialysis, peritoneal dialysis, renal transplantation, and/or palliative care (Tannor, Sarfo, et al., 2019). Elshahat et al.'s (2020) systematic review revealed the annual cost then of treating CKD in developed countries was 20,000 USD to 100,000 USD (27,128 CAD to 135,640 CAD) per person. Likewise, a systematic review conducted earlier by Mushi et al. (2015) revealed that the annual cost of treating CKD per person in low and middle-income countries was 8,000 USD to 48,000 USD (10,851 CAD to 65,107 CAD). Forouzanfar et al. (2017) noted that the cost of diagnosis and treatment for CKD is considered unaffordable for many Ghanaians living with CKD.

Uncontrolled hypertension among individuals diagnosed with CKD results in frequent hospitalizations in sub-Saharan African countries, including Ghana (Adjei et al., 2018; Agyemang et al., 2017; Boateng et al., 2016). In Ghana, CKD with uncontrolled hypertension is accountable for 5% of all medical admissions to hospitals, with most of the individuals reporting to hospitals with evident end-stage kidney disease (Amoako et al., 2014; Forouzanfar et al. (2017). It is also important to emphasize that CKD with uncontrolled hypertension has caused high mortality rates and reduced life expectancy in Ghana (Adjei et al., 2018; Forouzanfar et al., 2017). A retrospective analysis of autopsy records in two leading Ghanaian health facilities revealed that from 1995 to 2012, uncontrolled hypertension was accountable for 30% of all deaths due to renal disease (Adjei et al., 2018). Many families, including those with children, are affected by these deaths from uncontrolled hypertension and CKD.

Problem Statement

Efforts to control hypertension have attracted relatively minimal attention in

Ghana to date, yet many adults in Ghana live with uncontrolled hypertension (Adjei et al., 2018; Tannor, 2018). The high rate of uncontrolled hypertension in Ghana poses a significant burden on the affected individuals and their families, their local and larger communities, and the healthcare system (Adjei et al., 2018; Tannor, Sarfo, et al., 2019). Forouzanfar et al. (2017) asserted that the majority of Ghanaians diagnosed with CKD and hypertension could not afford the cost of its medical and pharmaceutical management. Moreover, there is minimal governmental support for renal failure treatments in Ghana, so renal patients have to pay out of pocket for their life-saving healthcare medications and treatments (Tannor, Sarfo, et al., 2019). In addition, there are different perceptions about health and illness among the Ghanaian populace that have contributed to the continued use of multiple and diverse healing systems, including the use of complementary health products and practices to control hypertension (Agyei-Baffour et al., 2019; Tannor, Sarfo, et al., 2019). Socio-economic factors, cultural beliefs, perceptions and definitions of health and illness, and the use of complementary health products and traditional practices may affect the health-seeking behaviors of many Ghanaians including hypertensive and CKD individuals (Agyei-Baffour et al., 2019). As suggested by Mason et al. (2007), an assessment of educational needs is important to design and implement effective educational interventions for hypertension control.

No research or other literature documenting the educational needs of people living with CKD and hypertension in Ghana could be located. Other countries, such as the United Kingdom and the United States, have had studies conducted that documented the educational need for hypertension control among people living with CKD (Lopez-Vargas et al., 2016; Luyckx et al., 2020; Ngendahayo et al., 2019; Stanifer et al., 2016). These

identified educational needs from developed countries may not necessarily reflect the situation in Ghana due to differences in culture, socio-economic status, healthcare access and services, and many additional socio-demographic and other characteristics (Airhihenbuwa & Iwelunmor, 2012).

Purpose of the Study

This study was conducted to identify and describe the educational needs for hypertension control among adult Ghanaians diagnosed with CKD and hypertension, and gain insights into their use of complementary health products and practices over or in addition to prescribed hypertension control medications.

Significance of the Study

Clinical evidence reveals that controlled hypertension among persons living with CKD is important as their renal perfusion increases and this improves their kidney function (Ku et al., 2019; Pugh et al., 2019). Improved renal function could potentially be achieved through education about hypertension control (Ahmed et al., 2016). This doctoral study is believed to be the first to identify educational needs for persons living with hypertension and CKD in Ghana. The findings of this study will inform health professionals and other stakeholders of the need to develop and implement effective educational interventions. Moreover, the findings will contribute to developing nursing knowledge, as nurses are critically important for designing and providing patient and general public education. Also, the findings will help to promote and develop the nursing profession in Ghana as nurses there are not always involved in public policy developments and healthcare system improvements. The insights gained into the use of complementary health products and practices over or in addition to prescribed

hypertension control medications from this study will also guide the development of effective and pragmatic educational interventions to control hypertension among adults living with CKD and hypertension in Ghana. This study has the potential to benefit the CKD populace and their families by reducing the disease's physical, emotional, economic, and financial burdens. It will also assist a healthcare system that has many demands on it.

Definitions of Terms

End-stage renal disease: End-stage renal disease (ESRD) is the loss of kidney function requiring treatment, which includes dialysis or kidney transplantation (Tannor, Sarfo, et al., 2019).

Hypertension control: A sustained systolic and diastolic pressure reading of less than140mmHg and 90mmHg respectively (Almalki et al., 2020).

Uncontrolled hypertension: Sustained systolic and diastolic pressure equal to or more than 140mmHg and 90mmHg respectively (Almalki et al., 2020).

Research Questions

- What proportion of persons diagnosed with CKD and hypertension, receiving care at the Korle-Bu Teaching Hospital, have controlled hypertension?
- How accurate is the knowledge of CKD and hypertension among persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital?
- What complementary health products and practices do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use, in addition to or instead of prescribed hypertension control medications, to

manage their hypertension?

- Why do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use complementary health products or practices, if any, to manage their hypertension?

Summary of Chapter One

Uncontrolled hypertension among people living with CKD and hypertension poses a significant personal health risk (Tannor, Norman, et al., 2019). Hypertension and CKD, the prevalence of uncontrolled hypertension among persons with CKD, socio-demographic correlates of hypertension control, consequences of uncontrolled hypertension, and hypertension control were discussed in this chapter. In addition, the chapter provided a brief overview of Ghana, the problem statement, purpose of the study, significance of the study, and research questions demonstrating the gap that exists for the educational needs for hypertension control and the use of complementary health products and practices instead of or in addition to prescribed antihypertensive medications.

Chapter Two: Literature Review

This chapter reviews the literature available in five areas to identify what is known about: (a) knowledge of hypertension and CKD, (b) hypertension control, (c) common complementary health products and practices for hypertension control, (d) the reasons for using complementary health products and practices for hypertension control, and (e) existing types and the proven effectiveness of educational programs/interventions for hypertension control. This review of published research literature highlights gaps in evidence, with these gaps significant for consideration. In addition, following the reviewed literature findings, the Integrated Behavioural Model (developed by Ajzen & Fishbein, 2000) is outlined, as it is the model that was chosen to guide a mixed-method study in Ghana.

Review of Related Literature

The literature review was not systematic or scoping in nature, but designed to provide a comprehensive discussion of key issues pertinent to the topic under investigation. Regardless, a comprehensive literature review was carried out through the electronic databases CINAHL and MEDLINE, with the following keywords used; chronic kidney disease, hypertension control among individuals with kidney disease, educational needs, educational intervention, and complementary health products and practices. Literature published in the years 2010-2022 was sought. Although there was a great deal of literature identified on hypertension and its control, complementary health products and practices, and educational interventions for hypertension control (180 articles were identified), there was limited information on hypertension education for individuals diagnosed with CKD (10 articles were retrieved).

Another extensive review was then conducted to specifically identify all published literature reports pertaining to educational needs for hypertension control and complementary health products and practices for hypertension control among individuals with CKD. With the help of a librarian, the following databases were included in this search: CINAHL, MEDLINE, EBSCO Discovery Service, Google Scholar, Web of Science Core Collection, PsychINFO, Embase, and PubMed. The main search words and MESH terms used in each database were: chronic kidney disease, renal failure, hypertension, hypertension control, herbal products usage, complementary health products and practices, educational needs/program/intervention, hypertension control, and facilitators or barriers. Also, the search was done based on the pre-specified inclusion and exclusion criteria in Table 1, including the type of publication, research studies, study population, language, date, and settings and approximately 147 articles were retrieved for the second search.

A third search was done to identify relevant book collections on the topic of the study and 16 books were identified. A fourth search of the previously described library databases was done during the writing of the chapter, which discussed the findings of this study. That search identified another 54 additional articles of relevance to this dissertation report when the date was set at 2022.

Table 1

Inclusion and Exclusion Criteria for Literature Search

CRITERIA	INCLUSION	EXCLUSION
Type of publication.	Peer review articles from 2010 - 2022 Grey Literature.	Articles published earlier than 2010.
Types of research studies.	Qualitative, quantitative and mixed-methods research designs.	Discussion papers, literature reviews.
Study population.	Persons with CKD, hypertensive individuals, and hypertensive individuals with CKD who are 18 years and above.	Persons with acute kidney disease, hypertensive individuals below 18 years with acute renal failure.
Publication language.	English	All non-English publications.
Settings.	Low-middle-income countries, developing and developed countries, and sub-Saharan African countries.	

Knowledge of Hypertension and CKD

Possessing knowledge of a disease condition influences an individual's attitude and practices, as this knowledge tends to improve compliance with treatment (Sanuade et al., 2020). Knowledge of hypertension and CKD is a critical component of kidney disease management, especially for those diagnosed with CKD and hypertension (Flythe et al., 2020). The literature reviewed showed that while some studies reported an appreciable knowledge of hypertension and its control among hypertensive individuals, others reported otherwise. Some studies in low to middle-income countries indicated that individuals with hypertension have good knowledge of hypertension regarding risk

factors, normal blood pressure levels, signs and symptoms, disease complications, and treatment (Bollampally et al., 2016; Naseem et al., 2018; Rahman et al., 2018).

In Ghana, Agyei-Baffour et al.'s (2018) mixed-method study that was conducted in 2014 revealed that knowledge of hypertension among 534 respondents was low. The investigators reported that most respondents had extremely low knowledge of hypertension, especially the risk factors, causes, and treatment (Agyei-Baffour et al., 2018). That study found increased knowledge gaps and misconceptions surrounding hypertension and its control in Ghana (Agyei-Baffour et al., 2018). Also, a cross-sectional study by Okai et al. (2020) using a total of 360 hypertensive patients from two hospitals in Accra, Ghana, revealed a low knowledge of hypertension and its management among 73% of the respondents.

Additional studies have indicated low knowledge of hypertension among CKD cohorts. For example, in Germany, Schneider et al. (2018) conducted a prospective observational study from 2010 to 2012 and recruited 5,217 adults living with CKD; this study revealed that individuals with CKD had low knowledge of hypertension and its control. Moreover, in sub-Saharan African countries including Ghana, Ethiopia, and Tanzania, studies have revealed that hypertension knowledge, such as causes, features, and treatments was low among individuals with CKD (Asmelash et al., 2020; Stanifer et al., 2016; Tannor, Sarfo, et al., 2019).

Agudelo-Botero et al. (2020) asserted that knowledge gaps are barriers to the effective prevention and treatment of kidney disease. Studies have documented low to average knowledge of CKD among adult CKD individuals regarding etiology, risk factors, medications, signs and symptoms, complications, management, and prevention

(Agudelo-Botero et al., 2020; Ku et al., 2019; Pugh et al., 2019). For example, a survey at the Vanderbilt University Hospital in the United States of America revealed low awareness and knowledge of kidney disease among 137 patients diagnosed with CKD (Siew et al., 2019). That study showed most respondents were unaware of their condition, and they did not understand risk factors or disease management (Siew et al., 2019).

Despite an extensive search for research literature, studies regarding knowledge of CKD in Ghana are rare. However, two studies conducted in Ghana revealed that most persons living with CKD lack knowledge of CKD, such as its etiology, signs and symptoms, prevention, and management (Amoako et al., 2014; Tannor, Sarfo, et al., 2019). These two studies also found that individuals who were living with CKD lacked knowledge of lifestyle modification, such as adherence to medication regimens, sodium diet restriction, and tolerable exercise to control their hypertension and manage CKD (Amoako et al., 2014; Tannor, Sarfo, et al., 2019). According to Siew et al. (2019), several factors contribute to the low knowledge of CKD among individuals living with the disease, these being low literacy level, low socio-economic status, and disease symptoms of delirium and restlessness (Siew et al., 2019). These factors make it difficult for individuals living with CKD to accept, understand, and retain information about the disease (Siew et al., 2019). Also, other factors such as cultural practices and religious beliefs have been found to contribute to low health-seeking behaviours of individuals living with CKD and hypertension in Ghana (Tannor, Sarfo, et al., 2019). While studies have revealed a positive association between adequate knowledge of hypertension and hypertension control (Agyei-Baffour et al., 2018; Gandomkar et al., 2018; Hamadou et al., 2017), other studies have reported a negative association (Bollampally et al., 2016;

Rahman et al., 2018). Therefore, it is essential to ascertain the knowledge level of CKD and hypertension and factors that need critical attention to help manage CKD and hypertension among adults living with hypertension and CKD in Ghana.

Hypertension Control

Hypertension control among individuals living with CKD in low and middle-income countries differs from high-income countries such as the United States of America, Germany, and Canada. For instance, Thomas et al. (2016) investigated the risk factors for CKD progression in the United States of America between June 2003 and December 2008. Their observational study, which involved 3,939 racially diverse groups of adults living with CKD, found that 40.4% had uncontrolled hypertension, with 59.6% having their hypertension controlled (Thomas et al., 2016). In Germany, another highly developed country, Schneider et al. (2018) conducted a prospective observational study using 217 adults living with CKD from 2010 to 2012. That study revealed that 51% of the cohort had their hypertension controlled (Schneider et al., 2018).

However, in Ethiopia, a sub-Saharan African country, a cross-sectional study involving 578 CKD patients in the Tigray Teaching Hospital found 96% of the respondents had uncontrolled hypertension (Bahrey et al., 2019). Likewise, in Cameroon, another sub-Saharan African country, a cross-sectional study using 400 adults living with CKD and hypertension conducted by Hamadou et al. (2017) revealed low hypertension control among two-thirds of the subjects. More specifically, 30.5% of the studied population had their hypertension controlled as compared to 69.5% who had uncontrolled hypertension (Hamadou et al., 2017).

In Ghana, a study conducted in the Greater Accra region by Osafo et al. (2011)

found that blood pressure control was low among persons living with CKD. Similarly, a 2014 survey at the renal unit of Komfo Anokye Teaching Hospital in Kumasi, located in the Ashanti region of Ghana, found a 45% rate of controlled hypertension among patients diagnosed with CKD (Amoako et al., 2014). Another 2015 survey in the southwestern part of Ghana found a 26% rate of controlled hypertension among adult CKD individuals (Ephraim et al., 2015). Therefore, it can be emphasized that uncontrolled hypertension among individuals with CKD is a well-established and long-standing major concern in Ghana. Comparably, hypertension control rates are higher in European and American cohorts, probably due to more public awareness of hypertension and greater treatment access to hypertension medications in these countries (Chow et al., 2013; Go et al., 2013).

Socio-demographic and Other Factors for Hypertension Control

Many studies have indicated that socio-demographic characteristics such as age, gender, education, income level, religion, marital status, body mass index, geographic areas, and additional factors are associated with hypertension control (Almalk et al., 2020; Hamadou et al., 2017; Mini et al., 2019). Studies in the UK, China, and India have found males and older people were less likely to have controlled hypertension (Mini et al., 2019; Tapela et al., 2021; Zhu et al., 2019). Studies in sub-Saharan Africa have also found an association between age or sex with hypertension control, although the findings were contradictory at times. For instance, in Cameroon and Tanzania, studies have reported that hypertension was controlled among young adults and men as compared to their older and female counterparts (Hamadou et al., 2017; Stanifer et al., 2016). In Ghana, a mixed-method study found that uncontrolled hypertension was higher in men

than women, and it also increased with age in both sexes (Agyei-Baffour et al., 2018).

Socio-economic status, such as geographical location, has also been implicated in the control of hypertension. Stanifer et al. (2016) reported minimal hypertension control among adult CKD individuals in a rural community in northern Tanzania. Contrarily, in Ghana, Bosu and Bosu (2021) reported significant hypertension control among rural people in a systematic review of 85 articles involving 82,045 subjects aged 15 to 100 years. In addition, several studies conducted in low to middle-income countries have revealed that formal education is likely associated with hypertension control. For instance, studies in Pakistan, Ethiopia, Zambia, and Ghana found that individuals who had higher formal education (tertiary education and secondary education) had better knowledge about hypertension and its control than those without formal education (Ademe et al., 2019; Chimberengwa & Naidoo, 2019; Naseem et al., 2018; Okai et al., 2020).

Conversely, a systematic review conducted by Bosu and Bosu (2021) indicated that reasonable hypertension control in rural settings in Ghana was not linked to formal education but instead to their traditional lifestyles, primarily manual farming, housekeeping, walking or bicycle use, and use of complementary health products and practices. These findings suggest that aside from one's geographical location and formal education, other factors may impact one's knowledge about hypertension and its control. Other socio-demographic factors such as employment status, ethnicity, income, marital status, and religion may predict hypertension awareness, knowledge, and control (Agyei-Baffour et al., 2018; Chimberengwa et al., 2019; Okai et al., 2020; Sanuade et al., 2020).

Barriers to Hypertension Control

Individuals living with hypertension and CKD are often overwhelmed by a treatment regimen that can be complex, restrictive, and insensitive to cultural norms, leading to non-adherence to the treatment regimen (Evangelidis et al., 2019). Studies have revealed substantive evidence of the barriers to blood pressure control in varying contexts (Evangelidis et al., 2019). Barriers to hypertension control may be grouped into patient-related, healthcare providers-related, and health system-related (Agudelo-Botero et al., 2020; Muscat et al., 2021; Sperati et al., 2019). Some of the patient-related barriers were low medication adherence, lack of helpful lifestyle behaviour, financial challenges in acquiring antihypertensive medications, and difficulty obtaining healthy foods (Agudelo-Botero et al., 2020; Muscat et al., 2021; Sperati et al., 2019). In addition, lack of hypertension knowledge, low health literacy level, and lack of social support are other identified patient-related barriers (Blackstone et al., 2019; Muscat et al., 2021; Sperati et al., 2019). In Ghana, patient-related barriers were identified as non-adherence to medication and dietary restrictions, inappropriate health beliefs, cultural and religious beliefs, improper usage of complementary health products and practices, and poor health-seeking behaviour (Asamani et al., 2019; Blackstone et al., 2019; Koduah et al., 2021; Nyaaba et al., 2020). These barriers led to uncontrolled hypertension and unsatisfactory clinical outcomes even among hypertension treated patients in Ghana (Koduah et al., 2021).

Ineffective drug therapy, improper communication style, lack of multidisciplinary teamwork, and inadequate knowledge of treatment guidelines for hypertension pertained to healthcare provider-related barriers to hypertension control (Agudelo-Botero et al., 2020; Muscat et al., 2021). Healthcare providers-related barriers to hypertension control

in Ghana encompassed communication difficulties between healthcare providers and recipients, low collaboration and referrals among healthcare providers, and limited training for hypertension and other non-communicable diseases control (Blackstone et al., 2019; Nyaaba et al., 2020). Inadequate and non-standardized diagnostic tools for early detection of hypertension, long wait times to access medical care, prolonged healthcare administrative procedures, and inefficient clinical information systems were identified as health system-related barriers to hypertension control in Ghana (Asamani et al., 2019; Koduah et al., 2021; Nyaaba et al., 2020). In addition, inadequate health system capacity due to an increasing number of patients, inequitable distribution of healthcare facilities affecting access, financial sustainability of the National Health Insurance Scheme and delays in reimbursement of claims to facilities affect the health system's ability to provide timely control of hypertension in Ghana (Koduah et al., 2021).

Complementary Health Products and Practices for Hypertension Control

According to the World Health Organization (2020), low adherence to prescribed antihypertensive medications is one of the most common reasons for uncontrolled hypertension. Multiple factors have been identified as responsible for low personal adherence to prescribed pharmacologic therapies, and one of them is the existence of complementary health products and practices (Krousel-Wood et al., 2010). Dumfeh and Ahorlu's (2020) survey assessed complementary and alternative medicine used among patients at a hospital in Accra, Ghana. Their study revealed that over 47% of individuals with hypertensive were using or had used complementary and alternative medicine to manage their illnesses (Dumfeh & Ahorlu, 2020). Complementary health products and practices consist of various therapies, such as dietary supplements, herbal remedies, faith-

based healing methods, traditional Chinese medicine, acupuncture, mind-body medicine, and therapeutic massage (WHO, 2020).

In a systematic review, James, Wardle, et al. (2018) indicated that traditional therapies, such as herbal products are the most common complementary and alternative health products used in sub-Saharan Africa. For instance, a cross-sectional survey among individuals with hypertension in Ethiopia revealed that the majority of the respondents (67.5%) used herbal products to treat their hypertension (Erku & Mekuria, 2016). In sub-Saharan Africa, faith-based healing methods (prayer/spirituality) and mind-body therapies (relaxation, meditation and yoga) are some of the practices used for the treatment of chronic illnesses, including hypertension and CKD (James et al., 2018).

In Ghana, Kenu et al.'s (2021) survey conducted in 2017 found that patients at Lekma hospital often used traditional medicines for the treatment of various chronic diseases. Other studies have indicated that traditional and alternative medicines used in Ghana for treating chronic illnesses are herbal products, mineral supplements, diet therapy, and spiritual healing/prayer (Agyeman et al., 2017; Kretchy et al., 2021). Moreover, Gyasi et al. (2017) conducted a cross-sectional study involving 900 students at the Kwame Nkrumah University of Science and Technology located in Kumasi, the Ashanti region of Ghana. That study found that most respondents predominantly used herbal products and faith healing modalities for disease treatment, prevention, and health promotion (Gyasi et al., 2017).

Reasons for Using Complementary Health Products and Practices for Hypertension Control

In 2002, the World Health Organization estimated that up to four billion people

(representing 80% of the world's population) living in the developing world relied on herbal medicinal products to manage an illness (Kenu et al., 2021). According to Erku and Mekuria (2016), the use of herbal products and other complementary health products and practices has increased remarkably worldwide in recent decades. More recently, a medical team indicated that herbal and other complementary health products and practices used to control chronic illnesses appear widespread across many countries in sub-Saharan Africa (James, Wardle, et al., 2018). Indeed, two studies found that about 60% of the adult population in Uganda and 70% of the adult population in Ghana depended solely on complementary health products and practices to manage their illnesses (De Coninck, 2016; Dumfeh & Ahorlu, 2020).

Factors for Complementary Health Products and Practices usage

Many factors have been identified as drivers of complementary health products and practices that are used for chronic disease management, including hypertension. These factors could differ between developed and developing countries. However, as the intention was to conduct a study in Ghana, it is important to recognize that the use of complementary health products and practices in developing countries appears to depend on numerous variables. Cultural and historical influences, legal regulations, accessibility, and affordability compared to conventional prescribed medicines are factors said to contribute to the use of complementary health products and practices in developing countries (WHO, 2019).

James, Wardle, et al. (2018) noted that sub-Saharan Africa has the largest population of economically disadvantaged people, and access to conventional care is limited due to personal out-of-pocket costs. Therefore, complementary health products

and practices offer a more affordable and easily accessible healthcare option for most people in sub-Saharan Africa (James, Wardle, et al., 2018). James, Wardle, et al. (2018) also reported that traditional beliefs and cultural practices are other reasons for using complementary health products and practices. In addition, the systematic review by James, Wardle, et al. (2018) revealed a significant relationship between demographic characteristics and the use of complementary health products and practices. The investigators noted that rural residents, higher educational status, male sex, low average monthly income, and a family history of hypertension were significantly associated with using complementary health products and practices for hypertension control (James, Wardle, et al., 2018). Age is also a factor, as the systematic review by James and colleagues (2018) indicated that studies conducted in urban or semi-urban settings found that users of complementary health products and practices were younger (often 20–50 years). The reviewed studies that were conducted in a rural setting found users of complementary health products and practices are more likely to be older (>55 years) (James, Wardle, et al., 2018). In addition, Kretchy et al. (2016) noted that the complementary and alternative health products used in sub-Saharan Africa to treat hypertension and other chronic illnesses have deep cultural and/or religious roots.

In Ghana, studies have found that accessibility, availability, affordability, spiritual, religious, and sociological values make complementary and alternative health products the preferred option for many Ghanaians (Aziato et al., 2016; Kenu et al., 2021; Kretchy et al., 2016). Other factors that positively influence the use of complementary and alternative health products among Ghanaians were adequate knowledge of their use and their low side effects (Dumfeh & Ahorlu, 2020; Kenu et al., 2021). As such, the

literature reviewed indicated diversified patterns and determinants of complementary health products and practices usage among people in Ghana. Therefore, it is imperative to understand the patterns and determinants of complementary health products and practices usage from the perspective of those diagnosed with hypertension and CKD. An intervention program could then be incorporated to enhance the possibility of desired health outcomes.

Educational Programs and Interventions for Hypertension Control

Chen et al. (2020) asserted that the effective control of hypertension had become a priority for global health policy, keeping with the growing interest worldwide in preventing and controlling non-communicable diseases. Healthcare systems must therefore deliver appropriate interventions for hypertension control (Chen et al., 2020). Many studies showed that self-regulation-based interventions such as sodium-restricted diet, physical exercise programs, self-management education, lifestyle changes, individualized medication treatment, structured telephone support, and primary care visits are associated with good outcomes of blood pressure control (Mini et al., 2019; Saran et al., 2017; Tu et al., 2020). Education of individuals and their families so that they know what to do and what not to do is a key to hypertension control, particularly when the person is already suffering from CKD (Mini et al., 2019; Tu et al., 2020).

For instance, Tu et al. (2020) experimentally evaluated the effect of a nurse-coordinated hospital-initiated transitional care program on hypertension control for older people with non-communicable diseases in China. The essential constituent of the program was self-management education, lifestyle changes, individualized medication treatment, structured telephone support, and primary care visits. The intervention

improved hypertension control and reduced hospital readmissions (Tu et al., 2020). In addition, in India, Mini et al. (2019) found that behavioural interventions such as lifestyle modification, including taking prescribed antihypertensive medication, quitting smoking, exercising, regular monitoring of blood pressure, and cholesterol level program were effective in controlling hypertension.

In the same vein, Ghana has developed some interventions since the 1990s to control non-communicable diseases, including hypertension (Adu-Gyamfi et al., 2020). More specifically, in Ghana, from 1992 to 2016, several interventions, including educational programs, were established to control hypertension and reduce its prevalence, complications, morbidity, and disability challenges (Adu-Gyamfi et al., 2020; Bosu, 2012). These intervention programs include the Non-Communicable Disease Control and Prevention Program in 1992, the Regenerative Health and Nutrition Program in 2005, the National Health Insurance Scheme in 2006, the Community-based Hypertension Improvement Project and Management in 2017, and the Prevention and Control of Chronic Non-communicable Diseases in Ghana in 2012–2016 (Adu-Gyamfi et al., 2020; Aikins et al., 2010; Bosu, 2012; Lamptey et al., 2017; MOH, 2012). Despite these intervention programs, hypertension control remains low in the Ghanaian populace (Adjei et al., 2018; Forouzanfar et al., 2017).

Theoretical Framework for the Study: The Integrated Behavioural Model

Controlling hypertension among persons living with CKD is essential to prevent complications and their associated burdens (Sanuade et al., 2020). In order to effectively control high blood pressure, an educational needs assessment is required to identify the areas that need changes in affected individuals or groups (Springer & Evans, 2016). In

the same vein, Fishbein and Ajzen (2010) asserted that to design effective interventions to influence one's health practices, it is important first to determine the degree to which one's attitude influences that practice, perceived norm, and personal agency. The following explains why the Integrated Behavioural Model was chosen for the qualitative component of the study to provide insights into perceptions and the use of complementary health products and practices to manage hypertension.

The concepts of this model explicitly indicate why individuals engage in a particular behaviour (as illustrated in Figure 1). Figure 1 is a depiction of the model components developed by Ajzen and Fishbein (2010). The fundamental concept of the Integrated Behavioural Model is the intention to perform a given behaviour. According to the model, the intention to perform a given behaviour is determined by the person's attitude, perceived norms, and personal agency (Fishbein & Ajzen, 2010). One's attitude toward engaging in a particular behaviour rests on one's feelings about that behaviour (experiential attitude) and one's beliefs about the behaviour (instrumental attitude) (Fishbein & Ajzen, 2010). If one's feelings and beliefs about a given behaviour are positive, then one is most likely to engage in that behaviour.

The perceived norms rest on two tenets which are that each individual's belief about what others think should be done, known as the injunctive norm, and what the individual perceives that others within the immediate environment are doing, also known as the descriptive norm (Fishbein & Ajzen, 2010). The Integrated Behavioural Model explains that the expectations and behaviours of significant others in the individual's circle may influence the individual to engage in or not engage in a particular behaviour (Fishbein & Ajzen, 2010). Also, personal agency captures the individual's perceived

control and self-efficacy (Fishbein & Ajzen, 2010). Perceived control reflects the individual's perceived degree of control over behaviour performance (Fishbein & Ajzen, 2010). Self-efficacy reflects one's degree of confidence in performing behaviour regardless of prevailing challenges (Fishbein & Ajzen, 2010). If the person perceives a high degree of control and self-efficacy, they will most likely engage in the behaviour (Fishbein & Ajzen, 2010).

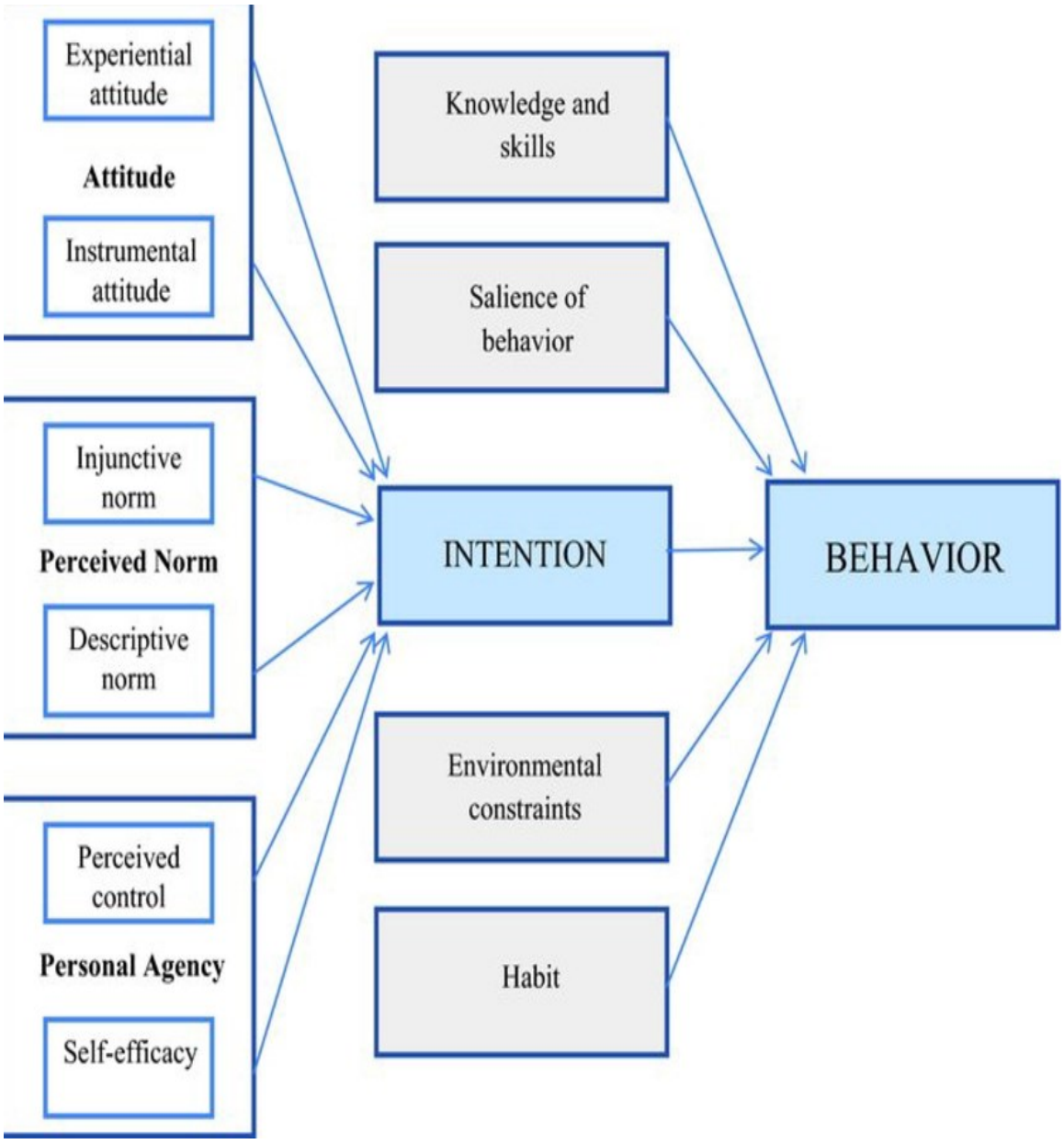
According to the Integrated Behavioural Model, aside from one's attitude, perceived norm and personal agency directly impacting one's behaviour, three factors directly affect behaviour (Fishbein & Ajzen, 2010). First, knowledge and skills to perform the behaviour impact one's willingness to engage in a particular behaviour (Fishbein & Ajzen, 2010). To engage in a particular behaviour, one must have sufficient information about the pros and cons of engaging in that behaviour and the needed skills to adequately perform the behaviour (Fishbein & Ajzen, 2010). If one is not adequately informed and deficient in skills, one's behaviour performance may be affected (Fishbein & Ajzen, 2010). Second, environmental constraints are another factor that impacts behaviour (Fishbein & Ajzen, 2010). Environmental constraints are environmental hindrances that make behaviour performance impossible (Fishbein & Ajzen, 2010).

The third factor is that one's habits impact a particular behaviour (Fishbein & Ajzen, 2010). If the individual has engaged in that behaviour before, they become experienced, it motivates them to engage in the behaviour again (Fishbein & Ajzen, 2010). The salience of the behaviour is another factor that directly affects behaviour performance (Fishbein & Ajzen, 2010). If the individual fails to see the importance of performing a particular behaviour, the individual will most likely not engage in that

behaviour (Fishbein & Ajzen, 2010). Also, Fishbein and Ajzen (2010) indicated that demographic variables might be indirectly associated with one's attitude, perceived norm, and personal agency.

Figure 1

Integrated Behavioural Model (Montano & Kasprzyk, 2008).



Application of the Integrated Behavioural Model

The Integrated Behavioural Model has been applied to a variety of fields. For instance, it has been applied to the field of healthy behavioural influences (Koenker et al., 2013). This model has also been applied to social phenomena as well. For instance, the Integrated Behavioural Model was used as a framework for studies of condom use among adolescents and adults (Carmack et al., 2015; Rhodes et al., 2007), patient sexual health communication (Hughes & Lewinson, 2015), and HPV vaccination (Dillard, 2011). The model has been applied to the African context. In Zimbabwe, the Integrated Behavioural Model was used as a conceptual framework for studying adult male circumcision practices (Montaňo et al., 2014). In South Africa, the Integrated Behavioural Model was used to study voluntary HIV counselling and testing intentions in South African teenagers and adults (Diteweg et al., 2013).

Although the Integrated Behavioural Model has contributed significantly to understanding certain behavioural constructs, the Integrated Behavioural Model has been criticized as being Western in its philosophy and focus (Fishbein, 2010). However, Fishbein and Ajzen (2010) indicated that an essential step in applying this model to develop an intervention is to conduct interviews with the population being studied to elicit information about the behavioural, normative, efficacy, and control beliefs of that behaviour and population. According to Fishbein and Ajzen (2010), failure to elicit these beliefs from the population is the reason that some investigators have concluded that the theory is Western and not appropriate cross-culturally. Fishbein and Ajzen (2010) emphasized that, in applying the model, it is critical to identify and understand the salient behavioural, normative, efficacy, and control beliefs associated with the behaviour from

the perspective of the study population.

Assessment Tools for Collecting Quantitative Data

This study relied on the Hypertension Knowledge-Level Scale that was developed by Erkoc et al. (2012) to assess hypertension knowledge among the test subjects. In addition, the Knowledge Subscale of the Chronic Kidney Disease Screening Index developed by Khalid et al. (2014) was used to assess their knowledge of CKD. These two assessment tools have already been used in sub-Saharan African countries like Nigeria, Ethiopia, and Ghana (Ernawati et al., 2020; Sarfo et al., 2021). These tools and their use, and all other research methods used in this dissertation study are described in Chapter 3.

Summary of Chapter Two

The research and other literature presented above on the topics of: (a) knowledge of hypertension and CKD, (b) hypertension control, (c) complementary health products and practices for hypertension control, (d) reasons for complementary health products and practices for hypertension control, (e) educational programs/interventions for hypertension control (f) assessment tools, and (g) the Integrated Behavioural Model demonstrate that there is the need to examine educational needs for hypertension control among adult hypertensive individuals living with CKD in Ghana. The findings from this study in Ghana may apply to other developing countries where hypertension, CKD, and the use of complementary health products and practices are prevalent.

Chapter Three: Methods

As indicated above, the prevalence of hypertension among individuals with CKD in Ghana is high. Tannor, Sarfo et al.'s (2019) study established it at a rate of 26% in 2018. Hypertension poses a significant burden on the individual and their family, community, and the healthcare system (Tannor, Sarfo, et al., 2019). This study sought to identify and describe the educational needs for hypertension control among select adult hypertensive Ghanaians diagnosed with CKD and gain insights into their use of complementary health products and practices alone or in addition to prescribed medications. This chapter presents the research questions, study design and philosophical assumptions, study settings, study population, sample size determination, and sampling techniques. In addition, the data collection and analysis procedures, ethical considerations, methodological rigor concerns, knowledge translation plans, dissemination strategies, and anticipated challenges are discussed.

Research Questions

- What proportion of persons diagnosed with CKD and hypertension, receiving care at the Korle-Bu Teaching Hospital, had controlled hypertension?
- How accurate is the knowledge of CKD and hypertension among persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital?
- What complementary health products and practices do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use, in addition to or instead of prescribed hypertension control medications, to manage their hypertension?

- Why do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use complementary health products or practices to manage their hypertension?

Study Design

Mixed-methods Design

A mixed-methods design was employed in this study. Mixed-methods research is a growing field, and using a mixed-methods approach has become increasingly common in health research (Creswell & Plano Clark, 2018). Although there is no established consistent definition, mixed-methods research often uses designs that incorporate both quantitative and qualitative methods (Schoonenboom & Johnson, 2017). Creswell and Plano Clark (2018) described a mixed-methods study as a scientific inquiry, purposefully collecting, analyzing, and integrating quantitative and qualitative data at an appropriate stage within the same study to better understand a phenomenon through diverse research lenses (Creswell & Plano Clark, 2018).

A sequential mixed-methods design was employed in this present study. A sequential mixed-methods design involves collecting quantitative and qualitative data separately, with either quantitative or qualitative data collection preceding the other (Schoonenboom & Johnson, 2017). In this study, quantitative data was collected, followed by qualitative data. The reason for the choice of mixed-methods design is that neither quantitative nor qualitative methods alone could answer the four essential research questions that were identified for this dissertation study. In addition, using mixed-methods approaches provides an in-depth understanding of the constructs under study while catering to any lapses in quantitative and qualitative methods

(Schoonenboom & Johnson, 2017). For instance, the quantitative aspect of the mixed-methods study would examine the relationship between independent and dependent variables. The qualitative aspect is useful in exploring events and answering the "why" of behaviours and experiences, as is the case with the present study. While qualitative techniques yield much detailed and rich subjective data, the findings from the quantitative research are more objective and could therefore be more often generalized to a larger population (Boswell & Cannon, 2018; Schoonenboom & Johnson, 2017). In other words, the depth and breadth of the present study would be expanded by using a mixed-methods design that includes gaining both quantitative and qualitative findings.

Quantitative Component of the Study

Quantitative research is the empirical investigation and analysis of numerical data to determine the relationship between the independent and dependent variables (Schoonenboom & Johnson, 2017). Quantitative research relies on deductive reasoning and uses various quantitative analysis techniques that range from providing simple description of the variables involved to establishing statistical relationships among variables through complex statistical modelling (Schoonenboom & Johnson, 2017). Schoonenboom and Johnson (2017) indicated that quantitative research is often categorized into experimental and observational designs. A cross-sectional study is a type of observational design that gives the researcher a snapshot of numerous characteristics under study at a time (Polit & Beck, 2014). In addition, a survey is relatively quick and flexible to conduct when data is needed about what is happening currently in a surveyed location (Polit & Beck, 2014). A cross-sectional survey was used to answer the quantitative questions in this study.

Qualitative Component of the Study

Qualitative research explores, describes, and promotes an understanding of human experiences, events, and cultures over time (Boswell & Cannon, 2018). Also, qualitative research aims to provide an in-depth understanding of people's experiences, perspectives, and histories in their circumstances or settings (Schoonenboom & Johnson, 2017; Thorne, 2016). The design is characterized by exploring phenomena from the perspectives of those being studied (Boswell & Cannon, 2018). Unlike quantitative research, the theoretical drive of qualitative research is inductive, involving perceptually putting insights and pieces of information together and identifying abstract themes (Schoonenboom & Johnson, 2017). The insights gained from the phenomena from qualitative research could foster an understanding of persons and problems, guide emerging theories, and build nursing knowledge (Boswell & Cannon, 2018).

Many qualitative methods exist, including phenomenology, grounded theory, ethnography, and interpretive descriptive design, to name a few. The method for a qualitative study usually depends on the research question(s) and the study population (Boswell & Cannon, 2018). The qualitative phase of this study used Thorne's interpretive descriptive design to answer the qualitative research questions. The interpretive phase of the analysis moved beyond description and helped gain an in-depth contextual understanding of herbal products and/or other complementary or alternative medicine usage over prescribed medications among individuals diagnosed with CKD and hypertension (Thorne, 2016). Thorne's interpretive descriptive design also has a nursing practice orientation focusing on building on existing knowledge and offering practical resolutions relevant to solving clinical problems (Thorne, 2016).

Philosophical Assumptions of Mixed-Methods Research Design

The philosophical assumption of qualitative research draws from constructivist and interpretivism paradigms as opposed to the positivist paradigm underlying quantitative research (Grove & Gray, 2018). However, pragmatism is the philosophical foundation for mixed-methods research (Cameron, 2009; Morgan, 2007). Pragmatism accepts the use of multiple methods in one study and emphasizes the relevant research questions and reliable findings or correct answers to the questions (Cameron, 2009). This present study drew from pragmatic philosophical assumptions using quantitative and qualitative methods.

Study Setting

This study was conducted in Accra, the capital city of Ghana, which is located in the Greater Accra Region in the southern part of the country. According to Ghana Statistical Services (2022), Ghana has approximately 31 million people. Accra has nearly four million inhabitants, many of whom come from all regions of Ghana originally, giving room for a diversified sample (Ghana Statistical Services, 2022). The institution selected as the data collection outlet for the present study is the Korle-Bu Teaching Hospital. This large hospital is located within the Greater Accra region of Ghana, and it offers a broad range of specialist services, including renal treatments (Korle-Bu Teaching Hospital, 2020).

The hospital's renal unit serves as a referral point for most renal patients as it provides a full range of treatment options for patients with kidney disease (Korle-Bu Teaching Hospital, 2020). For this study, individuals were recruited from the renal outpatient unit at the Korle-Bu Teaching Hospital. The renal outpatient unit has three

distinct outpatient clinics (general nephrology clinic, dialysis clinic, and glomerulonephritis and kidney transplant clinic) that are held on Mondays, Wednesdays, and Fridays each week (Korle-Bu Teaching Hospital, 2020). A maximum of 15 new referrals and 20 follow-up patients are scheduled per clinic session (Korle-Bu Teaching Hospital, 2020).

Study Population

The sample represents the population of interest (Onwuegbuzie & Collins, 2020).

Inclusion Criteria

The criteria for inclusion in this Accra area study were: (a) individuals diagnosed with CKD and hypertension who were receiving care at the Korle-Bu Teaching Hospital, (b) diagnosed as such for one year or more, (c) 18 years of age and above, and (d) consented to participate in the study.

Exclusion Criteria

The exclusion criteria for the study were: (a) individuals diagnosed with CKD and hypertension who also have comorbid conditions such as diabetes, heart failure, and liver failure, (b) do not wish to engage in this study or do not complete the interview and two knowledge assessment tools, and (c) do not speak English or local dialect.

Sample Size Estimate and Sampling Technique

Quantitative Component of the Study

This study component employed the convenience sampling technique, as it allows the researcher to select respondents of interest and based on the availability and willingness of the respondents to participate in the study (Campbell et al., 2020; Stratton, 2021). Convenience sampling involves selecting subjects who are easily available,

accessible, and ready to take part in the study at a given time (Stratton, 2021).

Sample Size

Studies have indicated that the sample size can be calculated when the prevalence rate of a disease condition is known (Pourhoseingholi et al., 2013). The prevalence of hypertension among CKD individuals in Ghana was 26% in 2018 in a multicenter cross-sectional study involving 2,780 individuals living with CKD (Tannor, Sarfo, et al., 2019). This rate was used in calculating the sample size of respondents for the study and is given by:

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

Where n symbolizes the sample size to be calculated,

Z symbolizes statistics for the confidence level,

P is the expected prevalence,

d is precision.

The sample size is calculated as follows:

Z = 1.96 at a confidence level of 95%,

P = 26.3% (0.26),

d = 5% (0.05). n = 289

The expected quantitative component's sample size (n) was calculated to be 289 respondents. An additional 62 respondents representing 22% of the sample size was added to 289, increasing the sample size to 351. The additional 62 respondents were to make up for gaps, such as if people dropped out of the study, or not complete all the questions in the questionnaires.

Qualitative Component of the Study

The purposive sampling technique was employed for the qualitative phase to select participants diagnosed with CKD and hypertension. The purposive sampling technique was chosen because the study focused on individuals with CKD and hypertension. According to Vasileiou et al. (2018), qualitative data saturation is often reached after interviewing 10 to 12 participants. Thus, the approximate sample size for the qualitative component of this study was expected to be not less than 10 participants; as based on identified findings, the quality of the data received from the participants, and through having gained an in-depth understanding of the phenomenon under study (Vasileiou et al., 2018).

Data Collection

Recruitment

In this study, the researcher recruited individuals diagnosed with hypertension and CKD from the renal outpatient unit at the Korle-Bu Teaching Hospital located within the Greater Accra region of Ghana. Data collection for the qualitative and quantitative phases began after the researcher gained ethical clearance for this study in both Canada and Ghana. The researcher got the assistance of some of the nurses from the renal outpatient unit to approach potential study participants/respondents who meet the inclusion criteria. The renal nurses had a short script (Appendix A) to describe the study to the potential participants/respondents. Individuals interested in the study were asked to provide verbal or written consent in English or local dialect to release their names, addresses, and phone numbers to the researcher. The renal unit nurses then contacted the researcher to provide the contact information of potential participants/respondents. Also, posters were put up

on Korle-Bu Teaching Hospital notice boards with the researcher's phone number and email address for individuals (who fell within the inclusion criteria and were willing to participate in the study) to contact the researcher.

The researcher contacted all possible participants/respondents and arranged to meet them to explain the study and obtain verbal or written informed consent (Appendix C) to participate in the study. Participants/respondents who were English literate and could read and write were asked to sign a written consent to participate in the study. In the case of individuals who could not read and write, the consent form was read and explained to them. They were asked to sign, and thumbprints were taken for those who could not read. At the end of each interview, the researcher gave a small gift (souvenir) to each participant as a way of showing appreciation and respect for him or her.

Data Collection Tools for the Quantitative Component of the Study

The quantitative data were collected by three methods: (a) select health and socio-demographic data were gathered from each patient's hospital chart/folder, (b) the Hypertension Knowledge-Level Scale developed by Erkoc et al. (2014), and (c) the CKD Screening Index developed by Khalil et al. (2014) (Appendix E). The quantitative data was collected to answer two research questions:

- What proportion of persons diagnosed with CKD and hypertension, receiving care at the Korle-Bu Teaching Hospital, had controlled hypertension?
- How accurate is the knowledge of CKD and hypertension among persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital?

Health and socio-demographic data were collected from each patient's hospital

chart/folder: Sex, age (year), religious affiliation if any, level of education, marital status, the first (most recent) previous blood pressure measurement, the second (most recent) previous blood pressure measurement, the third (most recent) previous blood pressure measurement, years or partial years since being diagnosed with hypertension, and years or partial years since being diagnosed with CKD.

Hypertension Knowledge-Level Scale by Erkoc et al. (2012)

The Hypertension Knowledge-Level Scale developed by Erkoc et al. (2014) has six sub-dimensions that measure the person's knowledge of hypertension definition, medical treatment, drug compliance, lifestyle, diet, and complications of hypertension. In total, this assessment tool has 22 items that measure hypertension knowledge using a dichotomous scale, with a completion score ranging from 0 to 22; a higher score indicates higher hypertension knowledge (Erkoc et al., 2012). The tool was designed in Turkey to assess hypertension knowledge, and the tool was developed with concern over content validity, face validity, construct validity, internal consistency, test/re-test reliability, and discriminative validity (Erkoc et al., 2012). Erkoc et al. (2012) indicated that the scale accurately reflects culturally consistent social norms, standards, and viewpoints among all races to determine an individual's hypertension knowledge level.

Since 2012, this tool has been translated into an English version, a Brazilian version, and an Indonesian version (Arthur et al., 2018; Erkoc et al., 2012; Ernawati et al., 2020). The English version was found to have a Cronbach's alpha coefficient of 0.82 (Erkoc et al., 2012). The Brazilian version was found to have a Cronbach's alpha coefficient of 0.92 (Arthur et al., 2018), and the Indonesian version was found to have a Cronbach's alpha coefficient of 0.759 (Ernawati et al., 2020). The English-language

version of this tool was chosen for this dissertation study because it asks highly relevant questions to test an individual's knowledge of hypertension, and the chosen subjects spoke English. Furthermore, it has good internal consistency in relation to reliability and construct validity (Erkoc et al., 2012). Erkoc et al. (2012) also recommended that the tool could be translated and used in other countries, as it was believed to have cross-cultural adaptation functions. The English-language version of the tool has been used in the sub-Saharan African countries of Cameron and Ghana (Domning, 2018; Nyantakyi et al., 2020).

The Hypertension Knowledge-Level Scale was determined to be an appropriate tool for a number of reasons. Any tool that is considered too sensitive (as it asks about personal matters and so will result in nonresponses or uneasy responses) threatens data quality (Han et al., 2014; Kaplan & Yu, 2015). The Hypertension Knowledge-Level Scale does not ask sensitive questions, but instead asks highly relevant questions for this study. Moreover, the 22 questions can be answered by the person simply indicating if each statement is correct, incorrect, or they can say they do not know. Hence, the tool was determined to be appropriate for a Ghanaian sample, as the literacy level is low in Ghana.

The Knowledge Subscale of the Chronic Kidney Disease Screening Index, developed by Khalil et al. (2014)

The entire Chronic Kidney Screening Index, developed by Khalil et al. (2014), comprises three subscales (knowledge, attitudes, and practices), each of which has questions that are scored separately from the other subscales. The Knowledge Subscale alone was used in the present study to determine CKD knowledge among the subjects.

The Knowledge Subscale has 24 items that are designed to assess the respondent's knowledge of CKD definition, its risk factors, its signs and symptoms, and CKD complications (Khalil et al., 2014). There are three answer options for each of the 24 items (yes, no, and don't know). All "don't know" answers were grouped with "no" answers for the purpose of this study. The total possible score for each person completing the 24 items scale ranges from 0 to 24. A higher score indicates higher CKD knowledge (Khalil et al., 2014).

Since the Chronic Kidney Screening Index tool was developed in Jordan in the Arabic language, two studies using an English version have since established Cronbach's alpha coefficients of 0.80 and 0.87 (Khalil et al., 2014; Sa'adeh et al., 2018). That tool has been used in low-middle-income countries such as Palestine, Jordan, Ethiopia (located in sub-Saharan Africa), and Ghana (Khalil et al., 2014; Sa'adeh et al., 2018; Tegegne et al., 2020). Furthermore, no other established tool was found other than this one that assesses an individual's CKD knowledge level. As such, the knowledge scale of the Chronic Kidney Screening Index was an appropriate data collection tool for this present study.

The Knowledge Subscale of the Chronic Kidney Disease Screening Index was determined to be an appropriate tool for a number of reasons. The Knowledge Subscale of the Chronic Kidney Disease Screening Index was designed to determine basic CKD knowledge for each person completing it, and so it would gain highly relevant data for this study. It does not ask for sensitive information that people are uncomfortable talking about. This subscale has 24 questions that each subject can simply answer with a yes, no,

or do not know. Therefore, it was determined appropriate for a Ghanaian study, as a low literacy level is common among people living in Ghana.

Pretesting of the Two Chosen Established Tools

Pretesting or piloting is when a new or developed tool is administered to a few subjects who share similar characteristics as respondents in a study prior to the final distribution of the questionnaire to the target population (Palmieri, 2020). In this study, piloting was conducted to ascertain whether respondents would have any difficulty completing the 22 and 24 questions in the two tools. The two tools were pretested using 10 individuals (for each tool) diagnosed with CKD and hypertension who receive care at the renal outpatient clinic at the Korle-Bu Teaching Hospital in Accra, Ghana, the same hospital where the study was conducted. The pilot test was such that the researcher found he did not have to restructure the questions, as they were clear and understandable to the 10 individuals in this pretest phase.

Data Collection Strategies for the Qualitative Component of the Study

In the second phase of the mixed-methods study, four qualitative data collection strategies were used: (a) a semi-structured interview using a pre-developed interview guide (Appendix D), (b) reflective journaling, (c) field notes, and (d) memos (Pacheco-Vega, 2019; Thorne, 2016; Woo, 2019).

Interview Guide

There are three main types of research interviews described as appropriate for qualitative research: Structured, semi-structured, and unstructured interviews (Merriam & Tisdell, 2016). Semi-structured interviews usually have a predetermined format allowing flexibility in the questions, which can be altered by the researcher when the research is

ongoing. Merriam (2009) stated that semi-structured interviews typically use a set of guiding questions concerning the topic to be explored. This study used a semi-structured interview guide of open-ended questions that were based on the qualitative research questions.

Semi-structured interviews were done in this study because the researcher had an idea of the information and questions needed to yield that information. The researcher had worked on the renal unit of the hospital where this study was initiated. Questions related to the topic explored were listed in the interview guide, but the researcher embraced new ideas that were developed during the interview. A semi-structured interview guide was also used to collect socio-demographic information about the participants. This information was essential to describe each participant's general characteristics.

Pretesting of the Interview Guide

Pretesting or piloting the interview guide consisted of interviewing three people who have similar characteristics as participants in the study setting to ensure the appropriateness of the interview guide (Buschle et al., 2021). These were also individuals diagnosed with CKD and hypertension who were receiving care from the renal outpatient unit at the Korle-Bu Teaching Hospital in Accra, Ghana. The pretest determined and ensured that the questions were clear and understandable (Buschle et al., 2021). The researcher restructured the questions that were not clear after pretesting in consultation with the supervisor.

Reflective Diary

During the qualitative data collection, the researcher used a reflective diary to

capture reflections on elements of the research process, including a personal interpretation or impression of identified findings and thoughts about particular participant experiences (Kitchenham, 2010). While the reflexive notes were not analyzed in the same way as the interviews, they assisted the researcher to conceptualize the data and situate the interpretation of participants' responses as a reflection of the researcher's influence (Thorne, 2016).

Field Notes

During the interviews, the researcher took field notes. Field notes helped keep track of observations, such as behaviours and nonverbal cues that could not be adequately captured through the audio recording during interviews (Pacheco-Vega, 2019). Additionally, the information recorded in the field note served as a backup for the voice recording during the discussion. Also, field notes served as a reference document for the researcher during data analysis when some statements were not captured clearly on the voice recorder (Pacheco-Vega, 2019).

Memos

Researchers are encouraged to write down ideas, thoughts, and questions about identified concepts during data collection, coding, and analysis in memos (Woo, 2019). In this study, writing memos allowed the researcher to preserve information that were not initially useful but later considered necessary, which needed further queries (Woo, 2019). In addition, memos helped the researcher mapped research activities, extracted meanings from the data, and maintained momentum (Birks et al., 2008). In the present study, the researcher used NVivo software to create and store all written memos to allow the researcher and supervisor to gain access to memos at any time for discussions during

meetings.

Data Collection Procedure

Quantitative Component of the Study

In this study, quantitative data were collected first, followed by qualitative data. A face-to-face interview to collect questionnaire data or self-administered questionnaires was used in this study, depending on the respondent's literacy level. For the face-to-face interviews when respondents were not able to read, the questions were read out to each respondent in “Twi" or English, whatever they were most comfortable with, and their responses were ticked. This approach aided in ensuring that questions were not left unanswered and that all respondents could answer the questions with clarity. For self-administered questionnaires, the respondent was allowed to take the questionnaires home and was given one week to complete them. One week was thought to allow the respondent enough time to complete the questionnaires. The quantitative data collection occurred as planned over a space of one month.

The researcher received the help of research assistants to collect the quantitative data. The researcher recruited and trained two undergraduate students as research assistants to assist in quantitative data collection. Each questionnaire item was explained during the training sessions to ensure consistency in interpretation. The researcher also explained the scoring of each questionnaire item to the research assistants. The research assistants had to demonstrate how they would question respondents and record their responses. After collecting each research assistant’s data, the researcher read through the questionnaires to check whether the questions were fully answered.

Qualitative Component of the Study

In this mixed-method study, the researcher alone collected the qualitative data. In total, 12 participants were interviewed; some were from the group that had answered the questionnaires for quantitative data and others were new people who fell within the inclusion criteria. The researcher conducted the interviews with all persons who had an in-depth understanding of the phenomenon being studied (Merriam, 2009), that being CKD and hypertension. The interview was conducted in the English or Twi language, and the participants chose which of the languages they were comfortable with for their interview. The participants were interviewed in an environment of their choice where they felt relaxed and comfortable during the data collection process. Each interview lasted for 60-90 minutes and all were recorded using a voice recorder (Irvine, 2011).

Language Consideration

All interviews conducted in Twi were translated into the English language, as the Supervisor and Supervisory Committee members are all English speaking. Two translation processes were employed in the study, cross-language and a back-translation or a parallel translation from a source into English (Santos et al., 2015). In qualitative research, where cross-language translation is needed, a translator can translate the documents or interviews into the recommended text (Squires, 2009). Since the primary investigator is fluent in both languages, he participated as a translator. The researcher also hired a professional translator who is a qualified bilingual person and not part of the data collection process as a second translator (Squires, 2009). Both the researcher and professional translator together translated all interviews conducted in Twi.

The translation was done before the documents were transcribed for analysis.

Also, a translation lexicon, as suggested by Squires (2009), was created to guide the translation process to guarantee "conceptual equivalence" (p. 280) toward a credible, unbiased document for analysis. The translation process involved the accurate transference of information from Twi to English in order to represent the original text using a computer-assisted translation tool (Zhao, 2018). Then, a review of the translation created from the original text was done to ensure accurate translation, and proofreading to ensure that the translated text sounds natural and reads smoothly in the target language (Zhao, 2018).

Data Analysis

Quantitative Component of the Study

The quantitative data analysis began after all the data had been collected in the quantitative phase of this study. The data were entered into an MS Access 2016 database on a computer, and were cleaned and checked for consistency. The Statistical Product and Service Solutions (SPSS) version 26.0 was used to analyze the quantitative data. The data were coded and entered into the SPSS database.

To answer the first research question (what proportion of persons diagnosed with CKD and hypertension, receiving care at the Korle-Bu Teaching Hospital, has controlled hypertension?), three most recent blood pressure recordings collected from each respondent’s hospital folder were entered into the SPSS spreadsheet database, with these coded as controlled or uncontrolled. Blood pressure measurements that were obtained from urgent care visits were excluded from the analysis to rule out the chance of including transiently high blood pressure readings resulting from acute illnesses (Mills et al., 2016).

If any one of the three readings demonstrated high blood pressure (i.e. equal to or more than 140/90 mmHg), then that person was identified as having uncontrolled hypertension (Almalki et al., 2020). If all the three readings demonstrate normal blood pressure measurements, the person was considered to have controlled hypertension (Almalki et al., 2020; Mills et al., 2016). The percentage of test participants who had controlled hypertension was calculated. After this, the nominal (controlled or uncontrolled hypertension) data was analyzed mainly using a series of chi-square analysis tests to determine if sex, age, religious affiliation, formal education, employment status, and marital status are significant factors for having controlled blood pressure. Also, binary logistic regression was used to assess the relationship between controlled or uncontrolled hypertension and the number of years that a person has been diagnosed with CKD or the number of years diagnosed with hypertension. Binary logistic regression is the statistical technique used to predict the relationship between the dependent variable and the independent variable, where the dependent variable is binary or dichotomous in nature (Harris, 2021).

To answer the second research question (how accurate is the knowledge of CKD and hypertension among persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital?), data collected on knowledge of hypertension and CKD was analyzed using both descriptive and inferential statistics. As before, the data was coded and entered into the SPSS spreadsheet database. The total hypertensive knowledge score and the total CKD knowledge score for each person was entered. Each of those variable scores had descriptive statistics performed (mean, standard deviation, and range). Logistic regression was done to determine if knowledge

of hypertension and knowledge of CKD (independent variables) predict controlled hypertension (dependent variable) using multiple linear regression analysis.

The final set of data analysis tests was done using multiple linear regression analysis. A multiple linear regression is a statistical model that determines the relationship between multiple independent variables and one dependent variable (Olive, 2017). The first one was done to determine if socio-demographic characteristics (independent variables) predict varying level of knowledge on hypertension (dependent variable) using multiple linear regression analysis. The second one was done to determine if socio-demographic characteristics (independent variables) predict varying level of knowledge on CKD (dependent variable) using multiple linear regression analysis.

Qualitative Component of the Study

In the qualitative phase of this study, the researcher used the ongoing data gathering, and analysis approach that Thorne (2016) proposed. The analysis started immediately following the initial interview and continued concurrently with the subsequent interviews, as responses from the previous interviews might help modify subsequent interviews. Thorne's interpretive descriptive design uses a data analysis process involving inductive reasoning and continual engagement to ascertain relationships and associations within the phenomena (Thorne, 2008). The data analysis process includes conceptualizing, testing, and challenging preliminary interpretations toward understanding a phenomenon under study (Thorne, 2008). Also, the analysis comprises constant participant engagement and theorizing to understand the phenomena being studied (Thorne, 2008). According to Thorne (2016), interpretive descriptive design analysis involves sorting and organizing, making sense of the patterns, and

transforming patterns into findings.

The researcher coded transcripts individually following an open coding process at the sorting and organizing phase. Raw data were fragmented into interpretable sections that were later more easily grouped into patterns, then larger findings (Thorne, 2016). Thorne et al. (2004) noted that this type of coding could "detract from the mind's inherent capacity to see patterns follow intuitions and retrace a line of logical reasoning among and between pieces of data" (p. 14).

The second phase of the analysis process is making sense of the pattern (Thorne 2016). In this phase, the identified codes were classified into areas of commonality or patterns that allowed for the consideration of relationships amongst patterns and the larger research question (Thorne 2016). Here, the process was guided by techniques of constant comparative analysis in which every piece of data (from the larger interview to the minutiae of individual codes) was compared to understand similarities and differences and theorize relations amongst the data (Thorne 2016).

The third and final stage of the analytical process is transforming patterns into findings (Thorne 2016). This phase comprises the researcher, thinking through credible patterns, considering what these patterns mean individually and as a whole, and how these patterns have added to the knowledge that was unlikely preceding the study (Thorne, 2016). The researcher examined the patterns with original research questions and the study's overarching aim to make sense of the findings and placed them within the larger context in a meaningful way (Thorne, 2016).

Finally, the data generated from this qualitative phase of the study was considered with existing literature and theory to determine areas of commonality and differences

(Thorne 2016). During data analysis, identified themes in the current study were compared to the existing literature for similarities and differences. This comparison could inform the researcher if there is a need for further interviews. In this study, saturation was reached after 10 participants were interviewed.

Data Management (Qualitative and Quantitative)

The obtained quantitative data were entered into an MS Access 2016 database on a computer that was password protected throughout the study. This data were cleaned and checked for consistency. The data were then exported into the Statistical Package for Social Science (SPSS) version 26.0 database for analysis. Printed copies of answered questionnaires were securely stored in a filing cabinet, only accessible to the primary researcher and the supervisor.

Qualitative data management involves tracking, organizing, and sorting out information the researcher brings from the field and can easily access during the data collection and analytic process (Thorne, 2016). In this completed study, the researcher used the NVivo software to manage the qualitative data that was collected. The NVivo was chosen because of its ability to serve the purpose of both organizing data collected (including tracking and sorting) and assisting in coding data into identified themes (Andrare et al., 2018). The software helps manage large transcription volumes and makes them easily accessible for analysis (Merriam, 2009).

Printed copies of transcriptions were securely stored in a filing cabinet, only accessible to the primary researcher and the supervisor. The collected qualitative data was imported into the NVivo software in the secure password-protected shared drive, accessible to the primary researcher and supervisor. Transcribed data was saved on the

secure password-protected shared drive with pseudonyms for participant confidentiality for easy retrieval. Field notes taken during the interviews were also typed electronically and saved with specific numbers and pseudonyms, similar to the transcribed interviews. Field notes were also securely stored in the secure password-protected shared drive. In this study, all information retrieved from data collection will be kept for at least five years as per the University of Alberta's policy before being destroyed.

Methodological Rigor/Trustworthiness

Quantitative Component of the Study (Validity and Reliability)

The validity and reliability are measures by which a quantitative instrument is effectively evaluated (Heale & Twycross, 2015). According to Heale and Twycross (2015), reliability is how a measurement technique can be depended upon to secure consistent results upon repeated application. Weiner (2007) described validity as the degree to which any measurement approach or instrument succeeds in describing or quantifying what it is designed to measure. In order to ensure the validity of this study, the researcher used questionnaires (standardized assessment tools) that covered the quantitative research questions. Moreover, to ensure face validity, the researcher engaged two individuals diagnosed with CKD and hypertension to read the questions from the standardized assessment tools. The researcher then inquired from the two individuals about their understanding of the questions.

After a week, the same two individuals were re-engaged to answer the same questions from the standardized assessment tools. The consistency of their responses for the first and second engagements assisted in assessing the reliability of the instrument. A total of 29 questionnaires that represent 10% of the total sample size were also pretested

at the renal outpatient unit at the Korle-Bu Teaching Hospital in Accra, Ghana, among individuals diagnosed with CKD and hypertension.

Qualitative Component of the Study (Rigor and Reflexivity)

Ensuring reflexivity is critical in every qualitative study for quality, credible, and dependable findings (Lincoln & Guba, 1985). Gale et al. (2013) suggested that the researcher would ensure rigor and reflexivity throughout the data collection process to generate rich data. For the researcher to ensure consistency in the data collection, there will be a back-and-forth movement between data collection and analysis (Gale et al., 2013). Lincoln and Guba (1985) proposed four ways (credibility, dependability, confirmability, and transferability) to ensure rigor in a qualitative study. However, in this study, the researcher used Thorne's (2016) proposed four criteria to ensure reflexivity: (a) epistemological integrity, (b) representative credibility, (c) analytic logic, and (d) interpretive authority.

According to Thorne (2016), epistemological integrity indicates a defensible line of logic and coherence in the methodology chosen, through the research process, from research questions, data collection, and analysis approaches. To address epistemological integrity, the researcher discussed with his supervisor the knowledge generated by the inquiry and the methodological decisions made throughout the study (Anastas, 2004).

Representative credibility is the second criterion suggested by Thorne (2016). This criterion addresses the issue of how knowledge generated from a study can be a valid claim upon the sample of participants being studied. In this particular research, for representative credibility to be attained, the researcher ensured adequate engagement with the participant, thus conducted one face-to-face audiotaped interview with each

participant to have an in-depth understanding and variation in the conceptualization of the phenomenon being studied (Merriam, 2009).

Analytic logic is the third criterion, according to Thorne (2016). The analytic logic comprises how the researcher makes choices throughout the research process, hence how claims are made on interpretations and knowledge derived from the research (Thorne, 2016). To attain an analytic logic, the researcher maintained an audit trail, allowing the researcher to maintain a strong position and indicate interpretation, methodology, and insight into the research (Sandelowski, 1995).

The last criterion is the interpretive authority, which captures an assurance from the researcher that the interpretation given about the phenomena being studied can be dependable (Thorne, 2016). According to Merriam (2009), the qualitative researcher needs to give a systematically detailed explanation of how he or she arrived at the results of the study. To ensure the attainment of interpretive authority in this study, the researcher employed reflexivity throughout the research process by doing a critical self-reflection of the entire research process (Merriam, 2009) using a reflexive diary.

Ethical Considerations

Applications were submitted to the Research Ethics Board (The Health Research Ethics Board) of the University of Alberta and then the Ethical Review Board of the Korle-Bu Teaching Hospital in Ghana for ethical approval, with both organizations providing ethical approval. Before data collection began, letters of introduction and letters of approval from the above-stated ethical boards were sent to the administrators of the renal outpatient unit at the Korle-Bu Teaching Hospital in Ghana. The researcher also sought informed consent from participants/respondents, ensuring anonymity and

confidentiality, safeguarding interviews, and ethics of information dissemination.

Informed Consent

In attaining informed consent, the researcher made the participants/respondents aware of the implications of participating in the study, allowing them to decide whether to participate or not to participate (Morse & Field, 1995). Participants/respondents were given a letter (Appendix B) explaining what the study entails to acquire informed consent individually from participants/respondents. The informed consent letter entailed an introduction to the research process, participant selection, description of the risk and benefits of participating, assurance of confidentiality and anonymity, data collection procedures, and options to withdraw from the study at any time during the research process (Byrne, 2001).

Informed consent forms were read and explained to the participant/respondent before the interview and before the administration of the questionnaires to gain approval before data collection began. Participants/respondents were asked to sign or provide a witnessed verbal consent (those who cannot write) to indicate acceptance to participate in the study. The researcher reminded participants/respondents about their freedom to withdraw from the study at any point in time during every interaction. They were made aware that withdrawal from the study will not affect their receiving services from the renal care unit or hospital. They were told that once their data has been analyzed anonymously, they will not be able to have their data erased. The data will still be used in the study.

Anonymity and Confidentiality

Safeguarding the participant's/respondent's information is an important part of

the study, and the researcher made ensure not to reveal any information about participants/respondents to any other person (Morse & Field, 1995). Since individuals who participated in this study were recruited with the assistance of the renal unit nurses, a letter of agreement to maintain the confidentiality of the participants/respondents was signed by the nurses. The use of pseudonyms was employed to elude the possible identification of study participants/respondents. All names and identifying information were removed from the transcripts and the questionnaires.

To ensure participant information confidentiality, the researcher secured all tape recordings during interviews, field notes, transcriptions, and analyzed data on a password-protected shared drive. The researcher saved all printed documents related to the data collection in a secured filing cabinet, such as questionnaires, field notes, and signed consent forms. In the final write-up of findings, the researcher maintained pseudonyms for participants/respondents to hide their identities.

Ethics of Information Dissemination

One of the aims of conducting research is to inform clinical practice and add to the existing body of knowledge (Thorne, 2016). Knowledge generated from the research findings must be used to improve healthcare (Thorne, 2016). In this case, the research findings of this completed study need to be disseminated to benefit all relevant stakeholders. The researcher will disseminate the information to avoid exposing any negative interpretation of the participants'/respondents' health.

Knowledge Translation and Dissemination Strategies

In health research, the researcher aims to use findings to improve health. For a researcher to achieve this, findings from health research must be presented to knowledge

users such as stakeholders, practitioners, policymakers, and sometimes non-governmental organizations. The knowledge translation activities of this completed study will be directed by using the Knowledge Translation Planning Strategy for the Canadian Institute of Health Research (CIHR, 2015). The CIHR (2015) strategy includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products, and strengthen the healthcare system. For the researcher to transfer knowledge to the target audience, there must be well-organized planned activities, including sending the correct message to the right people through the correct communication channel or network.

This study's planned target audience includes healthcare professionals, policymakers at the Ministry of Health in Ghana, individuals with CKD and their family caregivers in Ghana and sub-Saharan Africa, renal care non-governmental organizations, and health researchers. The findings of this completed study will be disseminated through both traditional and non-traditional strategies. The traditional dissemination methods will include publications in peer-reviewed journals. Workshops or brief oral presentations will be organized locally in Ghana, specifically for stakeholders such as directors at the institutional level, policymakers, renal care team, other relevant healthcare professionals, and individuals with CKD and their family caregivers. The non-traditional dissemination strategies through social media, such as blogs will be used to reach out to other knowledge users, such as individuals, family caregivers, members of the general public, and front-line healthcare professionals.

Anticipated Challenges of the Study

In this study, the researcher anticipated a challenge that some

participants/respondents may feel fatigued and/or emotionally unstable during the study. The researcher rescheduled interviews at the participant's convenience to curb this challenge. Similarly, respondents who felt the need to take the questionnaires home and answer them at their own convenient time were allowed. Upon completion of the questionnaires, the respondents were asked to mail them to the researcher or the researcher went to get them. The provision was made for emotionally disturbed participants due to sharing of their experiences during the interview to see a certified clinical psychologist when needed. However, none needed to see a psychologist.

Also, an additional challenge the researcher anticipated was getting the needed sample size for the quantitative component. Posters were put up at the Korle-Bu Teaching Hospital notice boards with the researcher's phone number and email address for individuals who fall within the inclusion criteria and are willing to participate in the study to contact the researcher. The required sample was gained as a result.

Another challenge the researcher anticipated was managing the large volume of both qualitative and quantitative data. The researcher retained a well-organized filing and data management system and used NVivo and SPSS software to aid in making the data management process more manageable. Regarding the anticipated challenge of financial constraints to conduct the study (Appendix F), the researcher applied for funding support in Canada and Ghana.

Summary of Chapter Three

The mixed-methods design chosen for this study used qualitative and quantitative components to answer the research questions (Creswell, 2009). This chapter contained a discussion on mixed-methods design, philosophical assumptions of mixed-methods

design, observational cross-sectional survey, and Thorne's interpretive descriptive design. The setting for the study, study population, data collection tools, and data analysis and management were discussed. The methodological rigor/trustworthiness for quality, credible, and dependable research findings, ethical approval for the study, and the ethics of information dissemination through traditional and non-traditional strategies were highlighted. The knowledge generated in this research process will contribute to an in-depth conceptual and contextual understanding of the phenomenon under study in sub-Saharan Africa, specifically Ghana.

Chapter Four: Report of the Study Results/Findings

This chapter presents the findings generated from the respondents/participants in this study. This study was designed to identify and describe the educational needs for hypertension control among select adult hypertensive Ghanaians diagnosed with chronic kidney disease (CKD) and gain insights into their use of complementary health products and practices alone or in addition to prescribed medications. The data analysis addressed the objectives of the study.

During the quantitative data analysis, data was coded and captured into MS Access 2016. At the end of the study, the data was cleaned and checked for consistency. The data was exported into Statistical Package for Social Science (SPSS) version 26.0 for analysis. All categorical data (such as religious affiliation, marital status, sex, level of education, work status, smoke status, drink status, and proportion of respondents with controlled hypertension) were described using frequencies and percentages. Continuous data (such as age, weight, height, and Body Mass Index) were summarized using the range, mean, and standard deviation.

A series of chi-square tests were used to determine the association between select socio-demographic characteristics and blood pressure (controlled or uncontrolled). Descriptive and inferential statistics were used to analyze data collected on respondents' knowledge of hypertension and CKD. Binary logistic regression was used to assess the relationship between controlled or uncontrolled hypertension and the number of years a person has been diagnosed with CKD or the number of years they had been diagnosed with hypertension. Any association between total knowledge score on hypertension or total knowledge score on CKD and controlled hypertension was assessed for. A stepwise

multiple linear regression was used to determine the independent predictors of hypertension knowledge and CKD knowledge scores.

The qualitative findings presented in this chapter represent the result of in-depth interviews with 12 participants, with non-verbal cues recorded as field notes throughout the interview process. Using Thorne's (2016) data analysis approach, 7 themes and 16 sub-themes were identified from the data that address the study's objectives. The themes and sub-themes are presented along with anonymized verbatim quotations from the participants. Participants were interviewed in numerical order, with PP1 representing the first participant and PP2 representing the second participant to the last participant, PP12.

Findings of Quantitative Component of the Study

Socio-demographic Characteristics of Quantitative Respondents

Three hundred and fifty-one respondents diagnosed with hypertension and CKD were recruited in the quantitative aspect of this study, a number larger than the projected sample size for meaningful findings. As shown in Table 2, the study population included 189 (53.8%) males and 162 females (46.2%) in a ratio of approximately 1.2:1. Table 2 shows that the mean and standard deviation (SD) age of this study population was 52.81 (13.84) years. Also, the mean and standard deviation of years diagnosed with hypertension or CKD were 6.21 (5.52) and 3.63 (3.52) respectively. The majority of the respondents (n=322, 91.7%), were aged 31 years and above. Only 3 (0.9%) respondents were 20 years of age or below.

More than half of the respondents (n=235, 67%) were married, while 68 (19.4%) were single, 30 (8.5%) were divorced, 17 (4.8%) were widowed, and 1 (0.3%) was separated. The majority (n=313, 89.2%) had some formal education, whereas 38 (10.8%)

had no formal education (none at all). Two hundred and thirty-seven (67.8%) were Christian, 68 (19.4%) were Muslim, 37 (10.5%) were Pagan, and 9 (2.6%) were Buddhist. The majority were working (n=230, 65.5%). The majority of the respondents (n=273, 77.8%) had never smoked and (n=179, 51.0%) had never consumed alcohol.

Table 2

Socio-demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Age	≤ 20	3	0.9
	21-30	26	7.4
	31-40	46	13.1
	41-50	59	16.8
	51-60	113	32.2
	>60	104	29.6
Sex	Male	189	53.8
	Female	162	46.2
Marital status	Single	68	19.4
	Married	235	67.0
	Separated	1	0.3
	Divorced	30	8.5
	Widowed	17	4.8
Formal education	None (none of the grades)	38	10.8
	Primary (grade 1 to 6)	91	25.9
	Secondary (grade 7 to 12)	100	28.5
	Tertiary (beyond grade 12)	122	34.8
Religion	Christian	237	67.5
	Muslim	68	19.4
	Pagan	37	10.5
	Buddhist	9	2.6
Work status	Employed	230	65.5
	Unemployed	72	20.5
	Retired	49	14.0
Smoking status	Smokes	38	10.8
	Used to smoke	40	11.4
	Never smoked	273	77.8
Drink (alcohol) status	Drinks	64	18.2
	Used to drink	108	30.8
	Never drinks	179	51.0

Descriptive Statistics of Socio-demographic Characteristics Continuous Variables

Table 3 describes the continuous variables such as quantitative subject age, weight, height, Body Mass Index (BMI), and years diagnosed with hypertension and CKD using range (minimum and maximum), mean, and (SD).

Table 3

Descriptive Statistics on Continuous Variables

Variable	Range		Mean (SD)
	Minimum	Maximum	
Age (years)	19	87	52.81 (13.84)
Weight (kg)	45.6	113	70.27 (10.83)
Height (m^2)	1.48	1.85	1.65 (0.07)
Body Mass Index (kg/m^2)	16.75	37.38	27.41 (3.68)
Years diagnosed with hypertension	1.00	35	6.21 (5.52)
Years diagnosed with CKD	0.58	35	3.63 (3.52)

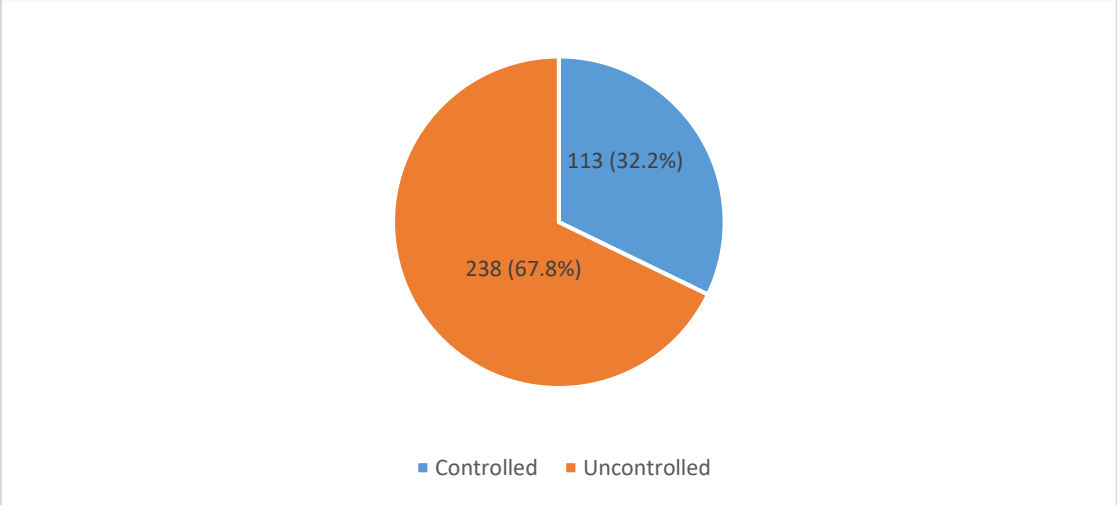
SD= Standard Deviation

Proportion of Persons Diagnosed with CKD and Hypertension with Controlled Hypertension

Figure 2 shows less than half of the respondents (n=113, 32.2%) had their hypertension controlled, while 238 (67.8%) had uncontrolled hypertension, as determined by a review of their hospital chart data.

Figure 2

Controlled and Uncontrolled Hypertension



Association between Blood Pressure Control and Socio-demographic Characteristics

A series of chi-square tests were done to determine if any demographic characteristic was associated with controlled blood pressure. Table 4 shows that there were no statistically significant associations between age and blood pressure control and between sex and blood pressure control (p value > 0.05). However, all the remaining demographic characteristics, such as religion, marital status, formal education, employment status, and BMI were found to have a statistically significant association with controlled blood pressure (p value < 0.05).

Table 4

Blood Pressure Control and Socio-demographic Characteristics

Variable	Category	Blood Pressure (mmHg)		Chi-square	p value
		Controlled	Uncontrolled		
Age	≤30	11 (38%)	18 (62%)	2.876	0.579
	31-40	13 (28%)	33 (72%)		
	41-50	17 (29%)	42 (71%)		
	51-60	33 (29%)	80 (71%)		
	>60	39 (38%)	65 (62%)		
Sex	Male	61 (32%)	128 (68%)	0.001	0.972
	Female	52 (32%)	110 (68%)		
Religion	Christian	90 (38%)	147 (62%)	18.938	< 0.0001*
	Muslim	19 (28%)	49 (72%)		
	Buddhist	3 (33%)	6 (67%)		
	Pagan	1 (3%)	36 (97%)		
Marital status	Single	11 (16%)	57 (84%)	16.445	0.002*
	Married	91 (39%)	144 (61%)		
	Divorced	5 (17%)	25 (83%)		
	Separated	0 (0%)	1 (100%)		
	Widowed	6 (35%)	11 (65%)		
Formal education	None (none of the grades)	0 (0%)	38 (100%)	106.914	< 0.0001*
	Primary (grade 1 to 6)	10 (11%)	81 (89%)		
	Secondary (grade 7 to 12)	22 (22%)	78 (78%)		
	Tertiary (beyond grade 12)	81 (65%)	41 (35%)		
Employment status	Employed	76 (33%)	154 (67%)	15.984	<0.0001*
	Unemployed	12 (17%)	60 (83%)		
	Retired	25 (51%)	24 (49%)		
Body Mass Index (BMI)	Underweight	1 (50%)	1 (50%)	17.241	0.001*
	Normal	16 (42%)	22 (58%)		
	Overweight	12 (20%)	47 (80%)		
	Obese	2 (5%)	40 (95%)		

*Statistically significant (p-value<0.05)

Relationship between Years Diagnosed with Hypertension or CKD and Controlled Hypertension

Table 5 illustrates that as the number of years with hypertension increased, the

odds of a patient with controlled hypertension was found to be 1.071 more than those with uncontrolled hypertension, but this was a statistically significant difference (p value < 0.05). Also, the odds of the person having controlled hypertension are directly proportional to the number of years diagnosed with CKD. However, this difference was not statistically significant (OR= 1.123, p value > 0.05), as indicated in Table 5.

Table 5

Years Diagnosed with Hypertension and CKD and has Controlled Hypertension

Variable	OR (95% CI)	p-value
Hypertension (years)	1.071 (1.002-1.144)	0.044*
Chronic Kidney Disease (years)	1.123 (0.999-1.261)	0.052

*Statistically significant (p-value<0.05), OR= Odd's Ratio, CI= Confidence Interval

Descriptive Statistics on the Knowledge Score of Hypertension and CKD

In Table 6, it can be observed that the mean (SD) knowledge score on hypertension among the 351 respondents was 13.07 (4.707), with a range of minimum and maximum values of 2 and 22. The mean (SD) knowledge score on CKD among the 351 respondents was 13.43 (6.475), with a range of minimum and maximum values of 1 and 24. This indicated that in general, respondents have an average knowledge of both hypertension and CKD.

Table 6

Descriptive Statistics of Knowledge Score of Hypertension and CKD

Variable	Range		Mean (SD)
	Minimum	Maximum	
Knowledge score (Hypertension)	2	22	13.07 (4.71)
Knowledge score (CKD)	1	24	13.43 (6.48)

Relationship between Total Knowledge Score of Hypertension or CKD and Controlled Hypertension

Table 7 shows that as the total knowledge score on hypertension increased, the odds of being in the controlled hypertension category increased by 1.436. Likewise, as the total knowledge score on CKD increased, the odds of being in the controlled hypertension category increased by 1.112. This difference was statistically significant (p-value < 0.05).

Table 7

Total Knowledge Score of Hypertension or CKD and has Controlled Hypertension

Knowledge	OR (95% CI)	p-value
Hypertension	1.436 (1.282-1.609)	<0.0001*
CKD	1.112 (1.028-10203	0.008*

Knowledge Score on Components of the Hypertension Knowledge-Level Scale by Erkoc et al. (2014)

Table 8 shows that the mean (SD) knowledge score on drug compliance component of the Hypertension Knowledge-Level Scale among the 351 respondents was 1.54 (±1.51), with a range of minimum and maximum values of 0 and 4 (4 was a perfect score). The mean (SD) knowledge score on the diet component of the Hypertension Knowledge-Level Scale among the 351 respondents was 0.64 (±0.79), with a range of minimum and maximum values of 0 and 2 (2 is a perfect score). These two findings show respondents had below average knowledge on drug compliance and diet components, as tested by the Hypertension Knowledge-Level Scale. However, all respondents had above average knowledge scores on the definition, medical treatment, lifestyle, and complications of hypertension as their means score were all above average (see Table 8).

Table 8

Knowledge Score on Components of the Hypertension Knowledge-Level Scale by Erkoc et al. (2014)

Knowledge	Range		Mean (SD)
	Minimum	Maximum	
Definition	0	2	1.64 (0.65)
Medical treatment	0	4	2.33 (1.30)
Drug compliance	0	4	1.54 (1.51)
Lifestyle	0	5	3.12 (1.43)
Diet	0	2	0.64 (0.79)
Complication	0	5	3.80 (1.34)

Association between Knowledge Score on Components of the Hypertension Knowledge-Level Scale by Erkoc et al. (2014) and Hypertension Control

As the respondents' scores on the knowledge of the definition component of the Hypertension Knowledge-Level Scale increased, the odds of having their hypertension controlled decreased by 0.579 and that decrease was statistically significant (p value = 0.035). This indicates that the respondents with good knowledge about the definition of hypertension were less likely to have their hypertension controlled. However, with all other components (medical treatment, drug compliance, lifestyle, diet and complication) respondents with high knowledge scores were more likely to have controlled hypertension (OR > 1.000) and these were statistically significant (p value < 0.05) except lifestyle (p value > 0.05) as shown in Table 9.

Table 9

Knowledge Score on Components of the Hypertension Knowledge-Level Scale by Erkoc et al. (2014) and Hypertension Control

Knowledge	OR (95% CI)	p-value
Definition	0.579 (0.349-0.962)	0.035*
Medical treatment	2.198 (1.604-3.012)	< 0.0001*
Drug compliance	1.721 (1.349-2.195)	< 0.0001*
Lifestyle	1.266 (0.945-1.697)	0.114
Diet	1.708 (1.088-2.683)	0.020*
Complication	2.055 (1.381-3.056)	< 0.0001*

*Statistically significant (p-value<0.05)

Knowledge Score on Components of the Knowledge Subscale of the CKD Screening Index by Khalil et al. (2014)

Table 10 below shows that respondents were mostly unfamiliar with the risk factors associated with CKD, as their mean score was 5.03 on a scale of 0 to 11. However, respondents generally had an adequate knowledge about the definition, sign and symptoms, and management of CKD as the mean scores were above average.

Table 10

Knowledge Score on Components of the Knowledge Subscale of CKD Screening Index by Khalil et al. (2014) and Hypertension Control

Knowledge	Range		Mean (SD)
	Minimum	Maximum	
Definition	0	5	3.93 (1.30)
Risk factors	0	11	5.03 (3.60)
Signs and symptoms	0	3	1.72 (1.17)
Management	0	5	2.76 (1.60)

Relationship between the Knowledge Score on Components of the Knowledge Subscale of CKD Screening Index by Khalil et al. (2014) and Controlled Hypertension

Table 11 below showed that respondents who were knowledgeable of the risk factors, sign and symptoms, and management of CKD are more likely to have controlled hypertension (OR > 1.000) and these differences were statistically significant (p- value < 0.05).

Table 11

Knowledge Score on Components of the Knowledge Subscale of CKD Screening Index by Khalil et al. (2014) and Controlled Hypertension

Knowledge	OR (95% CI)	p-value
Definition	1.006 (0.719-1.407)	0.973
Risk Factors	1.207 (1.064-1.368)	0.003*
Signs and Symptoms	1.658 (1.111-2.474)	0.013*
Management	1.792 (1.314-2.445)	< 0.0001*

*Statistically significant (p-value<0.05)

Distribution of Knowledge Score on Hypertension with Socio-demographic Characteristics

Table 12 reveals that the mean knowledge score on hypertension among the 351 respondents differed significantly on the basis of their religion, marital status, formal education, employment status, and BMI (p-value < 0.05). However, sex and age were not significant in relation to the mean knowledge score on hypertension (p-value > 0.05).

Table 12

Knowledge Score on Hypertension with Socio-demographic Characteristics

Variable	Category	Mean ± SD	Test statistics	p value
Sex	Male	12.88±4.75	0.708	0.401
	Female	13.30±4.66		
Age	≤ 20	13.67±4.72	0.845	0.519
	21-30	12.42±5.46		
	31-40	12.39±4.69		
	41-50	12.42±4.51		
	51-60	13.37±4.43		
	>60	13.57±4.92		
Religion	Christians	13.71±4.70	8.094	* < 0.001
	Muslim	12.26±4.66		
	Buddhist	14.89±4.83		
	Pagan	10.05±3.27		
Marital status	Single	11.09±3.85	6.428	* < 0.001
	Married	13.72±4.82		
	Divorced	11.30±3.89		
	Separated	14.00±0.00		
	Widowed	15.18±4.65		
Formal education	None (had none of the grades)	10.05±2.46	64.609	*< 0.001
	Primary (grade 1 to 6)	10.57±3.46		
	Secondary (grade 7 to 12)	11.91±3.48		
	Tertiary (beyond grade 12)	16.84±4.52		
Employment status	Employed	13.13±4.71	10.096	*< 0.001
	Unemployed	11.42±3.90		
	Retired	15.22±4.93		
BMI	Underweight	15.75±6.08	2.989	*0.031
	Normal	14.10±5.37		
	Overweight	12.84±4.57		
	Obese	12.34±4.00		

*Statistically significant (p-value<0.05), BMI= Body Mass Index

Relationship between Socio-demographic Characteristics and Varying Knowledge of Hypertension

The coefficient of variation (R^2= 0.392) showed that 39.2% of the variation in the knowledge of hypertension could be explained by the five independent variables

(religion, marital status, formal education, employment status, and BMI) and that variation is statistically significant (F value= 18.394, p< 0.0001). Specifically, Christianity, Buddhism, married, widowed, and formal tertiary education, each had a statistically significant impact on the knowledge of hypertension (p-value < 0.05) as showed in Table 13.

Table 13

Knowledge of Hypertension and the Socio-demographic Characteristics

Variable	F value	p value	Coefficient of variation (R^2)	Regression coefficient		
				Beta	t test	p value
Religion	18.394	< 0.0001*	0.392			
Christian				1.184	2.507	0.013*
Muslim				0.433	0.535	0.593
Buddhist				2.990	2.109	0.036*
Pagan [ref]						
Marital status						
Married				1.738	3.137	0.002*
Divorced				0.691	0.845	0.399
Separated				-1.768	-0.475	0.635
Widowed				3.179	3.064	0.002*
Single [ref]						
Formal Education						
Primary (grade 1 to 6				-0.513	0.663	0.508
Secondary (grade 7 to 12)				0.798	1.013	0.312
Tertiary (beyond grade 12)				5.396	6.865	< 0.0001*
None [ref]						
Employment status						
Unemployed				-0.237	-0.442	0.659
Retired				-0.090	-0.146	0.884
Employed [ref]						
BMI				-0.630	-1.152	0.250

*Statistically significant (p-value<0.05), [ref] = reference for the various variables

Predictors of Knowledge Score of Hypertension

A stepwise multiple regression test showed that all the demographic

characteristics (see Table 14) significantly influence knowledge of hypertension (p-value< 0.05). Christians and Buddhists were found to be 1.628 and 3.024 respectively more likely to be knowledgeable of hypertension as compared to Pagans. Also, married or widowed respondents were 1.677 and 2.858 more likely respectively to be knowledgeable of hypertension as compared to single respondents. Those with formal tertiary education (above high school) were 2.671 more likely to have higher knowledge of hypertension as compared to those with no education.

Table 14

Predictors of Knowledge Score on Hypertension

Socio-demographics	Regression coefficient (B)	t test	p-value	Variance Inflation Factor (VIF)
Religion				
Christian	1.628	3.737	<0.0001*	1.080
Buddhist	3.024	2.367	0.018*	1.059
Pagan [ref]				
Marital status				
Married	1.677	3.746	<0.0001*	1.151
Widowed	2.858	2.949	0.003*	1.125
Single [ref]				
Formal education				
Tertiary (beyond grade 12)	5.317	12.633	<0.0001*	1.043
None (none of the grades) [ref]				
Intercept	8.788	18.035	<0.0001*	

*Statistically significant (p-value<0.05), [ref] = reference

The model diagnostic was done and it yielded an absence of multi-collinearity (VIF <10) among the predictors (Christian, Buddhist, married, widowed, and formal tertiary education). Figure 3 shows that the model residuals (error) terms were normally distributed. The standardized residuals did not indicate any pattern on the scatterplot, as shown in Figure 4. Therefore, this information indicates that the model fits the data well,

and is suitable for analysis. The stepwise multiple linear regression model is given as follows;

$$\boldsymbol{Y = 8.788+1.628x_1+3.024x_2+1.677x_3+2.858x_4+5.317x_5}$$

Where x_1, x_2, x_3, x_4 and x_5 are the independent variables (Christian, Buddhist, Married, Widowed and Tertiary), respectively. Y is the total knowledge score on hypertension.

Figure 3

Normal Probability Plot of Residuals (Hypertension)

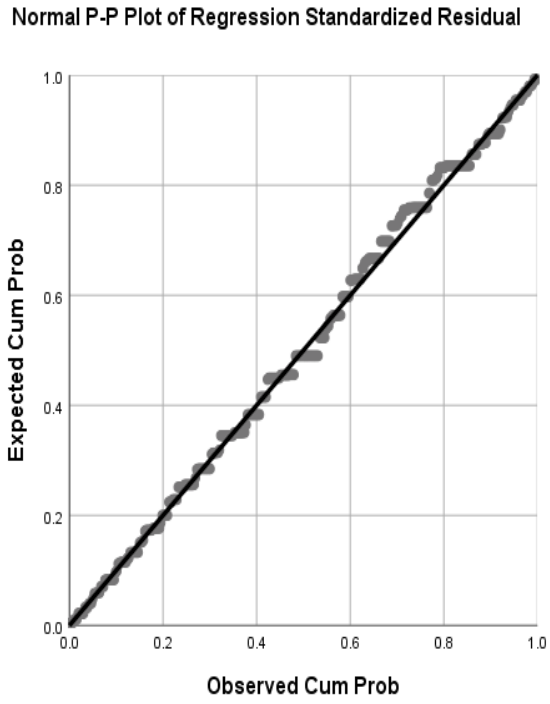
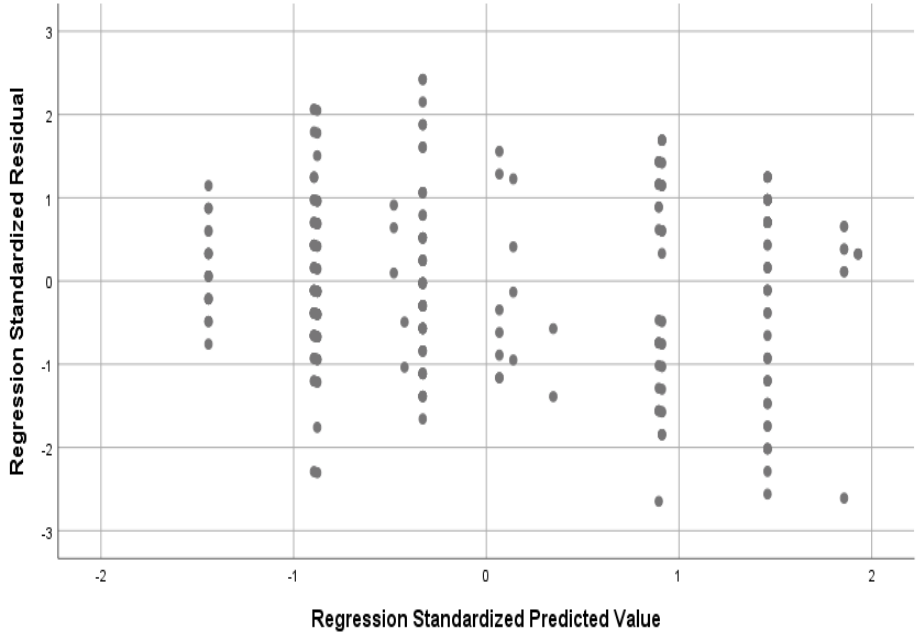


Figure 4

Scatter Plot of Residual (Hypertension)



Distribution of Knowledge Score on CKD with Socio-demographics Characteristics

Table 15 reveals that the mean knowledge score on CKD among the 351 respondents differed significantly on the basis of religion, marital status, formal education, work status, and BMI (p-value < 0.05). However, sex and age were not statistically significant in relation to the mean knowledge score on CKD (p-value > 0.05).

Table 15

Knowledge Score on CKD with Socio-demographics

Socio-demographics	Category	Mean ± SD	Test statistics	p value
Sex	Male	13.50±6.62	0.048	0.827
	Female	13.35±6.31		
Age	≤ 20	15.00±5.57	1.614	0.156
	21-30	12.69±5.29		
	31-40	12.39±6.08		
	41-50	13.15±5.73		
	51-60	12.80±6.56		
	>60	14.87±7.11		
Religion	Christians	14.52±6.35	11.614	< 0.0001*
	Muslim	12.29±6.51		
	Buddhist	14.22±6.24		
	Pagan	8.32±4.33		
Marital status	Single	11.13±5.30	5.521	< 0.0001*
	Married	14.25±6.69		
	Divorced	10.63±5.49		
	Separated	19.00±0.00		
	Widowed	15.82±5.98		
Formal Education	None (none of the grades)	8.34±4.58	56.073	< 0.0001*
	Primary (grade 1 to 6)	10.13±5.62		
	Secondary (grade 7 to 12)	12.57±5.28		
	Tertiary (beyond grade 12)	18.17±5.38		
Work status	Worker	13.22±6.32	8.801	< 0.0001*
	Non-worker	11.88±6.14		
	Retired	16.69±6.68		
BMI	Underweight	17.50±6.35	3.698	0.012*
	Normal	15.04±6.46		
	Overweight	12.95±6.53		
	Obese	12.44±6.16		

*Statistically significant (p-value<0.05)

Relationship between Socio-demographic Characteristics and Varying Knowledge of CKD

The coefficient of variation (R^2= 0.361) showed that 36.1% of the variation in knowledge of CKD could be explained by six independent variables (religion, marital status, formal education, work status, and BMI), and that variation is statistically significant (F value= 16.228, p< 0.001). However, the components that determined the difference were primarily: Religion (Christian, p= 0.002), Marital status (Married, p= 0.006 and Widowed, p=0.023), and formal education (Secondary, p=0.020 and Tertiary, p<0.001), as shown in Table 16.

Table 16
Socio-demographic Characteristics and Varying Knowledge of CKD

Socio-demographics	F value	p value	Coefficient of variation (R^2)	Regression coefficient		
				Beta	t test	p value
Religion						
Christian				3.317	3.0997	0.002*
Muslim				1.270	1.113	0.267
Buddhist				3.038	1.519	0.130
Pagan [ref]						
Marital status						
Married				2.153	2.754	0.006*
Divorced				0.495	0.429	0.668
Separated	16.228	< 0.001	0.361	2.211	0.421	0.674
Widowed				3.333	2.278	0.023*
Single [ref]						
Formal Education						
Primary (grade 1 to 6)				0.271	0.248	0.804
Secondary (grade 7 to 12)				2.590	2.331	0.020*
Tertiary (beyond grade 12)				7.725	6.967	< 0.001*
None (none of the grades) [ref]						
Work status						
Non-worker				0.560	0.740	0.460
Retired				0.616	0.707	0.480
Worker [ref]						
BMI				-0.119	-1.536	0.126

*Statistically significant (p-value<0.05), [ref] = reference

Predictors of Knowledge Score on CKD

A stepwise multiple regression showed that all the socio-demographic characteristics (depicted in Table 17) significantly influence the knowledge score on CKD among the 351 respondents. Specifically, Christians were 2.310 more likely to be knowledgeable of CKD than Pagans. Also, married or widowed respondents were 2.241 and 3.511 respectively more likely to be knowledgeable of CKD than single respondents. Formal secondary and tertiary education was found to have a 2.671 and 7.822

respectively increased effect on the knowledge of CKD over no education.

Table 17

Predictors of Knowledge Score on CKD

Demographic characteristic	Regression coefficient (B)	t test	p-value	Variance Inflation Factor (VIF)
Religion				
Christian	2.310	3.833	<0.001	1.080
Pagan [ref]				
Marital status				
Married	2.241	3.563	<0.001	1.152
Widowed	3.511	2.574	0.010	1.129
Single [ref]				
Formal education				
Secondary (grade 7 to 12)	2.671	3.826	<0.001	1.306
Tertiary (beyond grade 12)	7.822	11.702	<0.001	1.333
None (none of the grades) [ref]				
Intercept	6.718	9.352	<0.001	

*Statistically significant (p-value<0.05), [ref] = reference

The model diagnostic was done and it yielded the absence of multi-collinearity (VIF <10) among the predictors (Christian, married, widowed, formal secondary and tertiary). Figure 5 shows that the model residuals (error) terms are normally distributed. The standardized residuals did not indicate any pattern on the scatterplot, as shown in Figure 6. Therefore, this model fits the data well, and is suitable for use. The stepwise multiple linear regression model is given as follows;

$$\boldsymbol{Y = 6.718+2.310x_1+2.241x_2+3.511x_3+2.671x_4+7.822x_5}$$

Where x_1, x_2, x_3, x_4 and x_5 are the independent (Christian, Buddhist, married, widowed, and formal tertiary education) variables, respectively. Y is the total knowledge score.

Figure 5

Normal Probability Plot of the Residual (CKD)

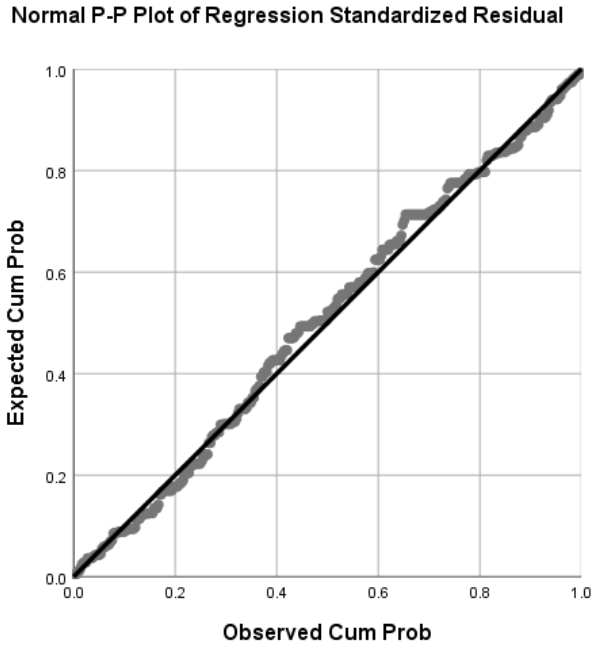
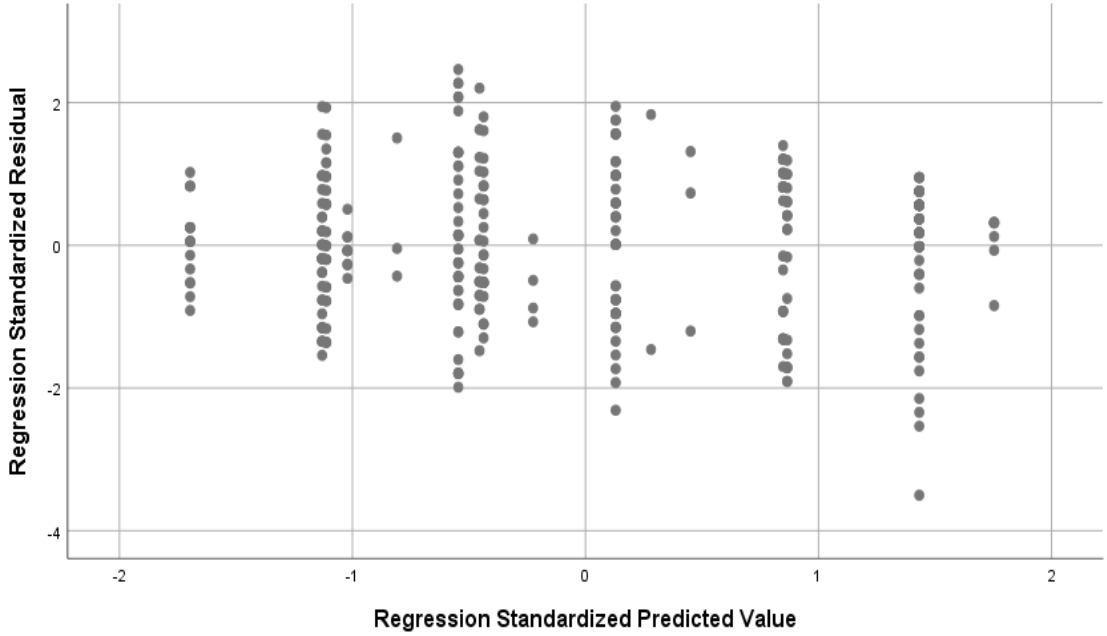


Figure 6

Scatter Plot of Residuals (CKD)



Summary of Quantitative Component Findings

As indicated, 351 outpatients diagnosed with hypertension and CKD were recruited for the quantitative phase of this study. This study population included males and females in a ratio of approximately 1.2:1. The majority of the respondents (n=322, 91.7%) were aged 31 years and above. More than half of the respondents (67%) were married. Most of the respondents had some formal education (n=313, 89.2%), and more than half (n= 237, 67.8%), were Christians. The majority of the respondents (n=230, 65.5%) were employed. More than half of the respondents (n=179, 51%) had never drunk alcohol or smoked (n=273, 77.8%).

As revealed through two of three readings recorded in each patient's chart, less than half of the respondents (n=113, 32.2%) had controlled blood pressure. Apart from

age and sex, all the other socio-demographic characteristics had a statistically significant association with controlled blood pressure (p value < 0.05). Descriptive statistics revealed that the mean (SD) knowledge score on hypertension was 13.07 (4.707) with a range of minimum and maximum values of 2 and 22. Also, the mean (SD) knowledge score on CKD was 13.43 (6.475), with a range of minimum and maximum values of 1 and 24. As the total knowledge score on various components of the Hypertension Knowledge-Level Scale (medical treatment, drug compliance, lifestyle, diet and complication) increased, the odds of an outpatient having controlled hypertension increased (OR > 1.000), and that was statistically significant (p value < 0.05). Also, as the total knowledge score on various components of the Knowledge Subscale of the Chronic Kidney Disease Screening Index (Definition, risk factors, signs and symptoms, and management) increased, the odds of an outpatient having controlled hypertension increased (OR > 1.000) and that was statistically significant (p value < 0.05) except Definition (p value > 0.05).

Stepwise multiple regression showed that demographic characteristics (religion, marital status, and level of formal education) significantly influence the knowledge of hypertension (p-value< 0.05). Christians and Buddhists are 1.628 and 3.024 more likely to be knowledgeable of hypertension than Pagans. Also, married or widowed outpatients were 1.677 and 2.858 more likely to be knowledgeable of hypertension than single. Formal tertiary education has 2.671 more effects on hypertension knowledge than no education. Likewise, a stepwise multiple regression showed that socio-demographic characteristics (religion, marital status, and level of formal education) significantly influence the knowledge score of CKD. Christians were 2.310 more likely to be

knowledgeable of CKD than Pagans. Also, married or widowed participants were 2.241 and 3.511 more likely to be knowledgeable of CKD than single ones. Those with formal secondary and tertiary education had 2.671 and 7.822 increased effect respectively on the knowledge of CKD over those with no education. Finally, the analysis indicated that as the total knowledge score on hypertension or total knowledge score CKD increased, the odds of being in the controlled hypertension category increased by 1.436 and 1.112, respectively and this was a statistically significant finding (p-value < 0.05). The discussion and interpretation of the above findings are carried out in Chapter five.

Findings of Qualitative Component of the Study

Socio-demographic Characteristics of Qualitative Participants

Table 18 shows the socio-demographic characteristics of the participants for the qualitative phase of this mixed methods study. The qualitative sample size was 12 participants, and they were aged 30 to 69 years. Four (33.3%) were between the ages of 60-69 years, four (33.3%) were between the ages of 40- 49 years, three (25.0%) were between the ages of 50-59 years, and one (8.3%) was between the ages of 30-39. Regarding sex, the majority of the participants (n=7, 58.3%), were females and five (41.7%) were males. Moreover, eight (66.7%) were married, three (25.0%) were divorced, and one (8.3%) was single. In addition, 9 (75.0%) were Christian, 2 (16.7.0%) were Pagan as they were Traditional believers, and 1 (8.3%) was Muslim. The participants had varying formal educational levels; 5 (41.7%) had formal tertiary education in that they had education beyond grade 12, 3 (25.0%) had a secondary level of formal education which is grade 7 to 12, and 4 (33.3%) had formal primary education which is grade 1 to 6.

At the time of the interview, 8 (66.6%) participants were employed, 2 (16.7%) were unemployed, and 2 (16.7%) were retired. Six (50.0%) participants resided in urban settlements and 6 (50.0%) dwelled in the rural settlements of their childhood. Ten participants (83.3%) had never smoked; while the remaining 2 (16.7%) used to smoke but no longer did. Concerning alcohol use, 7 (58.3%) used to take alcohol or currently take alcohol and 5 (41.7%) reported that they had never taken alcohol. Among these 12, 7 (58.3%) were diagnosed with hypertension for more than 6 years and 5 (41.7%) for 1 to 5 years. All participants had been diagnosed with CKD for 1 to 5 years.

Table 18

Socio-demographic Characteristics of Participants in the Interviews

Socio-demographic		Number	Percentage
Age (years)	60 - 69	4	33.3%
	50 - 59	3	25.0%
	40 - 49	4	33.3%
	30 - 39	1	8.3%
Sex	Male	5	41.7%
	Female	7	58.3%
Marital Status	Married	8	66.7%
	Divorced	3	25.0%
	Single	1	8.3%
Religion	Christian	9	75.0%
	Traditional	2	16.7%
	Muslim	1	8.3%
Formal Education	Tertiary	5	41.7%
	Secondary	3	25.0%
	Primary	4	33.3%
Employment Status	Employed	8	66.6%
	Unemployed	2	16.7%
	Retired	2	16.7%
Smoking	Used to/smoking	2	16.7%
	Never smoked	10	83.3%
Alcohol Use	Used to/smoking	7	58.3%
	Never taken alcohol	5	41.7%
Year Diagnosed with Hypertension	1 - 5	5	41.7%
	6 and above	7	58.3%
Year Diagnosed with CKD	1 - 5	12	100%

Complementary Health Products and Practices used by the Participants

To answer the research question "what complementary health products and practices do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use, in addition to or instead of prescribed hypertension control medications, to manage their hypertension?", three themes and six sub-themes were identified, as shown in Table 19.

Table 19

Themes and Subthemes: Complementary Health Products and Practices used by the Participants

Complementary Health Products and Practices used by the Participants	
Themes	**Sub-themes**
Biological-based therapies	• Herbal-based medicine • Dietary measures
Manipulative and body-based practices	• Tolerable exercise • Relaxation techniques
Spiritual/religious intervention	• Fasting and prayer • Reading and meditating on spiritual material

Theme 1- Biological-based Therapies

Biological-based therapies are natural substances such as herbs and diet that are used by the participants to control their hypertension. Specifically, all the participants (n=12) narrated that they used biological-based therapies to control their hypertension. The two sub-themes identified under the biological-based therapies were herbal-based medicine and dietary measures. The two sub-themes are described below.

Sub-theme Herbal-based Medicine

This sub-theme describes the medicinal or therapeutic use of plant products (such

as leaves, roots, flowers or extracts from plants) by the participants to control their hypertension. The participants commonly called these plant products “herbal medicine.” The majority of participants (n=10) indicated that they were using or have used herbal medicine to control their hypertension. The participants reported that they used herbal medicine alone or in addition to prescribed antihypertensive medication to control their hypertension. Precisely, 8 of the 10 participants who used herbal medicine indicated they were also taking prescribed antihypertensive medications. Two of the participants recounted:

> My blood pressure fluctuated between normal and abnormal values when I was using my prescribed antihypertensive medications alone. So a friend told me she had the same experience. She added a certain herbal medicine, and her blood pressure stabilized within the normal range. I decided to use the herbal medicine she used to control her hypertension. After taking the herbal medicine together with the prescribed antihypertensive medication, my blood pressure has remained normal. (PP3)

> I was still experiencing high blood pressure, headache, and dizziness when taking only the prescribed antihypertensive medications. I went back to the hospital, and the doctor changed my prescribed medications, yet, I experienced the symptoms, and my blood pressure remained high. I added herbal medicine a family member introduced to me. I tell you, the headache and dizziness stopped, and my blood pressure dropped to normal value. (PP6)

The participants who used herbal medicine in addition to prescribed antihypertensive medications indicated that there was risk of a negative impact from an

herbal regimen on their already diseased kidneys. Yet, none of the participants informed their doctors of such an herbal regimen. This may be because some of the participants reported that their doctors would not respect this choice. For instance, one of the participants reported on this issue:

> Neither the herbal medicine nor prescribed antihypertensive medications were able to control my hypertension. I could control my hypertension when I took the two medicines together. Taking herbal and prescribed antihypertensive medications together is not suitable for my already diseased kidneys. I could not tell my doctor that I was using both herbal and prescribed medications because he would insult me or disapprove of them. (PP6)

Other participants expressed that their doctors did not ask if they use herbal medicine in addition to the prescribed antihypertensive medications. These participants thought it unnecessary to inform their doctors about their use of herbal medicines. For instance, one participant said:

> The doctor did not bother to ask me whether I am using both herbal and prescribed medications to control my hypertension. Then why should I also bother to tell him? He would have asked if he needed to know. (PP2)

However, two participants indicated that they only used herbal medicine to control their hypertension, and that this was without taking the prescribed antihypertensive medications. The participants gave different reasons for not using herbal and prescribed medicine together to control their hypertension. A participant recounted:

> Combining herbal and prescribed antihypertensive medications is dangerous to control hypertension, especially for those of us who already have kidney disease.

> A friend of mine had her kidney destroyed and died when she used both medications (herbal medicine and prescribed antihypertensive medication). Because of that, I only use herbal medicine. (PP1)

The second participant said:

> I had an awful experience when I used herbal medicine together with prescribed antihypertensive medications to control my blood pressure. Currently, I am using the herbal medicine I bought from the herbal clinic. The herbal medicine was made from the leaves and roots of a plant, mixed with spices and alcohol. Because of the alcohol used to prepare the herbal medicine, I was advised to take it without prescribed antihypertensive medications. (PP9)

Sub-theme Dietary Measures

All the participants reported that they used dietary measures to control their hypertension. This sub-theme describes the type of food that the participants ate or that they avoided in other to control their hypertension. The majority of the participants (n=8) used prescribed antihypertensive medications, herbal medicine, and dietary measures together to control hypertension. One of them said:

> I have reduced my calorie intake. I have reduced my intake of salt, carbohydrate, and fatty food. I do not eat heavy food like "fufu" or "kenkey" at night. Nowadays, I don't eat meat, and I rather eat fish. Whenever I feel hungry late in the night, I drink coconut water. Though I am particular about diet, I take my prescribed antihypertensive and herbal medications. (PP6)

Two participants reported using both herbal medicine and dietary measures without taking prescribed medications. For example, one of them stated:

> In addition to the herbal medication, I take a low-fat diet and have stopped taking red meat, and I take dried fish and chicken instead. I have also reduced salt intake and avoided eating heavy food late at night. (PP12)

Two of the participant only took the prescribed antihypertensive medications in addition to dietary measures. One recounted:

> I believe my prescribed antihypertensive medications and my diet have helped control my hypertension. I take my prescribed antihypertensive medications every day. Also, I have reduced my intake of fatty food, red meat, and alcohol. I take chicken and fish. I am using blended dried fish and shrimp as spices for steaming my chicken. To stay healthy, I take only fruit drinks and water at night when I feel hungry. (PP5)

Theme 2 - Manipulative and Body-based Practices

This second of three themes features participant practices that involve the relaxation of the mind and the movement of one or more body parts to control hypertension. Examples of such practices used by most participants were exercise, massage, and listening to music. The general view of the majority of the qualitative participants was that such practices were used to relax the body and mind and reduce stress and anxiety resulting from progressive nature of CKD and adverse outcomes of their treatment regimen. Most of the participants expressed that they experience impairments of some of their senses (such as vision, taste, and touch), mobility, and cognitive functions as a result of progression and adverse outcomes of CKD and treatment regimen. They recounted that these unpleasant experiences necessitate the use manipulative and body-based practices. Two sub-themes were identified and they are

tolerable exercise and relaxation techniques. Below is the description of these two sub-themes.

Sub-theme Tolerable Exercise

This sub-theme explains the extent of physical activity a participant could endure without weariness to improve their fitness level. Tolerable exercises the participants practiced were moderate walking and activities of daily living such as cooking, washing dishes, doing laundry, and ironing. All the participants (n=12) said they used tolerable exercise to help control their hypertension. Most participants (n=8) reported using exercises in addition to prescribed antihypertensive medications and herbal medicine to control their hypertension. A participant who used exercise in addition to prescribed antihypertensive medication and herbal medicine recounted:

> I take my prescribed antihypertensive medications and herbal tea religiously. My doctor told me that I have to control my stress and anxiety and take in addition my prescribed medication to control my hypertension. Whenever I feel stressed out or anxious, I take a moderate walk for about 45 minutes. The moderate walk relieves stress and anxiety and makes me more relaxed. (PP6)

One of the two participants who used exercises and prescribed medications without taking herbal medicine indicated:

> I walk for about 30 minutes to the next five blocks every evening. I take my time and walk in a normal pace because I quickly get tired due to the kidney disease and the hypertension.. Sometimes too, instead of walking, I do household chores such as laundry and ironing as exercise. I take my prescribed medications twice in a day, usually after the morning and evening walks. (PP5)

Four of the participants reiterated that they favored using active exercise in addition to their prescribed medications to control their hypertension. However, some of the symptoms of CKD prevented these four from exercising. One of those participants explained:

> I wish I could perform an active exercise to maintain my normal body weight and stay active to control my hypertension. Nonetheless, my kidney disease, body pains, dizziness, and fatigue have prevented me from performing active exercise. (PP11)

Sub-theme Relaxation Techniques

Relaxation techniques were activities the participants performed to help relax their minds and bodies, control emotional stress, and reduce anxiety. Many relaxation techniques were reported, but the most common ones used by the participants in this study were positive thinking, listening to relaxing music, massage, and deep breathing. All participants used at least one of these relaxation techniques. Regarding the usage of listening to relaxing music, deep breathing, and positive thinking, two participants recounted the following respectively:

> Listening to gospel music and hymns is my hobby. When anxious about physiological changes in my bodies including impaired mobility, vision, and taste as a result of my condition. I listen to either gospel music or hymns. The words in the gospel music and the hymns give me hope and encouragement. For instance, sometimes I think I could develop a stroke from my hypertension, or experience cognitive impairment from the progression of my CKD and no one would take care of my little daughter. That thought gets me anxious and worried, but I usually

> take a deep breath and encourage myself by listening to gospel music or hymns. (PP10)
>
> I listen to music. I listen to gospel music and hymns when I feel tired or stressed out as a result of my treatment regimen. Listening to music makes me more relaxed, both physically and mentally. The music relaxes me, and I focus on God. Hymns are not just songs but are scriptures. Some of the hymns teach us to give all our problems to God. Hymns help us to meditate on the word of God. When I meditate on the word of God, take a deep breath, and focus my thoughts on one specific thing instead of crowding my mind with many unnecessary thoughts. (PP9)

One participant indicated the use of massage to control her hypertension. The participant stated:

> I have used prescribed antihypertensive medications for two years. I use other practices to complement my prescribed antihypertensive medications to control my hypertension. I go to the gym and massage therapy to maintain my normal body weight and relax my body to control my hypertension. (PP5)

None of the participants indicated that manipulative and body-based practices alone were used to control hypertension. Participants used manipulative and body-based practices in addition to prescribed medication and/or herbal medicine.

Theme 3- Spiritual/Religious Intervention

This third of three themes describes participant beliefs, trust, reliance, and personal relationships with a supernatural power (God, Allah, and Deities) to manage their hypertension. All the participants (n=12) perceived spiritual/religious intervention

contributed to the control of their hypertension. “Fasting and prayer” and “reading and meditating on spiritual material” were two sub-themes identified under spiritual/religious intervention. These two sub-themes are described below.

Sub-theme Fasting and Prayer

Fasting and prayer are when a participant voluntarily went without food to focus on deep communication and fellowship with a supernatural power (God, Allah, or Deity). All the participants (n=12) indicated that through fasting and prayer, they relied on a supernatural power (God, Allah, or Deity) to assist them with the control of their hypertension. For instance, one of the Christian participants who fasted and prayed to God said:

> Though hypertension is physical, I believe a human being is in three parts: body, soul, and spirit. Once hypertension affects the body, the spirit and soul also get affected. Through fasting and prayer, I established a personal relationship with God and asked Him (God) to heal my hypertension, and sometimes I pray over olive oil and apply it to my whole body. (PP5)

Also, regarding fasting and prayer to Allah, one of the participants, who was a Muslim recounted:

> I trust Allah would heal me of any disease, so whenever I fast and pray, I ask Allah to heal me of any diseases, including hypertension and kidney disease. I believe that the prescribed antihypertensive and herbal medicine would work through the power of Allah. Without Allah, those medications will not work. Before I take any of the medications, I pray over them for Allah to use the medications to heal me of my hypertension. (PP3)

A traditional believer who consulted a Deity reported:

> I believe in our ancestral spirits and the gods of our fathers. Before Christianity came to Ghana, ancestral spirits and gods protected and provided for our needs. The Bible is written," Give onto Caesar what belongs to Caesar." Like Christians fast and pray to God, I also fast and pray to my ancestral spirits and gods to heal me of any disease, including my hypertension and kidney disease. (PP1)

However, one participant, although she fasted and prayed to God for healing, was of the view that fasting and prayer are means of fellowship with the Creator (God), whether you are sick or well. This participant stated:

> I do not fast and pray to God only to heal me of my hypertension. I fast and pray to God as a sign of fellowship showing reverence to my creator. (PP11).

Two of the participant disclosed that apart from spiritual healing, fasting has physical benefits that could control hypertension. One of them indicated:

> When I fasted, I deprived my body of certain foods that could cause high blood pressure. Examples are fatty food and carbohydrate. Frequent fasting has helped reduce my body's calories, weight, and blood pressure. Fasting does not have only spiritual power. Fasting also has a physical effect on the body. I fasted at least once every week for six hours for three months and noticed a reduction in my weight and blood pressure. This is the physical benefit of fasting. (PP6)

Most participants (n=10) indicated that they used prayer and fasting in addition to prescribed antihypertensive medication and herbal medicine to control their hypertension. However, two participants indicated that in addition to herbal medicine they used prayer without prescribed medication to control hypertension. One of these participants said:

> Oh yes, I am not using any prescribed medications to control my hypertension. I used herbal medicine for my hypertension. When I developed kidney disease, my doctor told me that because my kidney was diseased, I should not burden my kidneys with many chemicals from medications. Then I decided, without telling the doctor, not to use prescribed antihypertensive medications because it contains chemicals. I only pray to God to heal me of my hypertension and kidney disease. Moreover, I am ready to die if God calls me. (PP4)

Sub-theme Reading and Meditating on Spiritual Material

This sub-theme reflects the finding that participants read and meditated on spiritual materials, specifically the Bible or Koran, while hoping to have their hypertension controlled. Most participants (n=10) reported that the knowledge acquired from reading spiritual materials built their faith and reliance on a supernatural power (God, Allah, or Deity). Both the Christians and the Muslims interviewed ascertained that reliance on supernatural power (God or Allah) helped them to cope with stress, anxiety, and worry associated with life issues that could be a risk or cause hypertension. A participant who was a Christian said:

> I believe that reading and reflecting on the word of God increases my faith in God. I meditate on the word of God and comfort myself with the word. When I was anxious and worried about my hypertension and kidney disease, reading and meditating on the word of God encouraged me. It took away my sorrow, anxiety and worry. (PP11)

Another Christian participant stated:

> I meditate on the word of God twice a day. I meditate for one hour in the morning

> from 5:00 am to 6:00 am and one hour at night from 9:00 pm to 10:pm every day. During meditation on the word of God, I get connected to the spiritual realm, and all my worries, fear, stress, and anxiety disappear. I always feel more relaxed and get a good sleep after meditating at night. I wake up every morning and check my blood pressure, which is always normal. (PP7)

A participant who was a Muslim explained:

> I read the Koran, the word of Allah. I get my spiritual support from the word of Allah in the Koran. Sometimes, I wake up in the deep night, read the Koran and meditate on the word of Allah. Understanding the word gives me the strength to go through all life challenges, including those from my current diseases (hypertension and kidney disease). (PP3)

Reason for Complementary Health Products and Practices used by the Participants

Relation to the second research question, "why do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use complementary health products or practices to manage their hypertension?" four themes and 10 sub-themes were identified. Table 20 shows these themes and sub-themes.

Table 20

Themes and Subthemes: Reason for Complementary Health Products and Practices used by the Participants

Reason for Complementary Health Products and Practices used by the Participants	
Themes	**Sub-themes**
1. Efficacy	• Relative effectiveness • Reduced or nonexistent side effects
2. Affordability	• Relative low cost • Flexibility of payment
3. Familiarity	• Culturally accepted. • Mass media exposure • Recommendations from friends and family • Easy accessibility
4. Etiology of hypertension	• Perceived spiritual cause • Evidence-based Cause

Theme 1 - Efficacy of Complementary Health Products and Practices

The first theme of the reason for complementary health products and practices usage describes the effectiveness of complementary health products and practices to control participant hypertension. Efficacy was one of the reasons most of the participants (n=10) used complementary health products and practices to control their hypertension. Relative effectiveness and reduced or nonexistent side effects were two sub-themes identified under the theme.

Sub-theme Relative Effectiveness

Relative effectiveness is a sub-theme that explains the effectiveness of complementary health products and practices to control hypertension as compared to prescribed medications. Almost all the participants (n= 10) indicated that complementary health products and practices were more effective than prescribed medications. For

instance, one said:

> I know herbal medicines are effective compared to prescribed medications from my own experience. Let me share my experience with you. I was given antihypertensive medications at the hospital when I was diagnosed with hypertension. After completing the course of the prescribed medications for two months, my blood pressure readings fluctuated between normal and high values. So I stopped taking the prescribed medications. I took the herbal medicine, and within two weeks, my blood pressure readings stabilized within the normal range. In addition to the herbal medicine, I do a lot of walking as an exercise and pray to my creator (God) to help control my blood pressure. (PP9)

Another participant added:

> Herbal medicine is very effective as compared to conventional medicine, in my opinion. It is not I alone testifying about the effectiveness of herbal medicine. I hear it daily on the radio, television, and even from my friends. When I added herbal medicine to my prescribed medications, my blood pressure stabilized within the normal range. (PP12)

However, two participants shared challenges regarding the efficacy of complementary health products and practices. One of the two participants narrated the ineffectiveness of the herbal medicine she used:

> There are fake herbal medicines on the market. To control my hypertension, I bought herbal medicine from the market and used it for about two weeks. I experienced intermittent occipital headache and dizziness for the two weeks I was taking the herbal medicine. Then I went and checked my blood pressure and the

> reading was high (160/120 mmHg). The herbal medicine I used was not effective and I could have developed complication. (PP11)

The other participant described ineffective spiritual intervention:

> I visited one of the spiritualists in my community. He told me that my mother is spiritually behind my hypertension therefore, he would perform rituals to liberate me from the spiritual attacks to control my hypertension. After several rituals, my blood pressure remained high, and I nearly developed a stroke. (PP12)

Sub-theme Reduced or Nonexistent Side Effects

As part of the reasons for using complementary health products and practices, the majority (n=8) of the participants recounted that complementary health products and practices have few or no side effects. For instance, a participant recounted:

> In addition to other reasons, herbal preparation and other practices for hypertension do not have any side effects. Even if they have any side effects, they are minimal compared to prescribed antihypertensive medications. A friend taking prescribed antihypertensive medications told me that he has not been able to perform well sexually. People in my community who used prescribed antihypertensive medications had similar experiences. Some even said that they no more get an erection. I do not want to have such an experience. I want to remain a man. (PP6)

A female participant also indicated:

> I heard that when men used prescribed antihypertensive medication for an extended period, they became impotent. Interestingly, though a woman, I am scared the prescribed antihypertensive medications could reduce my sexual drive.

> I am a young lady and should be good sexually to prevent any lady from snatching my husband from me. So I have stopped taking the prescribed antihypertensive medications and adhered to dietary measures, exercise, and stress reduction to control my blood pressure. (PP5)

In contrast, some (n=4) acknowledged adverse effects of herbal medicines. A participant reported:

> Safety is my primary concern because most people who sell or prepare herbal medicine may not have adequate knowledge of the preparation and dosage. When taken, poorly prepared ones could lead to adverse effects such as renal failure. I know many people who developed kidney disease from using herbal medicines". (PP6).

Another participant with a similar view indicated:

> I started using the herbal medicine I purchased from an herbalist, I began having serious palpitations. When I stopped the herbal medicine and started taking only the prescribed antihypertensive medications, the palpitations stopped. (PP11).

Theme 2 - Affordability of Complementary Health Products and Practices

The second theme, affordability, describes the participant ability to obtain complementary health products or practices at a cost that does not expose them to an excessive financial burden. More than half of the participants (n=8) reported that affordability was among the reasons they used complementary health products or practices to control their hypertension. Two sub-themes were identified under affordability: Low cost and flexibility of payment.

Sub-theme Low Cost

The sub-theme of low cost represents the relative inexpensiveness of complementary health products and practices to control hypertension. Two-thirds of participants (n=8) believed that complementary health products and practices are cheaper than prescribed medications. A participant reported:

> The amount I spent on prescribed medications for a month could get me herbal medicine for about three months. Comparatively, the herbal medicine I am using is cheap, and I could even get them free from the village. (PP2)

Another participant shared the same sentiment:

> I use dietary restrictions, regular exercise, and reading and meditating on the word of God to manage my hypertension. These practices are not expensive compared to prescribed medications. It is dietary measures that cost me a little money. Compared with the prescribed medications, dietary measures are cheaper. (PP11)

Yet, one-third of the participants (n=4) reported that complementary health products or practices such as herbal medicine, dietary measures, and massage therapy are expensive as a way to control hypertension. A participant recounted:

> One of the reasons I stopped using herbal preparation when the doctor advised me was that the ingredients I was using to prepare the herbal medicine were quite expensive. For instance, the alcohol I used for the herbal preparation was vodka, which was expensive. Also, the species I used were imported from India because I could not find them in the Ghanaian market, and they (species) were expensive to import. (PP4)

Another participant said:

> Some people think paying for the gym and dietary measures are cheap. No, they

> are not cheap when compared with antihypertensive medications. For instance, I do not want to use prescribed medications to control my hypertension because of my kidney disease and other reasons. I use herbs from China. I eat a lot of green leafy vegetables and fish and go to the gym to maintain my normal body weight to control my hypertension. These kinds of treatments are more expensive than prescribed antihypertensive medications. (PP5)

Sub-theme Flexibility of Payment

The sub-theme of flexibly of payment describes the option for participants to buy and pay later or pay in installments for complementary health products or practices that are used to control hypertension, and without paying interest. A significant number (n=4) reported that flexibility of payment was part of the reasons for using complementary health products or practices. A participant had this to say:

> I do not pay upfront for herbal medicine. The herbalist gives the medicine to me, and I pay installments without interest. (PP6)

Another participant also explained:

> In addition to my prescribed medications, I use prayer and fasting, listen to gospel music, and meditate on God's word to relax and reduce stress. These practices help control my hypertension and do not burden me financially. I go to church, and I give collection when I want. No one forces me or asks me to pay for the services at church. Sometimes, my pastor prays for me, and I only give any amount of money I have as a collection. (PP11)

Theme 3 - Familiarity with Complementary Health Products and Practices

The third theme of familiarity is about the considerable awareness in knowledge that participants have of complementary health products and practices. Familiarity was one of the prime reasons that most participants used complementary health products and practices to control their hypertension. Four sub-themes were identified. The sub-themes are culturally acceptable, mass media exposure, recommendations from friends and family, and easy accessibility.

Sub-theme Culturally Acceptable

This subtheme of cultural acceptability represents the approval of complementary health products and practices by participants as a traditional form of treatment for diseases within their society. All the participants viewed cultural acceptance as one of the main reasons for complementary health products and practices to be used to control hypertension. Herbal medicine and consultation with supernatural powers are considered culturally acceptable in Ghana for treating diseases. Some of the participants who considered herbal medicine usage as part of their culture recounted:

> My cultural belief influenced me to use herbal medicine to treat my hypertension. You are an African, and I think you know herbal medicine was what our forefathers used to treat disease. Herbal medicine is part of our tradition; we cannot throw it away and go for conventional medicine. (PP1)

Another indicated:

> I have adequate knowledge of herbal medicine, especially its preparation and usage. I understand how herbal medicines works compared to how conventional medicine works because herbal medicine is part of my culture, and I was given

> the knowledge right from my childhood. My grandmother was herbalist, and she taught my mother about herbal medicine. My mother also handed over my knowledge of herbal medicine to me. (PP7)

Participants who considered consultation of supernatural power as a culturally accepted means of treating diseases, including hypertension, also reported:

> When I was growing up as a child, my parents used to consult the spiritualist for healing when any family member was sick. Consultation of spiritualists for healing is a culturally accepted ideology our forefathers taught us, and we have used it since. Even the prescribed antihypertensive medications and the herbal medicine I took for my hypertension worked through the power of ancestral spirits. Before I take any medications, I pray to the spirits to make the medications work. (PP3)

Another participant who considered prayer for healing and protection as part of her culture said:

> I pray for healing and protection from diseases. It is part of my culture to seek supernatural power for healing. (PP7)

Sub-theme Mass Media Exposure

The sub-theme of mass media exposure describes the impact and extent to which media exposure had on participant use of complementary health products and practices. All participants had extensive exposure to complementary health products and practices through the media (television, radio, internet, and newspapers). They reported that mass media exposure played a significant role in disseminating information, educating them and others, and thus contributing to their usage of complementary health products and

practices:

> Nowadays, on radio and television, herbalist, spiritualist, and even pastors advertise their products and practices to cure diseases, including hypertension. They (herbalists, spiritualists, and pastors) advertised on all media platforms. At the prayer center I visited for spiritual counselling, and I first saw the pastor on television. (PP4)

Another said:

> I heard a lot about hypertension on the radio. Even I found some of the products advertisements in the newspapers. The radio stations give education on hypertension and its control. Specialists from various hospitals come on the radio to educate the public on hypertension and other diseases. I remember they brought a nutritionist who gave education on a diet for hypertensive individuals. Since then, I have avoided red meat and eating a heavy meal at night. I have also reduced my salt intake and canned food containing salt. (PP6)

Another participant reiterated:

> I watch programs on YouTube and Tik Tok on the uses of herbs. Most of the programs I watch are on using our local herbs to control diseases like hypertension, stroke, and diabetes. Sometimes, they discuss using exercise and dietary measures in addition to herbs to help control these diseases. Complementary health products and practices are advertised extensively on these social media platforms. (PP9)

Most participants indicated that the local dialect used by most media platforms helped increase their knowledge and awareness of complementary health products and

practices. Participants shared some views in relation to this:

> I am sure you are aware of many radio stations all over the country that broadcast their programs in our local language. I listen to programs on how to manage hypertension, diabetes, malaria and other conditions. Again, the stations broadcast Bible teachings, prayer, and healing sessions. Sometimes, people give testimonies about how they got healed through Bible teachings, prayer, and healing sessions. (PP11)

Another said:

> Nowadays, on radio and television, herbalist, spiritualist, and even pastors advertise their products and practices to cure diseases, including hypertension. They (herbalists, spiritualists, and pastors) advertised on all media platforms. The advertisement is done in our local dialect, which has contributed to the patronage of their products and practices. (PP4)

Although participants expressed that media exposure had contributed to their usage of complementary health products and practices, a significant proportion (n=5) sounded one or more warnings about the dangers of media exposure. For instance:

> Prayer, sermons, and healing sessions are conducted on social media platforms like YouYube, Tik Tok, and radio and television stations. Sometimes, people give testimonies to radio stations about how they got healed through prayers. These programs motivated me to believe I could manage my hypertension by praying and attending healing sessions. However, one needs to be careful about some of the pastors on various social media platforms; some are corrupt and there for exploitation. (PP1)

Another said:

> I listened to one of the programs, and people were phoning in to give testimonies about herbal medicine they use to manage their conditions, including hypertension. Later, I found out the herbal medicine was fake, and they were just interested in getting money from their victims. (PP6)

Sub-theme Recommendations from Friends and Family

The sub-theme of recommendations represents the introduction of complementary health products and practices by friends and family, all of them were trusted individuals. In this study, the recommendations from friends and family impacted a significant number of participants (n=5) who used complementary health products and practices. Participants described how recommendations from friends and family increased their awareness of these products and practices, and this boosted their use of complementary health products and practices to control their hypertension:

> My wife is hypertensive. She uses herbal preparation and dietary restrictions to control her hypertension. So when I was diagnosed with hypertension, she recommended I use dietary restrictions and herbal preparation to control my hypertension. Also, friends at church motivated me to use prayer, reading and meditation on the word of God. (PP1)

Another said:

> After completing my first degree, I worked with some Europeans in the northern and upper east of Ghana. The people living in those areas used herbal medicine for their illnesses. So it was there when a friend recommended herbal medicine to me when I was diagnosed with hypertension. (PP9)

Still another reported:

> Three of my family members in the village are hypertensive. They use herbal preparations in addition to walking long distances to farms and eating fresh leafy vegetables to control their hypertension. These approaches to hypertension treatment are working for them. Because of that, I also decided to use some of their approaches to managing my hypertension. (PP12)

Sub-theme Easy Accessibility

The sub-theme of easy accessibility describes the ready availability of complementary health products and practices. Most participants (n=10) thought that complementary health products and practices are easily accessible in their communities, and that this has contributed to the familiarity and use of such products and practices. For instance, one participant recounted:

> Let me tell you. There are all kinds of herbal medicines available on the market. I do not need a doctor's prescription to buy them (herbal medicines). When travelling, you see people selling herbal medicines on buses. Even on television and radio stations, they advertise and sell herbal medicines. People carry herbal products from one house to another and sell them. (PP2)

Moreover, participants indicated that protocols, waiting times, and attitudes of some health professionals at the hospitals had discouraged them from accessing prescribed medications. One participant reported:

> Before I could see the doctor, the protocols involved discouraged me from getting my prescribed medications for my hypertension. For instance, I had to queue to register my folder number and wait for about three to four hours before I could

> see the doctor. The waiting time did not end there. I spent about an hour at the pharmacy to get my prescribed medication. However, with my herbal medicine, within a few minutes, it is ready for use. (PP12)

Another participant reiterated:

> The attitudes of some health professionals are disgusting. Sometimes, some health professionals treat you as something dirty. They seemed not to care about the stress you are going through. They talk to you anyhow. When you ask them questions about your disease or make enquiries, they frown on their faces and may choose not to answer. How do you expect me to go to such a place for treatment? I prefer to go and see an herbalist or spiritualist who would give me a warm welcome for treatment. (PP9)

Theme 4 - Etiology of Hypertension

The fourth theme describes participant views on the cause of their hypertension. All participants completely or somewhat viewed the cause or origin of their hypertension as one of the reasons for using complementary health products or practices. Yet, participants had divergent views on the causes of their hypertension. Two sub-themes were identified: Perceived spiritual cause and evidence-based cause, discussed below.

Sub-theme Perceived Spiritual Cause

The sub-theme of perceived spiritual cause represents participant perceptions regarding oppressive spiritual forces as having caused their hypertension. Two-thirds of the participants (n=8) perceived that oppressive spiritual forces were behind their hypertension that was why they sought spiritual interventions to treat their hypertension. The participants explained that the empowerment derived from supernatural power (God,

Allah, and Deity) liberated them from the perceived oppressive spiritual forces behind their hypertension and helped control the disease. As one participant explained:

> The cause of diseases in Africa is not only what the doctor tells you. The doctor told me that the cause of my hypertension was alcohol abuse. There are evil forces behind my hypertension and kidney disease. I believe that someone (my enemy) has invoked the powers of evil spirits to cause my hypertension and kidney disease. That is why I fast and pray to God, my creator, to heal me of any disease. Though I take my medication, I can tell you that my fasting and prayers are also helping to manage my hypertension. (PP1)

Another reported:

> There was a spiritual cause of my hypertension, I saw it in a dream, and I know the person behind it. I visit my spiritual father at the village once every month, and he performs rituals for me. The spiritual powers of the rituals suppress the oppressive forces behind my hypertension and other diseases. (PP2)

Another one also reported:

> Herbs have spiritual powers to heal diseases that have spiritual causes. The spiritual powers in herbs could drive away evil spirits behind diseases. Our ancestors depended on the spiritual powers of herbs to cure diseases and drive away evil spirits that could cause diseases. (PP12)

Sub-theme Evidence-Based Cause

The sub-theme of evidence-based cause is what one third of the participants (n=4) described the cause of their hypertension as being due to physiological changes in their bodies, ones that could be determined by doctors through diagnostic investigations. These

participants reported physical evidence of physiological changes in their bodies that could cause hypertension. They understood that taking prescribed medications and/or complementary health products and practices was needed to correct physiological changes. Below are some of the explanations that two participants gave:

> I believe persistent stress and worry could be the cause of my hypertension. Also, the doctor told me that my laboratory investigation revealed that my blood cholesterol level was very high. Because of that, I take my prescribed medications to reduce my blood cholesterol level. In addition, I read the Bible, meditate on the word of God, and listen to gospel music to help deal with my stress and worries. (PP11)

> I have reduced my intake of fatty food, salt, and red meat. Also, I have avoided eating late at night and walking a lot as an exercise to control my body weight. My doctor told me that my weight could be a factor in my hypertension. Also, my ECG result indicated an abnormal heartbeat, which could cause my hypertension. Therefore, I needed to take my prescribed medications. (PP10)

Summary of Qualitative Component Findings

Participants described complementary health products and practices as being often used to manage or control their hypertension. Biological therapy (herbal-based medicine and dietary measures), manipulative and body-based practices (tolerable exercise and relaxation techniques), and spiritual/religious intervention (fasting and prayer and reading and meditating on spiritual material) were identified as three primary complementary health products and practices used by the participants. The interviews revealed that all the participants used complementary health products and practices to

control their hypertension. The majority of the participants (n=10) used complementary health products and practices in addition to prescribed antihypertensive medications. Two participants used complementary health products and practices alone to control their hypertension. Yet, the interviews also revealed that all the participants used dietary measures, tolerable exercise, relaxation techniques, and spiritual interventions.

All the participants had reasons for using complementary health products and practices to control their hypertension. The reasons were diversified, and there was typically more than one reason given for why a participant used complementary health products and practices to control hypertension. Efficacy (relative effectiveness and reduced or nonexistent side effects) and affordability (relatively low cost and flexibility of payment) of complementary health products and practices were reasons given by the participants. Familiarity (culturally acceptable, mass media exposure, recommendations from friends and family, and easy accessibility) and etiology of hypertension (perceived spiritual cause and evidence-based cause) were additional reasons for complementary health products and practice usage. The findings revealed that all participants cited media exposure, culturally acceptable, and cause of hypertension as reasons that contributed to their usage of complementary health products and practices. The discussion and the interpretation of these qualitative findings are done in the next chapter.

Chapter Five: Discussion of Results/ Findings

In this chapter, the results of the study are discussed within the context of existing literature on topics related to this study's purpose. This study was designed to identify and describe the educational needs for hypertension control among adult hypertensive Ghanaians diagnosed with chronic kidney disease (CKD) and gain insights into their use of complementary health products and practices alone or in addition to prescribed medications. The Integrated Behavioural Model is used in this discussion to help explain participants' knowledge of hypertension and its control, and perceptions about the use of complementary health products and practices to manage hypertension.

Discussion of Quantitative Component Findings

The discussion of findings is oriented to the two quantitative component questions:

- What proportion of persons diagnosed with CKD and hypertension, receiving care at the Korle-Bu Teaching Hospital, has their hypertension controlled?
- How accurate is the knowledge of CKD and hypertension among those persons diagnosed with CKD and hypertension who receive care at the Korle-Bu Teaching Hospital?

The discussion of findings also focuses on associations between dependent variables and independent variables:

- Assess the association between socio-demographic characteristics and blood pressure control.
- Assess the relationship between hypertension control and the number of years a person has been diagnosed with CKD or hypertension.

- Determine the relationship between knowledge of hypertension or CKD and controlled hypertension.
- Determine if socio-demographic characteristics predict varying knowledge of hypertension or CKD.

The Proportion of Persons Diagnosed with CKD and Hypertension with Controlled Hypertension

Studies have revealed that uncontrolled hypertension among many individuals with CKD poses a significant burden on the individuals and their families, their local and larger community, and the healthcare system in Ghana (Adjei et al., 2018; Tannor, Sarfo, et al., 2019). Therefore, examining the proportion of persons diagnosed with CKD and hypertension receiving care at the Korle-Bu Teaching Hospital with controlled hypertension was essential in this study. The present study found one-third of the respondents (n= 113, 32%) diagnosed with hypertension and CKD had controlled hypertension. This low rate of hypertension control is similar to what was found in other studies in sub-Saharan African countries (Amoako et al., 2014; Bahrey et al., 2019; Hamadou et al., 2017). For instance, in Cameroon, a sub-Saharan African country, Hamadou et al. (2017) reported that less than half of patients (30.5%) diagnosed with CKD and hypertension had their blood pressure controlled. Similarly, in Ethiopia, another sub-Saharan African country, Bahrey et al.'s study found a lower proportion (16%) of patients at Tigray Teaching Hospital with controlled hypertension (Bahrey et al., 2019). Likewise, a study at the renal unit of Komfo Anokye Teaching Hospital in Kumasi, located in the Ashanti region of Ghana, found that less than half (45%) of patients diagnosed with CKD had controlled hypertension (Amoako et al., 2014).

Therefore, it is possible that the low rate of hypertension control identified in the present study is not limited to the study population but also to other Ghanaians and additional people in sub-Saharan African countries.

Studies in developed countries such as Canada, Germany, and Iceland have recorded higher levels of hypertension control among individuals living with CKD (Campbell et al., 2022; Schneider et al., 2018; Zhou et al., 2021). For instance, in German, a highly developed country, Schneider et al. (2018) reported that among 217 adults living with CKD and hypertension, 49% had hypertension controlled compared with 32.2% in the present study. Hence, it could be reiterated that uncontrolled hypertension among individuals diagnosed with CKD is a major concern in sub-Saharan African countries, including Ghana. The possible explanation for low hypertension control, especially in low and middle-income countries, could be low knowledge of hypertension and limited access to hypertension treatment compared to the developed countries. This suggestion is congruent with the assertion that, comparatively, hypertension control rates are higher in Europe and North America, probably due to more public knowledge of hypertension and greater access to hypertension treatment (Campbell et al., 2022; Chow et al., 2013; Go et al., 2013). Furthermore, the low control rate of hypertension among the participants in this study and other sub-Saharan African countries may be attributed to patient-related, healthcare provider-related, and health system-related factors.

Previous studies have identified non-adherence to prescribed medications and lifestyle modification, cultural and religious beliefs, improper usage of complementary health products and practices, and inadequate health-seeking behaviours due to the

asymptomatic nature of hypertension as patient-related factors (Asamani et al., 2019; Blackstone et al., 2019; Koduah et al., 2021; Nyaaba et al., 2020). For instance, the qualitative findings of the present study revealed that all 12 participants cited cultural and spiritual beliefs as part of their reasons for using complementary health products and practices to control their hypertension. However, some of the participants' cultural and spiritual beliefs, such as perceived spiritual causes of hypertension and the effectiveness of herbal-based medicine, could lead to non-adherence to prescribed medications and needed lifestyle modifications.

Improper communication style, inadequate counselling, lack of multidisciplinary teamwork, and inadequate knowledge of treatment guidelines for hypertension are possible healthcare provider-related factors (Blackstone et al., 2019; Nyaaba et al., 2020). Consistent with the present study, all 12 participants interviewed in the qualitative phase indicated that family, friends, and media were the main source of information on their health conditions instead of healthcare providers. However, one could raise a concern about the reliability of their obtained information, especially through the media. Similarly, friends and family may have inaccurate information. These sources of knowledge on hypertension and CKD could affect the accuracy, hence, pose a barrier to hypertension control. Also, the need to travel long distances to reach hospitals, the high cost of antihypertensive medications, inadequate and non-standardized local diagnostic tools for early detection of hypertension, and long waiting times at hospitals to access medical care are likely health system-related barriers to hypertension control in Ghana (Asamani et al., 2019; Koduah et al., 2021; Nyaaba et al., 2020). These health system-related barriers were similar to those revealed by most of the 12 participants interviewed

in the present study. Hence, in the absence of effective strategies to address these barriers to hypertension control, it is likely that there will be no improvement in the hypertension control rate.

Association between Hypertension Control and Socio-demographic Characteristics

As indicated by an author of the Integrated Behavioural Model, Fishbein et al. (2010) thought socio-demographic variables might be associated with one's attitude, perceived norm and degree of control, and self-efficacy in the performance of a behaviour. Although the overall hypertension control rate among the sample was low (32%), this study showed that there were various socio-demographic factors associated with hypertension control. The results revealed that socio-demographic characteristics, such as formal education (tertiary), BMI (normal body weight), religion (being Christian), marital status (married), and employment status (employed) were significantly associated with blood pressure control. In the same vein, previous studies have indicated that socio-demographic characteristics, including formal education (tertiary), BMI (normal body weight), religion (being Christian), and marital status (married), were also associated with hypertension control (Almalki et al., 2020; Hamadou et al., 2017; Mini et al., 2019). The present study revealed that respondents with a higher level of formal education (tertiary) had a higher (65%) rate of hypertension control compared to those with no education (0%), only formal primary education (10%), and also secondary (22%) formal education. Similarly, in Pakistan, Naseem et al. (2018) noted that people in an urban setting with a higher level of formal education (tertiary) had their hypertension controlled as compared to those with a low level of formal education (primary).

Moreover, studies conducted in sub-Saharan African countries, Ethiopia and Zambia, indicated that hypertensive individuals with formal education had better hypertension control than those who could not read and write (Ademe et al., 2019; Chimberengwa et al., 2019). These findings are not different from previous studies in Ghana that identified a lack of formal education as a reason for uncontrolled hypertension (Agyei-Baffour et al., 2018; Okai et al., 2020; Sanuade et al., 2020). Yet, a systematic review by Bosu and Bosu (2021) indicated that hypertension control in rural settings in Ghana was not related to formal education, rather to their traditional lifestyle, primarily manual farming, housekeeping, walking or bicycle use, and the sole use of complementary health products and practices. Therefore, it is arguable that aside from formal education, other factors may be associated with hypertension control. The plausible explanation for individuals with formal education as to why they had their hypertension controlled is that formal education was associated with good knowledge and understanding of hypertension and therefore also knowledge-based adherence to the treatment regimen (Agudelo-Botero et al., 2020; Muscat et al., 2021). Moreover, formally educated (tertiary) respondents would have better access to health-related information than non-educated respondents, and they then would likely have greater autonomy to make health-related decisions, and also would have more ability to use quality healthcare services (Muscat et al., 2021). Educational interventions for hypertension control that target people with formal and without formal education, using videos, posters, and written educational materials in various local languages are needed.

Another finding of the present study was that normal body weight was significantly associated with hypertension control, while overweight and obesity were

related to uncontrolled hypertension. These findings are supported by studies conducted in the United States of America, Saudi Arabia, Ethiopia, and South Africa (Agarwal, 2020; Almalki et al., 2020; Gebremichael et al., 2019; Ku et al., 2019; Masilela et al., 2020). For instance, Ku et al. (2019) reported that every five kilograms of weight loss could reduce blood pressure by 5 mm Hg for an individual diagnosed with CKD and hypertension. In addition, Fraser and Blakeman (2016) asserted that controlling hypertension among CKD individuals require lifestyle recommendation, including maintaining normal body weight (body mass index of 20-25). The inference is that controlling body weight among hypertensive individuals diagnosed with CKD would improve their hypertension control.

Furthermore, two other socio-demographic characteristics that were significantly associated with hypertension control in this study were religion and marital status. Being married and widowed were significantly associated with hypertension control, findings that are consistent with a previous study in Iran (Ramezankhani et al., 2019). The study in Iran revealed that married individuals had blood pressure control as compared to their unmarried counterparts (Ramezankhani et al., 2019). Ramezankhani and colleagues suggested that married individuals had better sleep, less stress, better moods, and a healthier diet than unmarried counterparts. In contrast, previous studies in Nigeria and South Africa revealed that married men and women were more likely to have uncontrolled hypertension as compared to the unmarried subjects (Adeke et al., 2022; Lebuso et al., 2022). The authors believed that the gender-based roles in marriage could put pressure on both women and men, and these roles may then contribute to stress that could increase the risk of uncontrolled hypertension (Adeke et al., 2022; Lebuso et al.,

2022).

Moreover, the result of the present study that religion, specifically Christianity, was a significant factor associated with hypertension control is consistent with previous studies that demonstrated an association between religiosity and hypertension control (Gainey et al., 2016; Meng et al., 2019; Yazawa et al., 2016). Those studies noted that Christianity traditions and practices such as prayer, meditation, and reading religious scriptures were a better coping strategy for stressful life experiences, as they could elicit tranquility and relaxation, hence, also hypertension control (Gainey et al., 2016; Meng et al., 2019; Yazawa et al., 2016).

Although the findings of the present study suggested that there is no statistically significant association between age or sex with blood pressure control, previous studies have found otherwise. For instance, Tapela et al. (2021) reported hypertension control among younger adults and females as compared to older age persons and also adult males of all ages in a study conducted in the United Kingdom. Tapela et al. (2021) suggested that aging causes loss of elasticity of vasculature and arterial stiffening, peripheral vascular resistance, and uncontrolled hypertension. Moreover, in China, Zhu et al. (2019) reported that young adults and the female sex were factors associated with hypertension control as compared to older age and male sex. Likewise, in studies conducted in sub-Saharan African countries such as Nigeria and Tanzania, age and sex were significant predictors of hypertension control (Adeke et al., 2022; Stanifer et al., 2016). For example, in Tanzania, Stanifer et al. (2016) noted hypertension control among young adults and men diagnosed with CKD, as compared to their older and female counterparts.

Clearly, divergence exists in the correlation between socio-demographic factors

and hypertension control among diverse populations. Therefore, there is a need for country specific or perhaps even demographic group specific health education and policy formulation and implementation targeting these factors for hypertension control.

Relationship between Years Diagnosed with Hypertension or CKD and Controlled Hypertension

The present study's results indicated that the respondents' increased number of years diagnosed with hypertension was associated with higher odds of having controlled hypertension. This finding coincides with previous reports that highlighted improved hypertension control among individuals diagnosed with hypertension for five years or more (Dorans et al., 2018; Fryar et al., 2017). Dorans et al. (2018) noted that as the years diagnosed with hypertension increased, the adherence to prescribed treatment of hypertension improved. Moreover, a systematic review by Alessa et al. (2018) revealed significantly increased hypertension control among a cohort diagnosed with hypertension for three years and above as compared to those diagnosed with hypertension for only one year (Alessa et al., 2018).

Also, the present study indicated that a higher number of years diagnosed with CKD was associated with greater odds of having controlled hypertension. The findings of this study mirrored a previous study that revealed respondents who were diagnosed with CKD for three years and above and also had not developed end-stage renal failure showed improvement in their blood pressure control as compared to those newly diagnosed with CKD (Cheung et al., 2017). In sub-Saharan Africa, a study by Asmelash et al. (2020) found that a longer duration diagnosed with CKD and hypertension was statistically associated with hypertension control. In accordance with the Integrated

Behavioural Model, it could be inferred that people seemed more sensitive to or aware of their disease when the years of experiencing the disease increased (Fishbein & Ajzen, 2010). As such, they tried to adhere to the treatment regimen for managing their disease (Fishbein & Ajzen, 2010). Therefore, an educational intervention targeting high-risk individuals, including newly diagnosed individuals with CKD and hypertension or to those who have lived with it for three or less years, may be an effective strategy to improve the hypertension control rate, as these are the people who are the least likely to be adhering to a hypertension medication or diet regimen.

The Knowledge of CKD and Hypertension among Persons Diagnosed with CKD and Hypertension

Sanuade et al. (2020) asserted that knowledge of a disease condition influences an individual's attitude, practice, and compliance with the treatment regimen. Studies have documented low to average hypertension knowledge among adults who are living with CKD and hypertension (Agudelo-Botero et al., 2020; Ku et al., 2019). In the present study, the mean knowledge score on hypertension of the 351 respondents was 13, and a perfect score would have been 22. The findings indicate that the respondents in general had an average knowledge of hypertension. Compared with other studies conducted in Canada, Germany, and other developed countries, the present study illustrated lower hypertension knowledge (Leung et al., 2020; Schneider et al., 2018; Zhou et al., 2021). Similar to the finding of this study, previous studies conducted in sub-Saharan African countries, revealed low knowledge of hypertension among hypertensive individuals, including those with CKD (Abdalla, 2021; Agyei-Baffour et al., 2018; Bogale et al., 2020; Stanifer et al., 2016). The findings indicate that the knowledge of hypertension

among people living in sub-Saharan African countries is low.

The present study revealed that respondents in general also had below-average knowledge of drug compliance and diet components as assessed through the Hypertension Knowledge-Level Scale. However, their knowledge of the definition of hypertension, medical treatment, lifestyle and complications of hypertension was slightly above average scores. This finding corresponds with other studies conducted in low to middle-income countries (Al Zabadi et al., 2018; Eshah & Al-Daken, 2016; Nadeem et al., 2019). For instance, in Palestine, Al Zabadi et al. (2018) reported above average hypertension knowledge on definition, medical treatment, and complications; yet the respondents exhibited below-average knowledge of drug compliance. Similarly, Nadeem et al. (2019) noted that respondents to their study had above average knowledge of the definition, medical treatment, lifestyle and complications of hypertension but low knowledge of drug compliance and nutrition. Varying knowledge of hypertension could result from many factors, including socio-demographic characteristics (Sa'adeh et al., 2018; Stanifer et al., 2016). The present study's findings suggested the need for healthcare professionals to educate patients on drug compliance and diet, as studies have indicated that medication compliance and dietary measures are important components for managing hypertension (Abdalla, 2021; Sanuade et al., 2020).

With regard to the overall knowledge of CKD, the respondents in this study demonstrated average knowledge of CKD in general, as the mean knowledge score of the 351 respondents was 13, and a perfect score would have been 24. Comparatively, the knowledge of CKD of the respondents in the present study was low, a matter of concern as other studies have reported higher mean knowledge scores of CKD (Asmelash et al.,

2020; Sa'adeh et al., 2018; Younes et al., 2022). For instance, in Jordan, Khalil et al. (2014), using the same CKD screening index, recorded a mean knowledge score of 19 out of 24 among their studied CKD individuals. In Palestine, a developing country like Ghana, using the same CKD screening index, Sa'adeh et al. (2018) reported a mean knowledge score of 19 in their sample. They noted that 61% of those who responded to their study had high knowledge of CKD (Sa'adeh et al., 2018). Also, in Ethiopia, a sub-Saharan African country, Asmelash et al. reported that 69% of their study participants had high knowledge of CKD (Asmelash et al., 2020). However, Stanifer et al. (2016) recorded low knowledge of CKD in a community base-study in Tanzania, a sub-Saharan African country. The implication is that people in some developing countries, including Ghana, may have good general knowledge of CKD while others have low knowledge.

Another consideration is that the present study revealed that most respondents exhibited low knowledge of CKD's risk factors and etiology. However, they showed fair knowledge of the signs and symptoms, management, and prevention of CKD. This finding is in accordance with a study in the United States of America, which revealed that most of the study cohort lacked an understanding of the risk factors and causes of CKD (Siew et al., 2019). Similarly, a study conducted in Ghana discovered that most persons with CKD lack knowledge of risk factors, etiology, and the correct management of CKD (Tannor, Sarfo, et al., 2019). In contrast, in Ethiopia, Asmelash et al. (2020) noted that the respondents in their study had good knowledge of the risk factors and etiology of CKD.

A potential explanation for the average knowledge of CKD and hypertension among the respondents of this study may be largely due to the low literacy level and low

socio-economic status identified among many of the Ghanaian populace (Siew et al., 2019; Tannor, Sarfo, et al., 2019). In addition, as the respondents were diagnosed with two chronic diseases (hypertension and CKD), they would likely have to process complex health-related information for the two different conditions and also interact with providers from two different specialties (Siew et al., 2019). Another issue is that healthcare professionals may not communicate effectively about CKD and hypertension in ways that patients can comprehend, interpret, and apply (Siew et al., 2019). These factors could serve as a learning barrier and thus make it difficult for individuals with CKD to accept, understand, and retain information about the disease (Siew et al., 2019). It could be suggested that improving knowledge of hypertension and CKD among healthcare professionals, and the development of plain language teaching tools, may be an opportunity to improve health education for patients to understand and apply knowledge to manage their conditions. Low literacy and socioeconomic status identified previously among Ghanaians (Siew et al., 2019; Tannor, Sarfo, et al., 2019) should be of concern to policymakers in Ghana and probably those in other sub-Saharan African countries. Concrete measures are required to improve the vulnerable groups' low literacy and socioeconomic status to enable them to seek proper and adequate healthcare services.

Relationship between Knowledge of Hypertension or CKD and Controlled Hypertension

The literature reviewed indicated that previous studies had shown an association between knowledge of hypertension and hypertension control among adults, including those living with CKD (Flythe et al., 2020; Ku et al., 2019; Pugh et al., 2019). According to the Integrated Behavioural Model, to engage in a particular behaviour, such as blood

pressure control, one must have sufficient information and the needed skills to adequately perform the behaviour (Fishbein & Ajzen, 2010). The present study revealed a positive association between a good knowledge of hypertension and hypertension control. Consistent with the results of this study, in Germany, Schneider et al. (2018) noted that adults living with CKD who had good hypertension knowledge had their blood pressure controlled as compared with those with low knowledge. Also, in Iran, Gandomkar et al.'s (2018) study revealed that the cohort with adequate hypertension knowledge had their blood pressure controlled. Likewise, in Ghana, Okai et al. (2020) found that high knowledge of hypertension was associated with hypertension control.

Within the domain of knowledge of hypertension, the present study's findings showed that good knowledge about the definition of hypertension was less likely to be a factor for controlled hypertension. However, the study revealed that respondents who had good knowledge of medical treatment, drug compliance, diet and complication of hypertension were more likely to have their hypertension control. This result agrees with Kassa-Mekonnen et al.'s (2019) study report that respondents with adequate hypertension knowledge on medication compliance, lifestyle modification, and complication had their hypertension controlled. However, other studies have reported a negative association between hypertension knowledge and hypertension control (Bollampally et al., 2016; Rahman et al., 2018). For instance, Rahman et al. reported a low hypertension control rate among the respondents to their study who had adequate knowledge of hypertension (Rahman et al., 2018). Therefore, it could be suggested that although adequate hypertension knowledge may be a significant factor for hypertension control, other factors must be considered when formulating and implementing educational interventions

for effective hypertension control. This suggestion is congruent with the Integrated Behavioural Model which indicates that aside from knowledge and skills, other factors such as one's attitude, perceived norm, and environmental constraints impact one's intention, such as to control hypertension (Fishbein & Ajzen, 2010).

In addition, the present study showed that knowledge of CKD was another predictive factor influencing hypertension control among individuals diagnosed with CKD and hypertension. The result of the present study indicated that good knowledge of CKD was significantly associated with hypertension control. This finding agrees with existing literature regarding the control of hypertension among CKD individuals (Asmelash et al., 2020; Fraser & Blakeman, 2016; Sa'adeh et al., 2018). In Palestine, Sa'adeh et al. (2018) reported a correlation between adequate knowledge of CKD and health practices, including hypertension control among individuals diagnosed with CKD. In Ethiopia, a study conducted by Asmelash et al. using the CKD screening index revealed that adequate knowledge of risk factors of CKD, lifestyle, and medication compliance was associated with hypertension control (Asmelash et al., 2020). Their finding is congruent with the present study, which revealed that respondents who were knowledgeable about the risk factors of CKD, signs and symptoms, and management of CKD were more likely to have controlled hypertension. The findings imply that for effective educational interventions for hypertension control among CKD individuals, knowledge on CKD should be incorporated, as the two conditions are doubly linked (Ku et al., 2019).

Predictors of Knowledge Score of Hypertension or CKD

The results of the present study indicated that the knowledge scores of

hypertension or CKD differed among the 351 respondents. The variation in the knowledge scores of hypertension or CKD was associated with the five independent variables: Religion, marital status, formal education, employment status, and BMI. However, religion, formal education, and marital status significantly influenced the knowledge of hypertension and CKD. For instance, Christians and Buddhists were found more likely to be knowledgeable of hypertension and CKD as compared to Pagans. In agreement with the finding of the present study, other studies have indicated that being a Christian was associated with a likelihood of having increased knowledge of hypertension (Sanuade et al., 2020). A plausible explanation for this finding is that in Ghana, health education is often given at churches, a site which could serve as a key source of information on hypertension and CKD (Adu-Gyamfi et al., 2020). Another probable explanation is that in Ghana, myths, misconceptions, and misinformation about diseases exist more among Pagans as compared to Christians, and that this factor could have affected their health-seeking behaviours and their knowledge of hypertension and CKD (Aziato & Antwi, 2016; Boateng et al., 2016).

Also, the findings from the present study suggest a meaningful relationship between formal education and knowledge of hypertension: Those with formal tertiary education had better knowledge of hypertension than those without formal education. This finding is consistent with findings from previous studies (Agyei-Baffour et al., 2018; Al Zabadi et al., 2018; Chimberengwa et al., 2019), all of which reported a positive correlation between formal education and increased knowledge of hypertension. Similarly, in the multivariate logistic analysis, the knowledge score of CKD was significantly associated with formal education (tertiary). This finding was similar to a

study in Tanzania (Stanifer et al., 2016) and one in Ethiopia (Asmelash et al., 2020) that revealed a positive association between formal education and increased knowledge of CKD.

The explanation for these findings could be that patients with higher formal education have access to information from a range of different sources, including Internet usage and reading journals with published information on their diseases (Agudelo-Botero et al., 2020; Muscat et al., 2021). Also, formally educated individuals could access information and better understand it through listening to radio programs and watching television programs on health education broadcasted in English. English language capabilities have been shown to be low among uneducated people in Ghana (Ghana Statistical Services, 2019). Therefore, educational interventions for hypertension and CKD in Ghana should be differentially structured to improve knowledge uptake among the educated and the uneducated as indicted earlier. This suggestion is consistent with the study done in a Canadian province that showed significantly increased awareness of kidney health after a basic public health campaign, especially designed for those with less than a high school education (Ryz et al., 2015).

Another predictive factor of knowledge of hypertension or CKD was marital status. The study demonstrated that respondents who were married were more likely to be knowledgeable about hypertension or CKD compared to single participants. This finding mirrors that of a study done in Iran and eastern Ethiopia in sub-Saharan Africa (Bogale et al., 2020; Ramezankhani et al., 2019). Other studies have found significant associations between age and sex and knowledge of hypertension and CKD (Al Zabadi et al., 2018; Sadeq & Lafta, 2017). In this study, age and sex were not significantly related to the

mean knowledge score on hypertension and CKD. Whereas studies have found that women showed a higher knowledge of hypertension and CKD (Nadeem et al., 2019; Sanuade et al., 2020), other studies revealed that men had higher knowledge of hypertension and CKD (Sa'adeh et al., 2018; Rashidi et al., 2018). Also, studies have shown a significant correlation between older adults and better knowledge of hypertension (Bogale et al., 2020; Machaalani et al., 2022), while other studies indicated a positive association between younger adults and knowledge of hypertension (Nadeem et al., 2019; Al Zabadi et al., 2018). These findings suggest diversified predictors of hypertension or CKD knowledge.

Summary of Quantitative Discussion

The findings reveal control of hypertension among the study subjects was low (32%). This low rate may not be limited to the present study population but to more Ghanaians and other people in sub-Sub-Saharan African countries. Various socio-demographic characteristics (being Christian, married, having formal tertiary education, employed, and normal body weight) and an increased number of years diagnosed with hypertension or CKD were found to be associated with blood pressure control. The results of the present study indicated a positive association between hypertension control and good knowledge of hypertension or CKD. The study also revealed significant knowledge gaps on hypertension and CKD among the respondents, especially regarding drug compliance and dietary measures. Socio-demographic characteristics such as being married, Christian, and having formal tertiary education were likely to predict good knowledge of hypertension and CKD. The factors for knowledge gaps on hypertension and CKD, and hypertension control are diversified. Hence, there is a need for more

targeted approaches to increase knowledge on CKD and hypertension, and improve hypertension control among the wide range of persons who are living with CKD and hypertension in Ghana.

Discussion of Qualitative Component Findings

This section discusses qualitative findings in connection with qualitative research questions posed at the beginning of the study. The initial questions raised in this study were: What complementary health products and practices do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use, in addition to or instead of prescribed hypertension control medications, to manage their hypertension? Why do persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital use complementary health products or practices to manage their hypertension?

Socio-demographic Characteristics of the Qualitative Participants

The majority of the qualitative participants in this study who used complementary health products and practices were Christian, female, married, above the age of 50 years, and had some formal education. These findings agree with previous studies that indicated that socio-demographic characteristics such as age, sex, formal education, religion, marital status, and geographical location were associated with complementary health products and practices usage (El-Dahiyat, F et al., 2020; Dumfeh & Ahorlu, 2020; Ibrahim et al., 2018). For instance, in sub-Saharan Africa, James, Wardle, et al. (2018) found that complementary health products and practices use was more common among older individuals (above 45 years of age), persons with formal education, and Christians. James, Wardle, et al. (2018) noted that most users of complementary health products and

practices in rural settings were male and unemployed. However, this present study revealed that most of the users of complementary health products and practices were female, employed, and residing in urban settlements. The possible explanation for the variation could be that while the findings reported by James, Wardle, et al. (2018) were from people in rural settings, the present study was conducted in an urban setting, and more females were recruited than males.

Furthermore, consistent with the present study, Erku and Mekuria (2016) reported that the majority of participants who used complementary health products and practices to control chronic diseases were Christian, female, and married in a study done in Ethiopia. In addition, in Ghana, a study conducted by Dumfeh and Ahorlu (2020) found that most users of complementary health products and practices for similar purposes were 54 years and above, Christian, female, married, and had formal education. Moreover, the findings of the quantitative component of the present study indicated there is an association between various demographic characteristics, such as Christianity, married, and formal education, with hypertension control. It could be suggested that these demographic groups may hold beliefs about the positive outcome of complementary health products and practices usage (Fishbein & Ajzen, 2010).

Complementary Health Products and Practices for Hypertension Control

Previous studies have found that complementary health products and practices have been used to control chronic diseases, including hypertension and CKD (Erku & Mekuria, 2016; Dumfeh & Ahorlu, 2020; James, Steel, et al., 2018; Kretchy et al., 2016). For instance, James, Steel, et al. (2018) reported that complementary health products and practices were used to control various chronic diseases in sub-Saharan African countries.

These findings were consistent with the results of the present study. The present study found that all of the 12 interviewed participants were using or had used complementary health products and practices to control their hypertension. The common usage of complementary health products and practices among all of the qualitative participants in this study is not surprising, given that multiple previous studies have reported the widespread usage of complementary health products and practices among the Ghanaian population and other sub-Saharan African countries (Dumfeh & Ahorlu, 2020; Gyasi et al., 2017; James et al., 2018).

The present study identified various complementary health products and practices for controlling hypertension that were reported as being used by the 12 participants. Three types, biological-based therapies, manipulative and body-based therapies, and spiritual/religious intervention were identified. This finding was congruent with the WHO (2020) report on the different types of complementary health products and practices in use worldwide. According to the WHO (2020), complementary health products and practices include various therapies such as dietary supplements, herbal remedies, faith-based healing methods, traditional Chinese medicine, mind-body therapy, and therapeutic massage. Below is a discussion of the various complementary health products and practices reported as used by the participants in the present study.

Biological-based Therapies

Biological-based therapies consist of herbal-based medicine and dietary measures used by the participants to control their hypertension. The study found that most of the participants interviewed used plant products (such as leaves, roots, and flowers or extracts from plants) and all 12 participants used dietary measures for hypertension

control. This result is consistent with the findings of Erku and Mekuria (2016) that biological-based therapies, such as plant products, are the most common complementary health products used in sub-Saharan Africa. Moreover, Agyemang et al. (2017) and Dumfeh and Ahorlu (2020) both previously found that herbal products and dietary measures are the most commonly used complementary health products and practices in Ghana. Biological-based therapies are commonly used in addition to prescribed medications in sub-Saharan African countries (James, Wardle, et al., 2018). This result confirms the findings of the present study that the majority of the participants who used herbal-based medicine also used their prescribed antihypertensive medications. The effectiveness of such a combined regimen raises concern for hypertension control among the 351 quantitative subjects of the present study and other persons identified in previous studies in sub-Saharan African countries (Erku & Mekuria, 2016; James, Steel, et al., 2018; Kretchy et al., 2016).

Moreover, participants who used herbal medicine in addition to prescribed medications acknowledged the risk of the negative impact such a regimen could have on their already diseased kidneys. However, none of the participants had informed their doctors of such a regimen. Some believed that their doctors would not respect their choice, while others cited a lack of inquiry by physicians or nurses as the main reason for non-disclosure. A study by Adeniyi et al. (2021) revealed a similar finding: Most participants chose not to disclose their use of prescribed antihypertensive medications in addition to herbal-based medicine for fear of disapproval from their physicians. This finding suggests that healthcare providers must be aware that patients are often hesitant to discuss the use of other medications for the above reasons; therefore, they need to be

mindful of these facts when discussing the disease and its therapy with their patients. Moreover, the finding implies that a good proportion of hypertensive individuals probably would continue to use herbal-based medicine in combination with prescribed medications. It is essential to determine the safety of using biomedical antihypertensive medications with herbal-based ones to forestall any health implications of drug interactions.

However, in this study, 2 out of the 12 participants indicated that they used herbal medicine alone, explaining that using herbal medicine in addition to prescribed medications could destroy their already diseased kidneys. Dumfeh and Ahorlu (2020) advise that herbal medicine usage could pose additional risks or complications, such as kidney and liver failure, if used with antihypertensive medications. Therefore, it could be argued that education is needed for persons diagnosed with CKD who use herbal medicine in addition to or instead of prescribed antihypertensive medications. The lack of accurate or regulated dosing of these herbal products is another major concern.

Manipulative and Body-based Practices

Manipulative and body-based practices are tolerable exercise and relaxation techniques, used by all of the 12 participants to deal with some adverse outcomes associated with their conditions. It was observed that participants lived with the panic of what would happen to them in the future, as they were not sure about the outcomes of their treatment and the progressive nature of CKD. They recounted the experience of many physiological changes in their bodies, including impairments of some of their senses (such as vision, taste, and touch), mobility, and cognitive functions. Participants stated that these experiences made them anxious, worried, and stressed out. This

observation in the present study is similar to the findings of many studies and that these experiences are exclusively worrisome and unpreventable in the context of individuals diagnosed with chronic diseases, including CKD. For instance, Adjei et al. (2018), Kefale et al. (2019), and Tannor (2018) reported that individuals diagnosed with chronic diseases experience adverse outcomes that include low quality of life, substantial personal and family economic burden, and high premature mortality rates.

The present study found that all of the 12 participants used exercise and at least one relaxation technique to manage their hypertension. This result affirms a study by Erku and Mekuria (2016), which found that exercise and relaxation techniques, such as listening to relaxing music and deep breathing exercise, were used to reduce stress and anxiety, relax the body and mind, and maintain normal body weight as a treatment of hypertension. Likewise, the quantitative findings of the present study indicated there is a correlation between normal body weight and hypertension control. In the same vein, Kohl-Heckl et al. (2022) noted that exercise and relaxation techniques were often used to treat chronic illnesses, including hypertension and CKD.

Regarding the use of manipulative and body-based practices with other medications, Erku and Mekuria (2016) noted that none of the individuals living with hypertension used manipulative and body-based practices alone to control hypertension. According to Erku and Mekuria (2016), individuals used manipulative and body-based practices in addition to prescribed medications to control their hypertension. To buttress Erku and Mekuria (2016)'s report, Kohl-Heckl et al. (2022) reiterated that prescribed and/or herbal-based medicines are used together with manipulative and body-based practices for hypertension treatment. Consistent with the previous studies, the present 12

study participants recounted using manipulative and body-based practices in addition to prescribed medications and/or herbal medicine. The participants reported that the reason for combining manipulative and body-based practices with other medications was that although prescribed medications were effective in controlling their hypertension, manipulative and body-based practices also helped to reduce some of the factors such as stress, worry, anxiety, and overweight associated with hypertension (Erku & Mekuria, 2016; Kohl-Heckl et al., 2022).

Spiritual/Religious Intervention

Spiritual/religious intervention is the third of the three complementary health products and practices identified in this study as being in use by all of the 12 participants. This study discovered that the 12 participants relied on supernatural power (God, Allah, or Deities) through "Fasting and prayer" and "reading and meditating on spiritual material" to manage their hypertension. Other studies have identified similar practices for treating chronic diseases (Adeniyi et al., 2021; Gyasi et al. (2017; Kretchy et al., 2016). According to Adeniyi et al. (2021), seeking the face of God through prayer and meditation on the words from the Bible were practices of the majority of Jamaicans who used complementary health products and practices to manage their hypertension. In addition, in separate studies, Erku and Mekuria (2016) and Kretchy et al. (2016) reported that spiritual support from religious leaders and faith-healing methods were used to treat hypertension and other chronic diseases in sub-Saharan Africa. In agreement with these findings, Gyasi et al. (2017) reported that individuals in Ghana often used spiritual and religious interventions to manage their health problems.

Furthermore, all the 12 participants recounted that they experienced a decreased

level of concentration and progressive reduction in physical, psychological, spiritual, and social functioning that affected their daily activities. These experiences could be a result of the disease trajectory associated with negative thoughts such as impending premature death, perceived spiritual cause of their diseases, progressive deterioration of symptoms of their disease, and unaffordable cost of managing their conditions (Adjei et al., 2018; Forouzanfar et al., 2017; Kefale et al., 2019; Tannor, Sarfo, et al., 2019).

With regard to these unpleasant experiences, the 12 participants reported receiving spiritual support from religious leaders, reading and meditating on the words in the Holy Books (the Bible and the Koran) to help them cope with the stressful situation they found themselves in. This finding is supported by what Gyasi et al. (2017) and Kretchy et al. (2021) reported. They asserted that spirituality tends to cushion individuals with chronic disease against psychological and physical stress resulting from inadequate resources and limited family support (Gyasi et al., 2017; Kretchy et al., 2021).

All of the 12 participants in the present study said they were using spiritual/religious intervention and prescribed medications and/or other complementary health products and practices. Gyasi et al. (2017) reported similar findings but revealed that people in Ghana predominantly used herbal products and faith-healing modalities for disease treatment, prevention, and health promotion. Likewise, previous studies done in sub-Saharan African countries have also indicated that commonly used complementary health products and practices for treating illnesses, including hypertension, were herbal products and spiritual healing (Erku & Mekuria, 2016; Kretchy et al., 2021). The findings of the present study, coupled with reports of previous studies conducted in sub-Saharan

African countries, suggest that spiritual/religious interventions are common practices for treating illness among people in sub-Saharan African countries.

Reason for Complementary Health Products and Practices used by the Participants

The literature reviewed indicated diverse patterns and determinants of complementary health products or practices usage among people in both developing and developed countries. In sub-Saharan African countries, socio-economic status, cultural orientation, spiritual/religious affiliation, accessibility, affordability, and efficacy are among the drivers of complementary health products and practices usage (Aziato et al., 2016; Dumfeh & Ahorlu, 2020; James, Wardle, et al., 2018: Kenu et al., 2021; Kretchy et al., 2016). Likewise, the present study identified varying determinants for using complementary health products and practices for managing hypertension. The participants' four main reasons for using complementary health products and practices were efficacy, affordability, familiarity, and etiology of hypertension. It could be suggested that these identified reasons were influenced by the participants' attitudes, perceived norms, and personal agency, as posited by the Integrated Behavioural Model (Fishbein & Ajzen, 2010).

Efficacy of Complementary Health Products and Practices

The cost of diagnosis and management of CKD and hypertension in Ghana was considered a burden for all of the 12 participants interviewed. Yet, all of the participants were of the view that they would spend their limited financial resources on effective treatment. Consistent with the Integrated Behavioural Model (Fishbein & Ajzen, 2010), one of the main reasons for the use of complementary health products and practices was perceived effectiveness coupled with reduced or nonexistent side effects. This study

finding was consistent with previous studies, which reported the use of complementary health products and practices for the treatment of hypertension (Adeniyi et al., 2021; Dumfeh & Ahorlu, 2020). For example, Adeniyi et al. (2021) recounted that the perceived effectiveness of herbal-based medicine, dietary measures, and spiritual intervention was one of the reasons for their usage among hypertensive patients in western Jamaica. Studies conducted in Ethiopia and other sub-Saharan African countries reported similar findings (Erku & Mekuria, 2016; James, Steel, et al., 2018). For instance, consistent with the present study's finding, Erku and Mekuria (2016) reported that the effectiveness of herbal products, diet therapy, and spiritual healing/prayer was the reason for their usage by hypertensive individuals in Ethiopia. This perceived effectiveness of herbal-based medicine and spiritual interventions could contribute to non-adherence to prescribed medications and lifestyle modification to control hypertension.

Moreover, the results of the present study indicated that dissatisfaction with prescribed antihypertensive medications and the belief that complementary health products and practices are relatively effective, contributed to their usage among the study population. This perception of the present study's 12 participants is contrary to a study finding by Tu et al. (2020). Tu and colleagues (2021) documented that the majority of hypertensive patients in a hospital in China used prescribed antihypertensive medications without herbal medicine due to the perceived effectiveness of prescribed medications. Other studies have indicated that users and also nonusers of herbal-based medicines did not always believe that herbal-based medicines are effective and safe to use (El-Dahiyat et al., 2020; Ibrahim et al., 2018). Reasons reported for such a perception were varied. Among the reasons is the unavailability of adequate scientific evidence on the efficacy

and safety preparation of numerous herbal medicines on the market (El-Dahiyat et al., 2020). The lack of regulatory policy and protocol for the activities of herbalists and traditional practitioners, which has led to the proliferation of many fake and unsafe herbal products on the market, was an additional reason (Boateng et al., 2016; Ibrahim et al., 2018).

Moreover, in Ghana, Boateng et al. (2016) and Aziato and Antwi (2016) reported that fake herbalists and ineffective herbal medicines were implicated in avoidable complications (blindness, liver, and kidney failure), and even the deaths of individuals with hypertension. Therefore, it appears there is a need for policy development and enforcement to ensure only qualified registered herbalists and traditional practitioners sell select approved herbal-based medicines in Ghana. Also, herbal-based research is needed to provide evidence-based information, so the general public is protected from unsafe herbal-based medicines (Aziato & Antwi, 2016).

Similar to what was reported from Jamaica by Adeniyi et al. (2021), a majority of the present study's 12 interviewed people reported that complementary health products and practices have few or no side effects. These participants cited perceived side effects of prescribed antihypertensive medications, such as sexual weakness, cough, and constipation, among others, as a deterrent for not using their prescribed medications. However, a few participants recounted that they experienced side effects such as skin, eye, and gastrointestinal irritation after using an herbal medicine, with palpitation being the most commonly one reported. This finding suggests that the generally held perception that complementary health products and practices have no side effects and are safe to use is unsubstantiated. This suggestion is consistent with the assertion made by

Tangkiatkumjai et al. (2020), that the efficacy and safety of complementary and alternative health products are questionable. There is a need for more research into the efficacy and adverse/side effects associated with herbal medicine usage to ensure the safety of the public.

Affordability of Complementary Health Products and Practices

According to the Integrated Behavioural Model, a person's ability to afford products and practices determines their intentions to use such products and practices (Fishbein & Ajzen, 2010). The decision of most interviewed participants to use complementary health products and practices was greatly influenced by their affordability. This finding confirmed what was reported from a systematic review that low cost appears to influence people to use complementary health products and practices in developing countries, specifically in Asia and Africa (Tangkiatkumjai et al., 2020). A systematic review in sub-Saharan Africa also revealed that, comparatively, the low cost of herbal-based medicines and the flexibility of payment motivated their usage to treat chronic diseases, including hypertension (James et al., 2018).

Another common practice observed among the 12 participants in this study was the incorporation of spiritual/religious convictions in their daily lives to manage their hypertension. Most participants perceived that spiritual/religious practices have the advantage of being affordable, though their effectiveness is not certain. This finding from the present study was supported by what was reported from Ethiopia; that most of the respondents in a study indicated prayer and fasting were affordable for treating chronic diseases (Erku & Mekuria, 2016). In this study, most of the 12 interviewed people also reported that flexibility of payment for complementary health products and practices such

as herbal-based medicine and consultation with spiritualists make them affordable for treating their hypertension and CKD. The low cost and the flexibility of payment as the reason for using complementary health products and practices raise a concern that some people may not necessarily consider the effectiveness and safety of this regimen for hypertension control.

Nonetheless, 4 of the 12 participants in the present study stated that complementary health products or practices are expensive, and they are not covered by the National Health Insurance Scheme. In the same vein, a systematic review by Tangkiatkumjai and colleagues in 2020 found that complementary medicine and practices were not cheap and easy to access, compared with conventional medicine. The findings of the present study suggest that conventional medicine and complementary health products or practices used by the participants to control hypertension are expensive. It is incumbent on policymakers in Ghana, the Ministry of Health, and Ghana Health Service to lobby for the National Health Insurance Scheme to cover the cost of hypertension treatment, especially among individuals diagnosed with CKD.

Familiarity with Complementary Health Products and Practices

According to the Integrated Behavioural Model by Fishbein et al. (2010), expectations and behaviours of significant others in each individual's circle might influence that individual to engage in a particular behaviour. In line with this concept, many of the 12 participants' choices to use complementary health products and practices were influenced by members of their social network, as well as media reports, traditional beliefs, long-standing cultural practices, and easy accessibility. Consistent with this study finding, systematic reviews revealed that complementary health products and practices

used in Asia and Sub-Saharan Africa were linked with cultural beliefs and recommendations from trusted individuals, family, and friends (James, Wardle, et al., 2018; Tangkiatkumjai et al., 2020). In this present study, it was observed that recommendations from participants' social networks and cultural beliefs emphasized on natural and effectiveness of complementary health products and practices. A previous study in Jordan found the same pattern where the participants linked their usage of herbal medicines and prayers to recommendations from friends, family and cultural practices (El-Dahiyat et al., 2020).

Another possible reason for the usage of complementary health products and practices is media exposure. There is increasing accessibility to the Internet, radio, and television stations in Ghana now, coupled with more advertisements and open public discussions on the use of complementary health products and practices. The 12 participants reported that media exposure was influential in their using complementary health products and practices. According to the 12 participants interviewed, media exposure contributed to their familiarity with complementary health products and practices. The media helped them gain knowledge and skills for the usage of such products and practices. This finding is in line with one of the concepts of the Integrated Behavioural Model that a person has a strong intention to practice or utilize a product when there is knowledge and skills to do so (Fishbein & Ajzen, 2010). Congruent with the present study's finding, a systematic review by Farsi (2021) revealed that media had increased the accessibility to healthcare information to people worldwide. A previous systematic review revealed media was a powerful tool for disseminating information on complementary health products and practices in sub-Saharan African countries (James et

al., 2018).

On the other hand, since media exposure had contributed to the usage of complementary health products and practices, about half of the participants interviewed indicated that media had become a perfect platform for misinformation and exploitation of some users. This finding supports the report from a systematic review, which revealed that social media act as a vehicle for spreading misinformation about complementary and alternative medicine and practices, misleading some users and endangering their health (Ng et al. 2021). This finding raised critical concerns about the reliability of health information on social media that is accessible to many people.

Furthermore, most of the 12 participants interviewed in the present study thought easy accessibility to complementary health products and practices contributed to familiarity and usage. In agreement with this finding, studies in Saudi Arabia and Jamaica revealed that complementary health products were easily accessible compared to prescribed medications, which motivated their use to manage chronic diseases (Abdelmola et al., 2021; Adeniyi et al., 2021). A similar report was evident in a study by Aziato and Antwi (2016) who disclosed that easy accessibility made herbal medicine a preferred option for many Ghanaians. These findings suggest that personal or family-based familiarity contributed to using complementary health products and practices in developing countries.

Moreover, the majority of the 12 participants in the present study believed that protocols, waiting times, and attitudes of some health professionals at the hospitals discouraged them from accessing hospital services and using prescribed medications. Unpleasant hospital experiences by the participants redirected their interest to using

complementary health products and practices that were easily accessible. The question remains whether some of the easily accessible health products and practices could control hypertension effectively, as the quantitative findings from the present study and other studies (Amoako et al., 2014; Bahrey et al., 2019; Hamadou et al., 2017) that have been conducted in Ghana and other sub-Saharan African countries revealed low hypertension control. It is could be suggested that policymakers and health agencies in Ghana, including the Ministry of Health and Ghana Health Service, put more of a positive or humane system in place to address this concern.

Etiology of Hypertension

All the 12 participants interviewed in the present study viewed the cause of their hypertension as one reason for using complementary health products or practices. Perceived spiritual causes of hypertension accounted for using practices such as prayer, fasting, and reading and meditating on spiritual material by many of the 12 participants for hypertension control. In the same vein, Agyei-Baffour et al. (2018) asserted that spiritual/religious beliefs influence individuals' perceptions of health and illness in Ghana. According to Agyei-Baffour et al. (2018), these beliefs also affect people's strategies for dealing with health problems and the healthcare resources they choose to use during illness. To buttress this assertion, Aziato and Antwi (2016) noted that the explanation for hypertension causation extends beyond biomedical means to include spiritual causes. In Ghana, this assertion is strengthened by the belief that witchcraft and malevolent actions could lead to hypertension causation (Agyei-Baffour et al., 2018; Aziato & Antwi, 2016). Similar spiritual causal theories of hypertension have been reported in other low to middle-income countries such as Saudi Arabia, Jordan, and

Jamaica (Abdelmola et al., 2021; Adeniyi et al., 2021; El-Dahiyat et al., 2020).

These spiritual causal theories informed many of the 12 participants' engagement in traditional healing systems, such as using herbal-based medicine, consultation with deities, and faith healing practices to manage their hypertension. It was those participants' beliefs that engaging in traditional healing systems, backed by spiritual forces, could heal them of their hypertension that have spiritual causes. This finding of the present study is in accordance with the concept of the Integrated Behavioural Model that an individual is most likely to engage in a practice, if the person's feelings and beliefs about the practice are positive (Fishbein & Ajzen, 2010). Other studies reiterated that perceived spiritual causes of chronic diseases are favoured within most African communities and may account for the high numbers of respondents resorting to faith/prayer healing, reading spiritual materials, and consultation with supernatural power to manage the diseases (Erku & Mekuria, 2016; Kretchy et al., 2021). The results of some of these approaches for managing hypertension have not been forthcoming, as the prevalence of uncontrolled hypertension continues to increase among the populace using some of these traditional healing systems (Agyei-Baffour et al., 2019). Therefore, there is a need for interventional programs to educate the Ghanaian populace, including clergy members, to reduce misconceptions and increase their knowledge of hypertension.

Evidence-based cause of hypertension was another reason the result revealed that contributed to one-third of the 12 participant's usage of complementary health products and practices. Those participants believed that physiological changes in their bodies, determined by doctors through diagnostic investigations, were part of the reasons for using dietary measures, moderate exercise, and herbal medicine to control their

hypertension. One-third of the participants interviewed reported that a healthier diet, taking herbal medicine with/or without prescribed medications, and weight control could help correct the physiological changes in their bodies and control hypertension. This finding agrees with a previous study that revealed that dietary measures and moderate exercise could control body weight and consequently control blood pressure (Ahmadi et al., 2019).

Summary of Qualitative Component Discussion

The present study found that using complementary health products and practices was common among all of the 12 study participants as a way to control their hypertension. Biological-based therapies, manipulative and body-based therapies, and spiritual/religious intervention were identified as the participants' main complementary health products and practices. The effectiveness of such products and practices raises critical concerns as hypertension control remains low in the present study population. The majority of the 12 participants interviewed used complementary health products and practices in addition to prescribed medications. Those participants acknowledged the risk of the negative impact such a regimen could have on their already diseased kidneys. However, none of these participants had informed their doctors of such a regimen. The participant gave various reasons for this, ones that need to be addressed.

The interviews indicated that all 12 participants had reasons for using complementary health products and practices to control their hypertension. The study identified varying determinants for the usage of complementary health products among the participants. Efficacy, affordability, familiarity, and etiology of hypertension were the four main reasons for using complementary health products and practices among the

participants. All of the participants gave more than one reason for using complementary health products and practices to control hypertension. Some of the reasons raise critical concerns as they may lead to non-adherence to prescribed medications and lifestyle modification to control hypertension,

The Integrated Behavioural Model appears useful as it provides insights into participants' knowledge of hypertension and its control, perceptions and the use of complementary health products and practices to manage hypertension. The insights gained could be used to develop appropriate educational needs and interventions to encourage the proper use of prescription medicines and complementary health products, in addition to prescribed medications. Although neither the quantitative nor qualitative data of the present study was dependent on the other, there was consistency in some of the findings. Most of the findings of the present study were consistent with previous studies' findings; however, in some cases, the findings were divergent.

Chapter Six: Study Summary, Limitation, Implication, Recommendation, and Conclusion

The dissertation's final chapter presents the study's summary, conclusion, and limitations. Implications of the findings for nursing practice, nursing education, research and policy development are outlined. The chapter also outlines recommendations arising from the study's findings.

Summary of the Study

Uncontrolled hypertension among individuals with CKD results in many adverse health outcomes, affecting individuals, families, and society in many ways (Adjei et al., 2018; Kefale et al., 2019; Tannor, Sarfo, et al., 2019). This study was conducted to identify and describe the educational needs for hypertension control among adult Ghanaians diagnosed with CKD and hypertension, and gain insights into their use of complementary health products and practices over or in addition to prescribed hypertension control medications. The study utilized the Integrated Behavioural Model to explain participants' knowledge of hypertension and its control, and provide insights into the perceptions and practices related to the use of complementary health products and practices to manage hypertension.

The quantitative phase of the study determined the proportion of 351 persons diagnosed with CKD and hypertension, who were receiving care at the Korle-Bu Teaching Hospital, have controlled hypertension. In addition, the study investigated how accurate is the knowledge of CKD and hypertension among those persons. An association between many select socio-demographic characteristics and hypertension control was determined. Furthermore, the study used multiple linear regression to determine the independent

predictors of hypertension and CKD knowledge. The qualitative component of the study explored the types of complementary health products and practices used among persons diagnosed with CKD and hypertension who are receiving care at the Korle-Bu Teaching Hospital, in addition to or instead of using prescribed hypertension control medications, to manage their hypertension. In addition, the qualitative phase of the study explored why persons diagnosed with CKD and hypertension receiving care at the Korle-Bu Teaching Hospital use complementary health products and practices to manage their hypertension.

A sequential mixed-methods design was employed in this present study. A cross-sectional survey was used to answer the quantitative questions in this study. The qualitative phase of this study employed Thorne's interpretive descriptive design to answer the qualitative research questions. All respondents/participants were recruited from the renal outpatient unit of the hospital. Data collection started after ethical approval was received from the Research Ethics Board (The Health Research Ethics Board) of the University of Alberta and the Ethical Review Board of the Korle-Bu Teaching Hospital. The population of interest was individuals diagnosed with CKD and hypertension. A total of 351 respondents who met the inclusion criteria were sampled to participate in the quantitative phase of the study. The 12 participants who were interviewed for the qualitative data were from the group that answered the questionnaires for quantitative data. Data saturation was reached after interviewing 12 participants.

The quantitative data were collected first, followed by the qualitative data. A convenience sampling technique was used to recruit respondents for the quantitative components of the study. The purposive sampling technique was employed for the qualitative phase to select participants. Respondents/participants who agreed to participate

in the study signed a consent form to indicate their acceptance to participate. Face-to-face interviews to collect questionnaire data and also self-administered questionnaires were used for the quantitative component of the study. The researcher and two trained research assistants collected the quantitative data, and only the researcher collected the qualitative data. Two pre-existing questionnaires, known as the Hypertension Knowledge-Level Scale that was developed by Erkoc et al. (2014) and the Knowledge Subscale of the Chronic Kidney Disease Screening Index that was developed by Khalil et al. (2014), were used for the quantitative data. A semi-structured interview guide was used to interview the participants to gain an in-depth understanding of the phenomenon being studied for the qualitative phase of the study. Interviews were audiotaped, and verbatim transcription of interviews ensued alongside. Statistical Product and Service Solutions (SPSS) version 26.0 was used to analyze the quantitative data. Qualitative data were analyzed using the ongoing data gathering and analysis approach that Thorne (2016) proposed.

Hypertension control among the respondents was found to be low, as the study showed that only 32% of the respondents had their hypertension controlled. Socio-demographic characteristics (being Christian, married, employed, having formal tertiary education, and normal body weight) and an increased number of years diagnosed with hypertension or CKD were found to be associated with blood pressure control. The study also showed a positive association between hypertension control and good knowledge of hypertension or CKD. This study found that respondents had an average knowledge of hypertension and CKD. The study revealed knowledge gaps on hypertension and CKD among the respondents, however, especially regarding medication compliance and dietary measures**.** Socio-demographic characteristics, specifically being Christian,

married, and having formal tertiary education, were likely to predict varying knowledge of hypertension and CKD.

The qualitative component of this study found the use of complementary health products and practices was common among all 12 participants in part or wholly to control their hypertension. The study identified biological-based therapies, manipulative and body-based therapies, and spiritual/religious intervention as complementary health products and practices used by the participants. The interviews showed that complementary health products and practices were commonly used in addition to prescribed medications. All of the 12 participants used dietary measures, tolerable exercise, relaxation techniques, and spiritual/religious interventions to manage their hypertension. Participants reported using exercise, relaxation techniques, and spiritual/religious intervention in addition to prescribed medication and/or herbal medicine.

All the 12 participants interviewed had multiple reasons for using complementary health products and practices to control their hypertension. Efficacy, affordability, familiarity, and etiology of hypertension were the four main reasons among them however, for using complementary health products and practices. All the 12 participants interviewed cited media exposure, culturally acceptable, and cause of hypertension as reasons for the use of complementary health products and practices to control hypertension.

Limitations of the Study

Despite the comprehensive nature of this multi-methods study, it was not without limitations. First, the study was confined to outpatients who received care at a single tertiary hospital centred in an urban area of Ghana. Therefore, the quantitative results cannot be generalized to the larger population or to populations outside of Ghana.

Another key limitation of the study is that most of the participants were Christians and females. Also, as a result of the delay in acquiring ethical approval from the Ethical Review Board of the Korle-Bu Teaching Hospital in Ghana, the timelines for the study were not adhered to. Going to the participants' residences to interview them was difficult, due to an imprecise address system in Ghana. Navigating through the mixed-methods research design terrain as a novice mixed-methods researcher was like running a marathon. It took much effort and time to go through the process, but the experience has been worthwhile. Regardless of these limitations, the findings of this study remain helpful and provide a guideline for effective policies and health education programs for hypertension control in Ghana and perhaps other developing countries.

Implications of the Study

Implications for Nursing Education

The findings may be helpful to nurse educators in Ghana for the training of students. The study's findings may be helpful when teaching students about hypertension control among patients diagnosed with chronic diseases. The findings may also help student nurses get insight into the use of complementary health products and practices for the management of hypertension so that they can duly educate patients when on clinical practice. In Ghana, nursing training programs do not currently have a stand-alone course in chronic disease management. The findings suggest that stakeholders should integrate a chronic disease management course into the training programs for nurses in private and public accredited universities in Ghana. It is recommended that the course include content that describes complementary health products and practices for managing chronic diseases. In addition, workshops or in-service training sessions about managing chronic diseases

should be offered for nurses working on renal units. The in-service training session would help the nurses to acquire updated adequate knowledge and to interact skillfully with their clients throughout their disease trajectory.

Implications for Nursing Practice

In considering patients' sources of information, the study revealed that family, friends, and social media were their main sources. Nurses clearly did not contribute much to educating the patients on hypertension, CKD, or complementary health products and practices. This finding implies that health education programs by nurses regarding chronic disease management and the usage of complementary health products and practices should be intensified. For example, nurses could provide health education by using videos, posters, and written educational materials in various Ghanaian languages on managing chronic diseases and using complementary health products and practices. This education could be done during waits for appointments at the health facilities or during outreach service visits. Nurse managers of healthcare institutions are to identify and collaborate with non-governmental organizations (NGOs) willing to support persons diagnosed with chronic diseases financially. Nurses should also be encouraged to educate patients and given time out of their busy shifts to do so.

Implications for Patients

The low hypertension control rate among individuals with CKD in the present study indicates that there is the need for improved management of hypertension. Spiritual/religious interventions were among the various practices used to control hypertension, and the reason for such practices is the spiritual causal theory of hypertension. The study's findings reveal a need to assess the effectiveness of such

practices in future studies. The study revealed that individuals who use herbal-based medicine with prescribed medications did not inform their healthcare providers. Such individuals should be encouraged by their doctors and nurses to inform their healthcare providers, so there can be a discussion on the safety and effectiveness of using that regimen on their diseased kidneys.

This study also indicated a positive association between knowledge of hypertension or CKD and hypertension control. The study revealed that family, friends, and media are the main source of information on hypertension and CKD for participants. However, the study's findings indicated participants' knowledge gaps on hypertension and CKD. That implies that hypertensive individuals should be concerned about the reliability of the source of information on their conditions. Their healthcare providers could be reliable sources of such information. More can be done in Ghana to ensure people have accurate information about CKD and hypertension, such as school-based education, so people with CKD and hypertension have more sources of correct information.

Implications for Research

The present study's findings revealed a low hypertension control rate among CKD individuals. Further research should be done to develop an educational intervention for hypertension control and to evaluate its effect on blood pressure levels among CKD patients and other patients. Also, the study revealed the usage of complementary health products and practices among all the 12 persons interviewed. Future study is needed to evaluate the effectiveness of complementary health products and practices alone to control hypertension. In addition, the study indicated that a complementary health product such as herbal medicine was widely used in addition to prescribed medications. Examining the

safety of using biomedical antihypertensive medications with herbal-based ones is appropriate for future research to forestall any health implications of drug interactions.

Implications for Policy Development

The findings draw attention to the importance of developing and implementing effective educational interventions to control hypertension among individuals diagnosed with ÇKD. It is incumbent on policymakers to establish effective policies and appropriate intervention strategies to improve hypertension control and increase patient-desired therapeutic outcomes. The intervention programs should be effective, available, affordable, and accessible as it should be located in all regions of the country. The intervention programs could draw insights from countries in Europe and North America that have improved the rate of hypertension control over time. The improvement rate of hypertension control in the western world has been attributed to rigorous and pragmatic educational programs on hypertension, after the realization of the increasing morbidity and mortality due to uncontrolled hypertension (Ku et al., 2019; Pugh et al., 2019). Free antihypertensive medications may be required for all people diagnosed with hypertension.

In addition, the findings suggested that persons diagnosed with CKD and hypertension, particularly those with low socio-economic status, need ongoing financial support from the government to afford their medical care related to CKD. Therefore, there is a need for the Ministry of Health, together with other stakeholders, to lobby for the integration of the cost of CKD care into the National Health Insurance Scheme to reduce the financial burden on individuals diagnosed with CKD and their families. The scheme must accommodate all costs, such as consultation, medications, diagnostic investigations, and hospital admissions.

The study found misconceptions such as spiritual causal theories of hypertension among the participants that may have contributed to healer shopping between biomedicine, herbal medicine, and spiritual intervention (Aikins, 2010). There is a need for policy development and enforcement to ensure only qualified registered herbalists and traditional practitioners sell proven herbal medicines. Also, herbal medicine research is needed to provide evidence-based information to the general public, as needed to protect individuals from unsafe or misused herbal medicines. These studies would help ensure the safe use of herbal medicine and prevent avoidable complications and death.

Recommendations for Health Agencies

Based on the findings of the study, the following recommendations will be made to the Ministry of Health (MOH), the Ghana Health Service (GHS), and relevant Non-Governmental Organizations (NGOs). These recommendations are expected to guide various organizations in managing chronic diseases, especially hypertension and CKD.

Ministry of Health Ghana

- The MOH should establish a Community Case Management (CCM) program for community health nurses to identify, educate, and otherwise manage uncomplicated hypertension and CKD patient cases within their communities.
- The MOH should ensure that community health workers' activities, such as health education programs for hypertension control, are monitored, documented and evaluated.
- The MOH should evaluate the effectiveness of in-service training offered by all health facilities to staff in regard to managing CKD and hypertension.
- The MOH should ensure that medical resources for chronic diseases, such as specialist clinics, medications, and diagnostic equipment, are allocated to all district health facilities,

which serve as the first point of call for most chronic diseases.

Ghana Health Service (GHS)

The GHS should:

- Enforce the principles underlying the rational use of complementary health products and practices to ensure adherence by all qualified registered traditional medicine practitioners.
- Ensure in-service training about the management of chronic diseases, especially hypertension with CKD within all health facilities under their jurisdiction is regularly offered.
- Ensure hospital authorities should create ways of making care follow-ups more client-friendly, such as by organizing satellite clinics in all districts to ease client stress of travelling to Accra to one hospital, and to increase the benefits of more follow-ups.

Non-Governmental Organizations (NGOs)

Relevant NGOs should:

- Intensify media campaigns to create awareness about the need for hypertension control, and also the safe use of complementary health products and practices.
- Organize community support interventions for CKD individuals and families by educating and assisting them in the management of CKD.
- Collaborate with the management of healthcare institutions to offer financial support for the care of CKD, especially for patients with low socio-economic status.

Knowledge Dissemination

During the data collection process, I contacted top officials, including the urologists at the Korle-Bu Teaching Hospital, who said they would be happy to see the study findings. Based on this expectation, I intend to schedule a meeting with top officials at the

Korle-Bu Teaching Hospital and present the study findings to them, reiterating the concerns of the participants about their hypertension control. A working/partnership relationship will be established with the officials to develop measures based on the study's findings to improve hypertension control among persons diagnosed with CKD.

Again, the study's findings will be disseminated to the policymakers at the Ministry of Health in Ghana, renal units across the three teaching hospitals in Ghana, and the scientific community through conference papers, poster presentations and publications in peer-reviewed journals. Also, I plan to liaise with some of the local media stations in Ghana to create public awareness of the need for hypertension control among CKD individuals and share the insight gained in using complementary health products and practices. Finally, other knowledge users will be reached through social media handles like Twitter, LinkedIn, YouTube and Facebook.

Conclusion of the Study

The study met the outlined objectives and answered all of the research questions posed. The study revealed that persons diagnosed with hypertension and CKD had an average knowledge of hypertension and CKD. However, despite this average knowledge, most of them did not have their hypertension controlled. This finding depicts not only individual lack of knowledge but also that healthcare professionals may not be communicating effectively about needed patient knowledge of CKD and hypertension in ways that could be understood, interpreted, and applied. The factors for knowledge gaps on hypertension and CKD, and hypertension control are diversified. There is a need for more targeted approaches to address the knowledge gaps on CKD and hypertension and improve hypertension control among the wide range of persons who are living with CKD

and hypertension. Also, the study provided insight into complementary health products and practices used by persons diagnosed with hypertension and CKD. The effectiveness of such products and practices raises critical concerns as hypertension control remains low in the present study population. The findings of this study showed that participants used multiple complementary health products and practices in addition to prescribed medication without considering the safety or possible complications. The safety of using biomedical medications with multiple complementary health products and practices among persons diagnosed with hypertension and CKD must be addressed to prevent any negative health implications. Also, the study identified varying determinants for using complementary health products among the interviewed patients. The patients gave more than one reason for using complementary health products and practices to control their hypertension. Some of the reasons raise major concerns as they may lead to non-adherence to prescribed medications and lifestyle modification to control hypertension, The completed study is thus deemed useful, relevant, and timely as the findings are expected to aid stakeholders in establishing effective policies and health education programs for hypertension control and using complementary health products and practices among persons diagnosed with CKD in Ghana. Finally, this research work has stirred in me the need to advocate for effective, practical, culturally sensitive educational interventions for patients and healthcare providers to effectively control hypertension among individuals diagnosed with CKD.

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Appendix A: Recruitment Script

A nursing student at the University of Alberta in Edmonton, Canada, is conducting a study as part of a Doctor of Philosophy degree in nursing. I am assisting him to recruit people for his study on the educational need for hypertension control among individuals diagnosed with chronic kidney disease and hypertension. He will be engaging you in an interview that will last for 60-90 minutes and/or administration of questionnaires. If you are interested in participating in this study, I would like to have your consent to provide him with your contact details to contact you for further explanation about the research. Your refusal to participate in the study will not affect the services you receive from this unit or hospital.

Thank You.

Appendix B: Information Letter for All Participants/Respondents

Title of Study	**Educational Needs for Hypertension Control Among Adult Ghanaians diagnosed with Chronic Kidney Disease and Hypertension**	
Principal Investigator **Supervisor**	Frederick Anafi (PhD student) Faculty of Nursing University of Alberta anafi@ualberta.ca Phone: +1(780)2036985 Dr. Donna Wilson Faculty of Nursing, The University of Alberta.	

Purpose of the Study

This study seeks to identify and describe the educational needs for hypertension control among adult hypertensive Ghanaians diagnosed with chronic kidney disease and hypertension, and gain insights into their use of complementary health products and practices alone or in addition to prescribed medications.

Background

Chronic kidney disease is well recognized as a significant public health problem in both developed and developing countries. Most hypertensive individuals living with chronic kidney disease have low hypertension control, hence causing a reduction in life expectancy, poor quality of life, high mortality rates, and substantial economic burden. For hypertension to be properly managed among individuals living with chronic kidney disease, there is the need to ascertain the educational needs for hypertension control among them. The findings would help gain insights into their use of complementary health products and practices over prescribed medications.

Procedures

You are invited to participate in this two-part study, but you do not have to be in

this study. Taking part in this study is your choice. I will explain the study to you and ask for your consent to take part in this study.

You will be asked to participate in the two parts of this study, or only one if that is what you choose. The first part uses two questionnaires to collect information about you and about your blood pressure. You can fill those out on your own in the hospital or take them home to fill them out. You can also tell the researcher the answers to the questions, with the questions being read out to you in "Twi" or English.

For the qualitative part of this study, you will be asked to meet with the researcher and have one audiotaped interview. This interview will last about 60-90 minutes at a time and place that is convenient for you. After you give consent, the interview will be recorded, and the audio recorder can be shut off at any time. Should you wish to shut the recorder off, notes may be taken with your consent. In this interview, the researcher will invite you to talk about your use of complementary health products and practices for hypertension control.

Voluntary Participation

Benefits: There are no anticipated direct benefits to participants in the study. However, indirectly the findings of this study will inform health professionals and other stakeholders of the need to develop and implement an effective educational intervention to control hypertension among adults living with chronic kidney disease and hypertension in Ghana. The insights gained into the use of complementary health products and practices over prescribed medications from this study will also guide the development of effective educational intervention.

Risks: No risks are expected of you. However, you may feel sad or worried when talking about your health. We can stop this study at any time. Provision has been made for you to see a certified clinical psychologist should that happen.

Confidentiality and anonymity: All information you provide would be held private, except when professional codes of ethics or the law require reporting. Data will be securely stored in the password-secured system assessable to only the primary researcher and his supervisor. Audio files, transcripts, answered questionnaires, and consent forms will be kept for at least five years after the study is completed. Consent forms will be stored separately from audio files. All the data collected with

participants/respondents will be used for this study only. Data will be reported using direct quotes from interviews with participants.

Freedom to withdraw: Even if you start the study, you do not have to answer all of the questions or discuss any subject in the interviews if you do not want to. You may withdraw from the study at any time by telling the researcher. Taking part in this study or dropping out will not in any way affect your receiving services from the renal outpatient unit or hospital.

Future use of data: The researcher may report findings from this study in conferences or published material. Your name will not appear in any report. The researcher may also use information collected in this study in future studies. Before doing so, the researcher will seek permission from the appropriate ethics committee.

For further information: If you have any questions about the research, please contact me on the phone via [cell phone to be used for study purpose only] or email at anafi@ualberta.ca. A Research Ethics Board at the University of Alberta (The Health Research Ethics Board) has reviewed the plan for this study. If you have questions about your rights or how research should be conducted, you can call (780) 492-2615. This office is independent of the researcher.

Appendix C: Consent Statement

I have read this form, and the research study has been explained to me. I have been given the opportunity to ask questions, and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form after I sign it.

_____ _____

Participant's/respondent's Name (printed) and Signature Date

_____ _____

Name (printed) and Signature of Person Obtaining Consent Date

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate. A copy of this consent form has also been given to the participant.

_____ _____

Name of Researcher Date

Appendix D: Interview Guide for Participants

I am a student of the Faculty of Nursing at the University of Alberta in Edmonton, Canada. I am conducting this study as part of the requirement for a doctor of philosophy degree in nursing. This interview will last for 60-90 minutes, and you will be asked questions about complementary health products and practices to manage your hypertension. I will also ask you why you use complementary health products and practices to manage your hypertension.

Socio-demographic Data

Sex:
Age (year):
Weight:
Religious Affiliation, if any:
Level of Education:
Marital status:
Rural or urban childhood:
Working or not:
Occupation:
Smoking – yes or no currently, and years of pack smoking history:
Alcohol – yes or no currently, and years of alcohol intake history:
Years or partial years since being diagnosed with hypertension:
Years or partial years since being diagnosed with CKD:

Interview Questions

- What complementary health products and practices do you use now or have used to manage your hypertension?

  Probes:

  - What other personal health products and practices do you use now or have used to manage your hypertension?

- Why do you use complementary health products and practices to control your hypertension?

  Probes:

  - What are your other reasons for use of complementary health products and practices to manage your hypertension?
  - Describe the effectiveness of complementary health products and practices for the control of your hypertension?
  - How accessible are the complementary health products and practices you use to control your hypertension?
  - Explain how the cost of the complementary health products and practices and prescribed medicine influences your choice of therapies to control your hypertension?
  - Describe how your cultural beliefs and or religious affiliation if any influence your use of complementary health products and practices to control your hypertension?
  - What motivated you to use complementary health products and practices other than prescribed medication to control your hypertension?
  - What are the challenges you have experienced with the use of prescribed medications to control your hypertension?
  - Tell me the challenges you have been experiencing with the use of complementary health products and practices to control your hypertension?
  - Tell me other psychological, physical, social, religious, and economic challenges in using prescribed medications to control your hypertension.
  - Tell me any influences from family and friends, social groups, hospital, or healthcare professional has contributed to the use of complementary health products and practices to control your hypertension.
  - What other information would you like to give me on your hypertension control?

    Thank you for participating in the study.

Appendix E: Assessment Tools for Quantitative Data

Health and Socio-demographic Data from each Patient's Hospital Chart/folder

Sex:

Age (year):

Weight:

Religious Affiliation, if any:

Level of Education:

Marital status:

Working or not:

Occupation:

Smoking – yes or no currently, and years of pack smoking history:

Alcohol – yes or no currently, and years of alcohol intake history:

The first (most recent) previous blood pressure measurement:

The second previous blood pressure measurement:

The third previous blood pressure measurement:

Years or partial years since being diagnosed with hypertension:

Years or partial years since being diagnosed with CKD:

Hypertension Knowledge-Level Scale, Developed by Erkoc et al. (2012)

This tool has 22 items that seek to determine the basic hypertension knowledge level of the person completing it. For each item indicate if the statement is correct, incorrect, or do not know.

Items	Correct	Incorrect	Don't know
Definition 1. Increased diastolic blood pressure indicates increased blood pressure.			
2. High systolic blood pressure indicates increased blood pressure.			
Medical Treatment 3. Drugs for increased blood pressure must be taken every day.			

4. Individuals with increased blood pressure must take their medication only when they feel ill.			
5. Individuals with increased blood pressure must take their medication throughout their life.			
6. Individuals with increased blood pressure must take their medication in a manner that makes them feel good.			
Drug Compliance 7. If the medication for increased blood pressure can control blood pressure, there is no need to change lifestyles.			
8. Increased blood pressure is the result of ageing, so treatment is unnecessary.			
9. If individuals with increased blood pressure change their lifestyles, there is no need for treatment.			
10. Individuals with increased blood pressure can eat salty foods as long as they take their drugs regularly.			
Lifestyle 11. Individuals with increased blood pressure can drink alcoholic beverages.			
12. Individuals with increased blood pressure must not smoke.			
13. Individuals with increased blood pressure must eat fruits and vegetables frequently.			
14. For individuals with increased blood pressure, the best cooking method is frying.			
15. For individuals with increased blood pressure, the best cooking method is boiling or grilling.			
Diet 16. The best type of meat for individuals with			

increased blood pressure is white meat.			
17. The best type of meat for individuals with increased blood pressure is red meat.			
Complication 18. Increased blood pressure can cause premature death if left untreated.			
19. Increased blood pressure can cause heart diseases, such as heart attack if left untreated.			
20. Increased blood pressure can cause strokes if left untreated.			
21. Increased blood pressure can cause kidney failure if left untreated.			
22. Increased blood pressure can cause visual disturbances if left untreated.			

The Knowledge Subscale of the Chronic Kidney Disease Screening Index, Developed by Khalil et al. (2014)

This subscale has 24 items that seek to determine the basic CKD knowledge level of the person completing it. Indicate yes, no, or do not know in relation to each of the 24 items.

Items	Yes	No	Don't know
1. The kidneys regulate body water and chemicals in my blood, such as sodium, potassium, phosphorus, and calcium.			
2. The kidneys remove drugs and toxins introduced into my body.			
3. The kidneys release hormones into the blood to regulate blood pressure, produce red blood cells, and promote strong bones.			
4. Chronic kidney disease (CKD) is a serious illness.			

5. CKD is an irreversible illness.			
6. Becoming an old person will decrease the function of my kidneys.			
7. Having increased blood pressure makes me more likely to get CKD.			
8 Having diabetes mellitus make me more likely to get CKD.			
9. Having a family member with CKD will increase my chances of getting CKD.			
10. Having high lipid in my blood will increase my chances of getting CKD.			
11. Being a smoker increases my chances of getting CKD.			
12. Becoming an obese person (fatty) will increase my chances of getting CKD.			
13. Having untreated anemia will increase my chances of getting CKD.			
14. Undergoing certain procedures such as cardiac catheterization and CT scan requiring dye injection increases my chances of getting CKD.			
15. Having kidney stones and recurrent urinary tract infections increase my chances of getting CKD.			
16. Doing routine checkups of lab tests such as creatinine and serum urea nitrogen will decrease my chances of getting CKD.			
17. Having CKD gives trouble in concentrating.			
18. Having CKD gives me sleeping trouble.			
19. Having CKD gives me muscle cramps at night.			

20. Having CKD gives me swollen feet and ankles, and puffiness face in the morning.			
21. Having CKD gives me dry and itchy skin.			
22. CKD gives me more often urination.			
23. There are five stages for CKD, and every stage need a management plan.			
24. People in the final stage of CKD need dialysis as a life-long treatment.			

Appendix F: Research Budget (Amount in Canadian Dollar)

	Item	Unit cost	Quantity	Total
1.	Digital voice recorder (Recording of interviews)	250.00	1	250.00
2.	Headset (for transcription)	150.00	1	150.00
3.	Memory cards (as backup for recordings)	40.00	X5	200.00
5.	Printer, Printer Ink Cartridge, and Print Sheets (printing and photocopying)	800.00	-	800.00
7.	Air transport from Edmonton to Ghana and back for data collection	3500.00	-	3500.00
8.	Ground transportation to study sites	500.00	-	500.00
12.	A professional translator and two research assistance	200.00	X3	600.00
13.	Miscellaneous such as phone calls, and water and small gifts for participants/respondents during interviews	500.00	-	500.00
	Total	-	-	6,500.00

Appendix G: Timeline of Activities for Research

Activity	2022/2023				
	January – March (2022)	**April (2022)**	**May – July (2022)**	**August (2022) – January (2023)**	**February - April (2023)**
Proposal Defense	**XXX**				
Ethical Clearance		**XXX**			
Recruitment of Participants			**XXX**		
Data Collection and Analysis			XXX		
Writing of Research Report				XXX	
Final Defense					XXX