

ASSESSING IMPLEMENTATION OUTCOMES TO ADDRESS ANTIHYPERTENSIVE
MEDICATION ADHERENCE IN SUB-SAHARAN AFRICA:
A SYSTEMATIC REVIEW AND FOCUS GROUP STUDY

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ABSTRACT

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CHIOMA OGECHI EGEKEZE

Annually, hypertension is responsible for over 10 million deaths. During the span of a decade, low-middle income countries (LMICs) have experienced the most negative change in progress towards decreasing hypertension prevalence. It is estimated that 46% of the adult population in Sub-Saharan Africa (SSA) is hypertensive. When looking at solutions to address hypertension management in SSA, finding effective medication adherence interventions is the way forward. The purpose of this study was to promote the implementation of evidence-based interventions for successful treatment and improved life quality of hypertensive adults in Sub-Saharan Africa, with the input of healthcare stakeholders. The specific aims were to: 1) determine what interventions for antihypertension medication adherence have been successfully implemented in SSA and assess their implementation outcomes, and 2) conduct a focus group with health practitioners to evaluate what interventions and implementation practices were supported. The methods used to complete this study were a systematic review and focus group sessions. The systematic review was able to identify measurable implementation outcomes for the evidence based interventions found in the literature. The implementation outcomes identified in each of the included studies were categorized according to definitions derived from Proctor, et

al.'s Outcomes for Implementation Research and Gyamfi, et al.'s Assessment of Descriptors of Scalability. The systematic review findings revealed that to establish antihypertensive medication adherence in SSA, the appropriateness of an intervention and the inclusion of health education are essential. Additionally, in order to have successful implementation of an intervention, stakeholders need to commit to addressing systematic challenges emphasized in the literature. The focus group sessions helped to identify tangible actions that can be implemented in order to improve antihypertensive medication adherence in the region. Thematic analysis was used to organize themes found across the focus group transcriptions. During the focus group sessions, health practitioners addressed the practicality of implementing evidence-based interventions found in the literature within their communities. The focus group findings reveal key recommendations including increasing government participation and addressing barriers to implementation. Overall, the data gathered across the studies shows that implementation is not easy to achieve. In addressing antihypertensive medication adherence, stakeholders must take into consideration how healthcare systems function as a whole. Although international and national guidelines provide excellent guidance for implementing evidence-based care, adjustments are needed in order to address population needs and scale interventions.

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“I can do all things through Christ who strengthens me.” - Philippians 4:13 (NKJV)

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COE

DEDICATION

I dedicate this dissertation to my parents, Dr. John Okechukwu Egekeze, and Mrs. Leticia Ngozi Egekeze, for supporting me through my academic journey and raising me to value education.

I dedicate this dissertation to my aunt, Ms. Josephine Opara Okorie, for encouraging me and supporting me from childhood until now.

I dedicate this dissertation to my dear cousin, Ms. Chioma Sheila Okorie, whose untimely passing is a prime example of why this research is vital to improving the health outcomes of hypertensive patients in Sub-Saharan Africa. It is my hope that this dissertation will serve as the foundation for something much greater.

Love you all!

Chapter I – INTRODUCTION

Hypertension is ranked as the top risk factor for death globally (Arima et al., 2011). Annually, hypertension is responsible for over 10 million deaths (Ferdinand, 2020). During the span of a decade, low-middle income countries (LMICs) have experienced the most negative change in progress towards decreasing hypertension prevalence. To address hypertension prevalence globally, it is essential to tackle patient and health system challenges.

Currently, the region of the globe with the highest hypertension prevalence is Sub-Saharan Africa (SSA). It is estimated that 46% of the adult population in SSA is hypertensive (Ferdinand, 2020). This percentage is approximately 11% higher than what is seen in high-income countries (HICs) such as the United States of America, and approximately 6% higher than other parts of the world (Ferdinand, 2020). Research has noted that there are physiological factors that specifically affect individuals of African descent when it comes to how soon hypertension develops. In 2020, the International Society of Hypertension (ISH) noted that, when looking at ethnicity and hypertension, African populations “develop hypertension and associated organ damage at younger ages” as well as higher incidence of resistance and increased cardiovascular risk (Unger et al., 2020, p. 1350). Due to these findings, early screening, lifestyle modifications, and pharmacological interventions are encouraged for management in this population.

There are several studies on hypertension in Sub-Saharan Africa that have focused on identifying factors that influence nonadherence to prescribed treatments. Factors related to lack of hypertension management included drug pricing and availability, poverty, cultural factors, poor health habits, and poor treatment compliance (Seedat, 2015). Furthermore, a study done in

Nigeria and Ghana found that hypertensive medication nonadherence was due to beliefs about medication and long-term use of antihypertensives (Boima et al., 2015). This same study noted that health education in regard to hypertension management, antihypertensives, and the dangers of alternative medications was effective for increasing medication adherence (Boima et al., 2015).

Problem Statement

In 2003, the World Health Organization (WHO) stated that, by increasing the effectiveness of interventions for medication adherence, there could be a much greater impact on the overall health of populations (Brown & Bussell, 2011). Overall, approximately 50% of individuals with chronic illnesses do not take their medications as prescribed which leads to yearly healthcare costs estimated at \$100 billion a year (Brown & Bussell, 2011). This is strong evidence that patients with a chronic illness, such as hypertension, “have difficulty adhering to their recommended medication regimen” (Brown & Bussell, 2011, p. 312). When looking at solutions for hypertension management in Sub-Saharan Africa, finding effective medication adherence interventions is the way forward.

Existing peer-reviewed literature identifies that there is a lack of established evidence on sustainable ways to implement effective hypertension interventions in Sub-Saharan Africa. Research related to hypertension treatment has focused on detecting the causes of non-adherence in a way to combat the prevalence of hypertension. Although risk factors serve as a key factor to address behaviors that contribute to uncontrolled blood pressure, education and medication adherence are effective in creating controlled blood pressure in patients. Recent studies present that the implementation of task shifting, community health workers, and pharmacists have proven to be effective in treating mild or moderate cases of hypertension Sub Saharan Africa

(Ogedegbe et al., 2018). Taking this into account, international effective interventions focused on the implementation of these methods may prove to be most helpful in addressing the hypertension burden in the region.

Significance of Study

The significance of the evidence brought forth by the study is an indication of how hypertension can be addressed through global participation. The study presents findings of how well evidence-based interventions (EBIs) are being implemented to hypertension in the region of Sub-Saharan Africa. Globally, health systems serve the purpose of producing positive health outcomes, but unfortunately, when compared country to country, not all health system function to this capacity. Though this is the current state of things, by looking at the implementation of an intervention, stakeholders can find solutions on how to provide the best outcomes for their patients. Overall, my study presents evidence of how Sub-Saharan Africa can move forward to successfully increase antihypertensive medication adherence through the application of tested solutions.

Purpose of the Study

With the lack of enforced guidelines for hypertension treatment in Sub-Saharan Africa, it is critical that the identification and application of solutions is necessary. The purpose of this study was to identify the implementation elements of effective, evidence-based interventions for successful treatment and improved life quality of hypertensive adults in Sub-Saharan Africa, with the input of healthcare stakeholders.

Research Questions

The research questions for the study are as follows:

1. Among the adult hypertensive population in Sub-Saharan Africa, what evidence-based interventions (EBIs) for medication adherence can be effectively implemented?
2. From the systematic review conducted, what EBIs and implementation strategies for hypertensive medication adherence are supported by practitioners for implementation?

Specific Aims

The specific aims were to:

1. Determine what effective interventions have been implemented successfully within the different levels of Sub-Saharan Africa's health systems to address medication adherence. This aim was addressed with the use of a systematic review.
2. Conduct a focus group of healthcare stakeholders. The developed systematic review was presented to a focus group of healthcare practitioners (doctors, nurses, pharmacists and community health workers) for evaluation. Their responses expressed experiences treating hypertensive patients, the interventions supported, and the practicality of implementation for said interventions.

Theoretical Framework

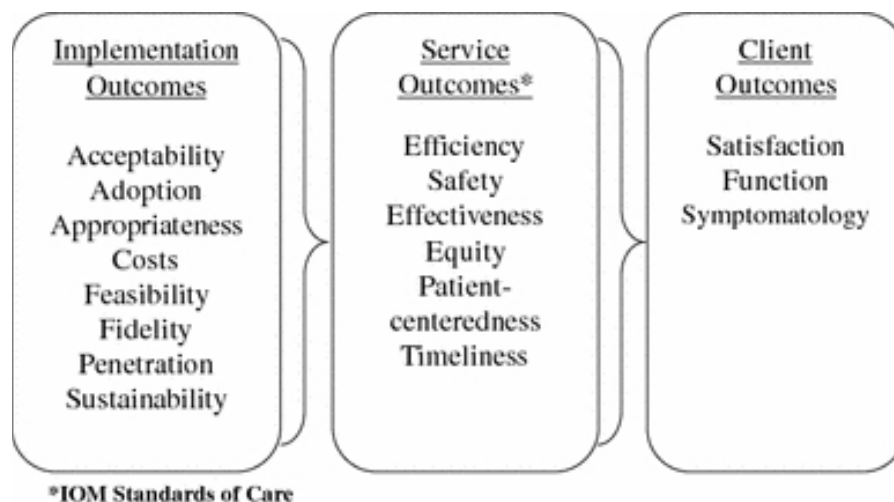
Evidence-based methods must be assessed in order to inform health practitioners how to put them into best practice. Implementation science allows for evidence-based interventions (EBIs) to be adopted into practice and, in turn, improves quality and effectiveness of health services (Bauer & Kirchner, 2020).

In approaching the systematic review and to assess outcomes of implementation research, Proctor et al.'s Implementation Outcomes Framework was utilized. Adapted from the

publication, *Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda*, the framework is used for the evaluation of successful implementation. To indicate the success of implementation, the framework presents eight implementation outcomes: Acceptability, Adoption, Appropriateness, Feasibility, Fidelity, Cost, Penetration, Scalability and Sustainability. Additionally, the term of “Scalability” was used to assess the implementation outcomes. This term was adopted from the publication “*Assessing descriptions of scalability for hypertension control interventions implemented in low-and middle-income countries: A systematic review*” by Gyamfi et al. The implementation of the interventions will be assessed against the outcomes established in the framework and the additional literature. This framework was effective in determining what interventions have been successfully implemented and help to address which areas need to be strengthened in the implementation process.

Figure 1

Proctor et al.'s Conceptual Model of Implementation Outcomes



Note. From “Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda”, by Proctor et al., 2011, *Adm Policy Ment Health*, 38(2), 65-76.

Thematic Analysis

Thematic analysis is a qualitative approach that allows researchers to establish themes from transcribed data in an effort to clearly interpret what was found in the data. The thematic analysis of the focus group transcripts allowed for the gathering of common concerns, recommendations and patterns of practice from the practitioners in the study. The thematic analysis was conducted using a qualitative software Atlas.ti.

Definition of Key Terms

Evidence Based Interventions (EBIs) – interventions that have been proven to be effective through the evaluation of outcomes.

Hypertension – a noncommunicable disease diagnosed when a person’s systolic blood pressure (SBP) is “ ≥ 140 mm Hg” and diastolic blood pressure (DBP) is “ ≥ 90 mm Hg” (Unger et al., 2020, p. 1336). (This term is also described as high blood pressure or raised blood pressure in the literature.)

Implementation Science – the study of methods to promote “the systematic uptake” of evidence-based practices” into “routine practice” in order to improve quality of care (Bauer & Kirchner, 2020, p. 3).

Medication Adherence – “the degree to which the person’s behavior corresponds with the agreed recommendations from a health care provider” (Jimmy & Jose, 2011, p. 155).

Delimitations

This is a study that will produce data from a systematic review and a focus group. Due to the method’s chosen, the research is dependent upon the researchers skill set and therefore the

study may be influenced by the researcher's personal bias. Additionally, the responses of the focus group participants may be influenced by the presence of the primary researcher.

The population of interest in this study is comprised of a small percentage of health practitioners in the Sub-Saharan Africa region. Due to this, the findings may not be generalizable to the remainder of countries and practitioners in the region.

Researcher Experience

While pursuing my Master's degree in Public Health at New York University's School of Global Public Health, I was able to take two courses that established my understanding of research methods: Data Driven Decision Making and Global Public Health Informatics. In these courses, I learned how to accurately assess both qualitative and quantitative scholarly articles and data. Additionally, I participated as a graduate student researcher in the *Implementing Sustainable Evidence-based interventions through Engagement Lab* (ISEE Lab). The lab focuses on the adoption and maintenance of interventions in relation to global areas, such as maternal health, communicable and noncommunicable diseases, and health equity.

During my time as a doctoral student at Teachers College, Columbia University, my enrollment in the Research Seminar and the course Competence with Multicultural Populations enabled me to better understand the challenges and complexities of implementing culturally sensitive health applications and resources.

Publications:

Nessa Ryan, Dorice Vieira, Dena Goffman, Evan M Bloch, Godwin O Akaba, Brenda S D'mello, Chioma Egekeze, Anya Snyder, Magdalena Lyimo, Obiageli Nnodu, Emmanuel Peprah, Implementation outcomes of policy and programme innovations to prevent obstetric haemorrhage in low- and middle-income countries: a systematic review, *Health*

Policy and Planning, Volume 35, Issue 9, November 2020, Pages 1208–1227,

<https://doi.org/10.1093/heapol/czaa074>

Chapter II – REVIEW OF LITERATURE

This chapter will explore hypertension and the burden of the disease in Sub-Saharan Africa. The chapter will explain health system norms in the region and region-specific solutions for hypertension. The chapter concludes with a discussion of the topics of evidence-based practice, implementation science, and medication adherence.

Hypertension Defined

Hypertension, also referred to as high blood pressure, is a noncommunicable disease diagnosed when a person's systolic blood pressure (SBP) is " ≥ 140 mm Hg" and diastolic blood pressure (DBP) is " ≥ 90 mm Hg" (Unger et al., 2020, p. 1336). If just one number is higher, then the hypertension is considered either isolated systolic or isolated diastolic (Huang et al., 2021). Diagnosis takes place after a health practitioner performs at least 2-3 examinations, at the rate of 1-4 week intervals (Unger et al., 2020). The disease is often labeled as a silent killer because there are no distinguishing signs until the disease has reached a point of crisis such as a "heart attack, stroke, or chronic kidney disease" (Singh et al., 2017, p. 1). Hypertension is the leading cause of 50% of cardiovascular conditions, is identified in 40% of diabetic deaths, and is the cause of 13% of deaths overall (Seedat, 2015). Though most people with hypertension are asymptomatic, some still may experience symptoms, including (but not limited to) headaches, vision issues and fainting (Singh et al., 2017). The factors that predispose a person to hypertension vary from location, condition of health, and socioeconomic status.

When it comes to the prevention of hypertension, detecting the disease early is crucial. The stage of prehypertension is a key point of interaction for both patients and practitioners.

Those with prehypertension carry a higher risk of becoming hypertensive and developing cardiovascular disease (Guwatudde et al., 2015). Prehypertension is a blood pressure measurement that ranges between a systolic blood pressure range of 120-139 mm Hg and a diastolic blood pressure range of 80-89 mm Hg; that is taken on at least two separate occasions. The role of health practitioners is critical to treating prehypertension rapidly, as it is a condition that increases in severity with the increase of age. The 7th Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) suggests that there are 5 effective non-pharmacological treatments for addressing prehypertension as shown in the figure below (Svetkey, 2005). The Dietary Approaches to Stop Hypertension (DASH) is a diet that promotes fruits and vegetables rich in potassium, calcium, reduced sugar and saturated fat intake. Studies have found that prehypertensive blood pressure was reduced in 62% of patients who participated in the DASH diet (Svetkey, 2005). Weight loss, as a prehypertensive non-pharmacological treatment, showed to provide “an average reduction in SBP of 3.7 mm Hg and DBP of 2.7 mm Hg” (Svetkey, 2005, p. 1058). Other non-pharmacological treatments for prehypertension included reduction of sodium intake, physical activity and moderation of alcohol intake (Svetkey, 2005). The use of a pharmacological intervention has only been suggested if all non-pharmacological options fail to reduce blood pressure below 130/80 mm Hg (Svetkey, 2005). Currently, it is not recommended to treat prehypertension with a pharmacological intervention as it would potentially be expensive, cause side effects and not address the “modifiable causes of elevated BP” (Svetkey, 2005, p. 1058).

There are also unique conditions that can occur with hypertension. During pregnancy, mothers can experience hypertension at various stages. Two of the most common forms of hypertension during pregnancy are preeclampsia and eclampsia. Preeclampsia is defined as

hypertension in pregnancy with a detection of high protein in urine and the risks include fetal growth restriction and preterm birth. Eclampsia refers to hypertension in pregnancy that is accompanied by symptoms such as seizures, headaches and abdominal pain. The course of action for this condition is immediate delivery of the baby and treatment (Unger et al., 2020). Another unique type of hypertension is resistant hypertension. This is when one has a blood pressure of “>140/90 mm Hg” that is being treated by “three or more antihypertensive medications” (Unger et al., 2020, p. 1346). Resistant hypertension impacts at least 10% of the hypertensive population and is more commonly seen among patients of African descent (Unger et al., 2020).

Hypertensive patients also can experience comorbidities. Common comorbidities with hypertension include diabetes, coronary artery disease (CAD), chronic kidney disease (CKD), Chronic Obstructive Pulmonary Disease (COPD), and HIV/AIDS (Unger et al., 2020).

Figure 2

Effective Non-Pharmacological Treatments for Prehypertension

Management of Prehypertension

Strategy*	Recommendation	SBP Effect in Prehypertension	Effect on Incidence or Prevalence of Hypertension
DASH dietary pattern	4–5 fruits/day 4–5 vegetables/day 2–3 low-fat dairy/day <25% fat	3.5 mm Hg	decreased by 62% (prevalence)
Weight loss	Effective BP lowering even without attaining normal BMI	1 mm Hg/kg weight loss	decreased by 42% (incidence)
Reduced sodium intake	<2400 mg/day	2 mm Hg per 76 mmol/L per day decrease	decreased by 38% (incidence)
Physical activity	Moderate exercise \geq 30 minutes most days	3–4 mm Hg	N/A
Moderation of alcohol intake	\leq 2 oz/day (men); \leq 1 oz/day (women)	3.5 mm Hg	N/A

N/A indicates not available.

*Additional information for health care providers can be found at www.nhlbi.nih.gov. Information for patients concerning the DASH eating pattern can be found at www.nhlbi.nih.gov/health/public/heart/hbp/dash.

Note. From “Management of prehypertension” by Svetkey, 2005, *Hypertension*, 45(6), 1056-1061.

Hypertension Burden in Sub-Saharan Africa (SSA)

According to the World Health Organization (WHO), the prevalence of hypertension in Sub-Saharan Africa for adults 25 or older is measured at 46% (Ferdinand, 2020). This prevalence is significantly higher than the international average range of 35-40% (Dzudie et al., 2017). A four-country cross sectional study on hypertension concluded that 50% of the hypertensive population in Sub-Saharan Africa are unaware that they are hypertensive (Guwatudde et al., 2015). Additionally, the study found that at least 21% of the population in the region is prehypertensive (Guwatudde et al., 2015).

When looking at this region of the world, there are several factors that play into the statistics aforementioned. The implications of these factors fall on health system stakeholders, patients and socioeconomic conditions. In relation to the contribution of healthcare stakeholders, data taken across several facilities shows that many patients received a diagnosis of hypertension after one blood pressure measurement (Addo et al., 2007). This method of a single measurement diagnosis can possibly inflate prevalence data for the region. According to the ISH's Global Hypertension Practice Guidelines, a diagnosis of hypertension should ideally be diagnosed after approximately 2-3 office visits that occur in 1-4 week intervals (Unger et al., 2020). In the case that the patient is diagnosed with hypertension in one visit, the blood pressure must read greater than or equal to 180/110 mm Hg in conjunction with evidence of heart disease (Unger et al., 2020). The detection, treatment, and control of hypertension were alarmingly low in the region as well. Detection refers to "any prior diagnosis of hypertension" and the rate of detection ranged between 11-47% ; with the lowest rate in rural Cameroon and the highest rate among females in South Africa (Addo et al., 2007, p. 1013). Treatment refers to the "use of recognized antihypertensive medication" and the rate of treatment ranged from 10% in urban parts of

Cameroon to 32% in Ghana (Addo et al., 2007, p. 1013). Lastly, control of hypertension is “defined as blood pressure of <140/90 mm Hg” and ranged between 0.4% and 16.8% in the region (Addo et al., 2007, p. 1013). When it comes to patients, lifestyle choices and underlying health conditions, such as obesity, are additional factors that impact the prevalence in the region. Data shows that urban areas in Sub-Saharan Africa have a higher prevalence compared to rural areas, which could be linked to a more sedentary lifestyle. Across multiple studies from Sub-Saharan Africa, women have better rates of detection, treatment and control when it comes to hypertension. The reason for this may be due to women frequenting healthcare facilities more often due to pregnancy. Additionally, women are more accepting of their diagnosis and starting treatment (Addo et al., 2007). In Sub-Saharan Africa, stroke is the main outcome of uncontrolled hypertension, and has seen a 46% increase since 1990 (Seedat, 2015).

Burdens can also be assessed on a socioeconomic and infrastructure basis. Poverty is considered a major “underlying factor for hypertension and cardiovascular diseases” (Seedat, 2015, p. 193). Countries with populations that experience poverty may struggle to stick to specific medications and treatments due to a cost burden. When looking into infrastructure there are two angles, availability of trained personnel and systems for treatment support. In the region issues include, serious shortages when it comes to “qualified healthcare workers, internal maladministration of professionals, and emigration of trained workers” (Seedat, 2015, p. 194). Additionally, there is little emphasis on primary care and record keeping for patients (Seedat, 2015). For the successful management of hypertension, it is important for healthcare practitioners and patients to have records and consistent updates of treatment status. Poor staffing of clinics, lack of essential testing apparatuses, such as blood pressure machines and echocardiograms, only intensifies the burden of hypertension.

Health Systems in Sub-Saharan Africa

A majority of national health systems in Sub-Saharan Africa operate on a pyramidal system. This essentially means that there is an infrastructure of national, regional, and rural systems that deliver healthcare services designed to support the health needs of each country. These levels are sometimes labeled as primary, secondary, and tertiary, depending on the country. This pyramidal system, “begins at the village level and reaches the apex at the most advanced, but also most expensive, approach to providing health care” (Azevedo, 2017, p. 13). This means that the least accessible care is the most advanced. In this context, this section describes the healthcare workforce, task shifting and sharing, and international influence and guidelines on hypertension control.

Healthcare Workforce

The presence and participation of healthcare workers is directly related to quality of care and outcomes for patients. With the emigration of healthcare workers from the region of Sub-Saharan Africa, the “quality of health services” has decreased (Chikezie et al., 2023, p. 1649). Over the past two decades, the region of Sub-Saharan Africa has experienced a depletion of its health workforce. Individuals have migrated out of the region due to “poor working conditions, low remuneration, and a scarcity of career development opportunities” (Chikezie et al., 2023, p. 1650). In South Africa, reasons for emigration include “corruption, personal and family safety, poor infrastructure, and their children's future” in addition to “insecurity and high crime rates” (Chikezie et al., 2023, p. 1650). In order to address this issue, nations must be willing to create “supportive environments that enhance service delivery, work culture, and systems to improve population health outcomes” (Chikezie et al., 2023, p. 1650). Researchers have found that, in the region, “79% of nurses and 76% of doctors were carrying out processes for which they were

overqualified” (Chikezie et al., 2023, p. 1650). To address this issue, health systems can use technology to shift the workload off of practitioners. Technology can help with, “facilitating patient education” and “providing seamless access to medical records” (Chikezie et al., 2023, p. 1650). Additionally, the increased participation of community health workers can help to create “a balance of duties so that a professionals’ activities match their qualifications” and, therefore, “improve working conditions in health systems” (Chikezie et al., 2023, p. 1650). Overall, when it comes to the retention of the healthcare workforce, “supportive environments that enhance service delivery, work culture, and systems to improve population health outcomes” are essential (Chikezie et al., 2023, p. 1650).

Task Shifting and Sharing

Task shifting and task sharing have become key solutions to addressing the workforce challenges in the region of Sub-Saharan Africa. Task shifting as defined by WHO as “the rational redistribution of tasks among health workforce teams” (Okoroafor & Christmals, 2023, p. 1). Essentially, healthcare workers are given specific tasks that are not within their purview. These workers are more readily accessible, but carry a narrower skillset and fewer qualifications. Ultimately, task shifting allows for a more efficient use of human resources while training and retention capacities are increased (Mbouamba Yankam et al., 2023). The method of task sharing was introduced in 2010 by the Institute of Medicine (IOM) to strengthen the capacity of the healthcare workforce to address the prevention, treatment, and care of HIV/AIDS in Africa (Mbouamba Yankam et al., 2023). The WHO defines task sharing as “an increase in the number of healthcare workers who can provide appropriate health services” (Mbouamba Yankam et al., 2023, p. 2). The implementation of task sharing means that healthcare professionals work collaboratively to complete a task comprising of a team of experts and non-specialty trained

individuals. This makes healthcare delivery more affordable for health systems and is a critical strategy when a facility is short on expert practitioners. Both task shifting and task sharing requires for the individuals receiving the task to receive proper training before encountering patients.

Evidence in the literature has supported that both of these methods have been effective and efficient. For task sharing, a study in South Africa showed that “decentralization” can take place without negative patient outcomes (Mbouamba Yankam et al., 2023, p. 3). Additionally, in low-and-middle income countries (LMICs), the use of task sharing lead to efficacy when treating hypertension. For task shifting, a study in Central Republic of Africa, showed an increase in vaccination uptake and acceptability during administration. Another study showed how task shifting with community health workers (CHW) was able to improve access to immunization in “zero-dose communities” (Mbouamba Yankam et al., 2023, p. 3).

The WHO has also created global recommendations and guidelines for task shifting and task sharing implementation to help support countries with initiatives and workforce organizing. With this framework, countries should be able to implement “safe, equitable, efficient, effective, and sustainable task shifting” (Mbouamba Yankam et al., 2023, p. 3). With these guidelines, practitioners hope to achieve, “strengthening healthcare workforce capacity, improving access to services, enhancing program implementation, and bolstering health systems for high-quality treatments” (Mbouamba Yankam et al., 2023, p. 3). In order to accomplish these outcomes, stakeholders engagement and a consistent national agenda are key. This will allow for “shared responsibility” and “alignment with national needs” when addressing the needs of the healthcare system (Mbouamba Yankam et al., 2023, p. 3).

International Influence and Guidelines

There are several guidelines that support the development of interventions and the care delivered to individuals. These guidelines are created by international health agencies to set goals over time and standards for effective care. In the treatment of hypertension, there are four major organizations that have contributed to the conversation of treating hypertension in Sub-Saharan Africa: the World Health Organization (WHO), the World Heart Federation (WHF), International Society of Hypertension (ISH), and the Pan-African Society of Cardiology (PASCAR).

Strategies To Address Hypertension Prevalence

Several international health agencies have taken it upon themselves to develop multitiered approaches for addressing cardiovascular health on a global scale. The World Heart Federation (WHF) produced roadmaps concerning cardiovascular disease, potential roadblocks and solutions to improve prevalence and care. In 2015, the WHF specifically launched a roadmap on raised blood pressure that was followed by updated guidelines and interventions from the ISH and WHO that drastically improved the management of hypertension globally. In 2018, the World Health Organization (WHO) produced the HEARTS technical package with the objective of engaging policymakers and program managers to implement successful cardiovascular disease (CVD) primary care. This technical package consists of modules on topics that include implementation, evidence-based treatment and building a consensus on protocols.

Identifying Roadblocks

PASCAR, the Pan-African Society of Cardiology, determined that addressing hypertension was priority in the effort to reduce cardiovascular disease incidence in Africa. To

produce effective change PASCAR developed a 10-point action plan that African governments would be able to implement into their country's healthcare system. Before producing a solution PASCAR identified the roadblocks that occur on three levels: "Government-and health system-related", "healthcare professional-related", and "patient-related" (Dzudie et al., 2017, p. 263). On the government and health system-related level, the roadblocks were connected to the lack of policies established to control hypertension and the lack of systems for the distribution of resources. In addition to these issues, many African governments were unable "to effectively work with the private sector, non-governmental organisations (NGOs) and academia" (Dzudie et al., 2017, p. 263). On the healthcare professional-related level the roadblocks placed an emphasis on the need for evidence-based guidelines, increasing the volume of physicians at the primary care level, and access to quality medication (Dzudie et al., 2017). Lastly, on the patient-related level, the roadblocks were identified as lack of awareness, nonadherence to medication, poor patient education (Dzudie et al., 2017).

Specific Solutions for Sub-Saharan Africa

In 2004, the African Union (AU) member states took note of data that showed hypertension as the second most pressing issue on the continent. The AU took special interest in addressing hypertension by suggesting that best practices such as screening, affordable care and community based programs should be implemented. A decade later, the World Health Organization's 2013 to 2020 Global Action geared towards "preventing and controlling non-communicable diseases (NCDs)" (Dzudie et al., 2017, p. 263) and the WHF's Roadmap For Hypertension were created. The sixth target on the WHO's action plan promoted the achievement of a 25% reduction in hypertension prevalence by 2020 or the maintenance of 25% prevalence. To support the goals set forth by the African Union, the Pan-African Society of

Cardiology (PASCAR), gathered to establish key actions that would form a roadmap for governments to follow. In doing so PASCAR set a new goal of 25% hypertension prevalence by 2025 (Dzudie et al., 2017). PASCAR identified roadblocks on the government, physician and patient level.

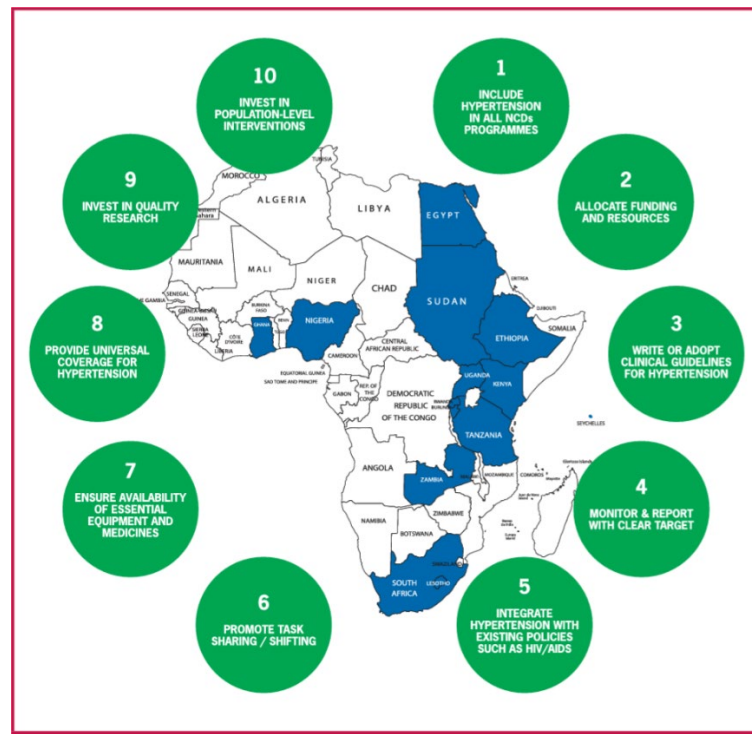
Specifically, the three patient-level roadblocks are as follows:

- “poor awareness about hypertension and its consequences”;
- “poor adherence to drug therapy because of limited access to medication”; and
- “difficulty in changing lifestyles, and false health beliefs that hypertension is curable, due to poor patient education.” (Dzudie et al., 2017, p. 263).

On the patient-level, medication adherence, awareness and education have all played a significant role when it comes to the management of blood pressure in Sub-Saharan Africa. PASCAR’s own 10-point action plan is built to equip African ministries of health to appropriately implement change for the goal of 25% hypertension prevalence by 2025.

Figure 3

PASCAR's 10-Point Action Plan



Note. From “Roadmap to achieve 25% hypertension control in Africa by 2025”, by Dzudie et al., 2017, *Cardiovasc J Afr*, 28(4), 262-272.

The 4Ps of Hypertension Management in SSA

When it comes to hypertension management, there are four major factors to consider: “patient, professional, primary healthcare system, and public health policy” (Sorato et al., 2021, p. 1). A scoping review, published in 2021, used these factors to explain the reasons for poor blood pressure control in a selection of countries from Sub-Saharan Africa. Cardiovascular disease takes time to develop. During this latency period, a comprehensive approach between the 4Ps (patients, professionals, and primary healthcare systems and public health policy) must take place to mitigate risk.

Primary healthcare (PHC) is the foundation for hypertension care and management. This is the first point of interaction for treatment but, unfortunately, the service availability and

readiness (SAR) in Sub-Saharan Africa (SSA) to treat noncommunicable disease is worrisome. Data has shown that service availability and readiness at PHC facilities ranges from 22-41% through the region; with 34% in Kenya, 28% in Tanzania, and 13.1% in Zambia. Of all of the assessed facilities, 9% “reported having at least one trained staff” and 42% reported having “guidelines for hypertension” (Sorato et al., 2021, p. 5). When looking at hospitals and medication availability, about 7.5% of facilities had the proper drugs available for treating hypertension (Sorato et al., 2021). Most importantly, out of ten of the countries studied, only three had established an “annual screening program for high-risk patients” (Sorato et al., 2021, p. 5).

The role of patients is a key factor of hypertension management, and their participation is core to the system. Approximately 80% of cardiovascular deaths occur in LMICs (Sorato et al., 2021). Unfortunately, poverty contributes to negative CVD outcomes due to lack of affordability of preventative services and treatments. This, in turn, impacts hypertensive awareness and education on the disease, which is the first step of treatment. In Tanzania, knowledge on hypertension was noted at below 10% and in Uganda, it was noted at 28.2% (Sorato et al., 2021). Furthermore, in Tanzania, 48.3% of patients were aware of their hypertension and in Malawi, 62% of patients were aware of their hypertension (Sorato et al., 2021). These statistics were not in range with the rate of hypertension management; Tanzania has experienced 95.3% uncontrolled hypertension and Uganda experienced 90.6% (Sorato et al., 2021). Low adherence to medication or nonadherence is the top reason for uncontrolled hypertension. In Kenya, 53.6% of patients believed that they should stop their regimen of antihypertensives once blood pressure was under control (Sorato et al., 2021). This is a clear sign of patients not receiving health education about hypertension and the treatment of chronic disease. On the other hand, data

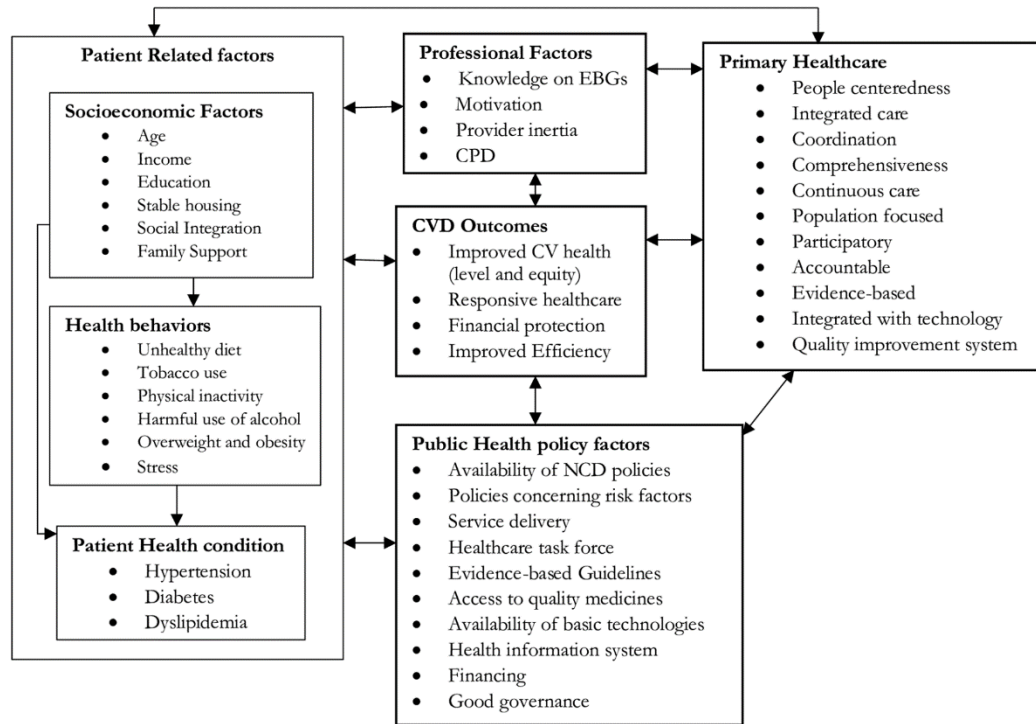
collected from Ethiopia is promising with medication adherence ranging between 61.8-75.1% (Sorato et al., 2021). Patients must account for understanding the disease, consistent treatment, lifestyle changes and affordability as factors in the continuum of hypertension care.

When it comes to providers, they bring expertise to the hypertension care experience. They acknowledge patient needs and habits to provide the best possible solution for care. Providers have the tendency to prescribe more than one drug to achieve hypertension control, but this method of treatment usually leads to nonadherence as it requires many adjustments by the patient (Sorato et al., 2021). A single pill combination (SPC) is suggested for optimal adherence (Unger et al., 2020). Another barrier that providers face when it comes to blood pressure control is the implementation of “evidence-based guidelines” (Sorato et al., 2021, p. 8). Data from Zimbabwe and Rwanda showed knowledge of evidence-based guidelines among health workers and clinicians ranged from 43-47.7% (Sorato et al., 2021). Without proper evidence-based guidelines, consistent care that is shown to be effective is unattainable.

Public health policy factors into the continuum of hypertensive care by establishing the availability of treatment options and “diagnostic technologies” (Sorato et al., 2021, p. 8). Policies are what establish healthcare coverage and social insurance, and without these options, financial barriers hinder patients from receiving medication. In LMICs, data shows that there is little to no standardization of treatment protocols, and practitioners are not properly practicing evidence-guidelines for hypertension care (Sorato et al., 2021).

Figure 4

4P's (primary care, professional, patient, public health policy)



Note. From “Reasons for poor blood pressure control in Eastern Sub-Saharan Africa: looking into 4P's (primary care, professional, patient, and public health policy) for improving blood pressure control: a scoping review”, by Sorato et al., 2021, BMC Cardiovasc Disord, 21(1), 123.

Physiological Differences in Hypertension for Africans

Research has shown that among individuals with African descent internationally, there are physiological differences that lead to more severe cases of hypertension that develop earlier (Ferdinand, 2020). In 2020, the International Society of Hypertension (ISH) reported that individuals of African descent experience a higher rate of resistant and nighttime hypertension, kidney disease, heart failure, stroke, and mortality (Unger et al., 2020). These physiological differences include a suppressed “renin angiotensin aldosterone system” (RAAS), “vascular aging (large artery stiffness)” and “increased cardiovascular reactivity” (Unger et al., 2020, p.

1350). In order to combat these possible physiological factors, early hypertension screening from the age of 18, lifestyle modifications, single pill combinations (SPC) and inhibitors are suggested (Unger et al., 2020).

Evidence-Based Interventions and Medication Adherence

For a patient, adherence is the extent to which a person's actions towards treatment "taking a medication, following a diet or executing lifestyle changes corresponds with agreed recommendations from a healthcare provider" (Unger et al., 2020, p. 1341). Unfortunately, nonadherence affects between 10-80% of hypertensive patients and is the top cause of uncontrolled blood pressure (Unger et al., 2020). The ISH's suggested strategies for improving medication adherence include: using a single pill combination (SPC), once-daily dosing, "linking adherence behavior with daily habits", practitioners providing adherence feedback for patients, home blood pressure monitoring, reminders on medications, "empowerment-based" counseling, mobile reminders, and a multidisciplinary healthcare approach that incorporates the use of pharmacists (Unger et al., 2020, p. 1344). Methods such as patient education also plays a role in improving medication adherence by ensure that the patient is thoroughly informed (Jimmy & Jose, 2011). In addition to these suggestions, practitioners may also find it useful to use the Harm Reduction Model to improve medication adherence. This model is consistent with the ideas backing adherence and is often used to help patients with addiction (Gould & Mitty, 2010). The model places an emphasis on facilitating with the patient and meeting them at their point of need (Gould & Mitty, 2010).

Adherence vs. Compliance

In literature pertaining to medication adherence, it may be found that the authors often interchange the two terms adherence and compliance. As aforementioned, adherence refers to a

patients actions or behaviors coming into agreement with the medical recommendations that were suggested to them by their healthcare provider (Unger et al., 2020). Compliance refers to “the extent to which the patient’s behaviour matches” the medical recommendations (Horne et al., 2005, p. 12). The reasons these two differ is based on the relationship between the patient and the practitioner. When used in medical terminology, compliance signals that the practitioner is the overall decision maker when it comes to treatment recommendations and that the patient must follow the doctor’s orders. In medication management, when using compliance, practitioners focus on having their patients participate in activities that promote following a medicine regimen (Gould & Mitty, 2010). Compliance takes convincing from the practitioner so that the patient is not encouraged to question the approach of the treatment. Researchers and medical professionals have stayed away from using this term because when referencing noncompliance it can seem as if the patient was purposefully implementing behaviour that was deviant (Horne et al., 2005). The term adherence was first adapted in the fields of psychology and sociology, and emphasized that the patient had free will as to whether or not they would follow the treatment recommendations made by their practitioner (Horne et al., 2005). The whole purpose of adapting this term was to reduce blame on the patient and look for ways that both the patient and practitioner can come into agreement with. Adherence looks to bring partnership, promote trust, and increase the patient’s comprehension of the treatment plan (Gould & Mitty, 2010). This also means that adherence may require a family effort as well when it comes to patients who are older or may be experiencing special circumstances such as pregnancy, a multigenerational home or disability.

Although adherence does promote partnership with the patient and deciding upon course of treatment, nonadherence still occurs. The type of nonadherence that may occur is divided into

two categories, purposeful and unintentional. Purposeful nonadherence is when a patient establishes that a medication “is ineffective, not necessary, or unsafe” (Gould & Mitty, 2010, p. 291). A patient may mistrust the clinician’s judgement and from experience decide that the course of treatment is not right for them. This may also apply to a treatment cost decision as well. If the patient decides that the cost-benefit of them following the regimen is not suitable for them, they may suggest another medication that is just as effective but more affordable (Gould & Mitty, 2010). Unintentional nonadherence occurs due to barriers that are not in control or have altered the routine of the patient. These barriers could be physical, cognitive, psychological, sociocultural, or economic (Gould & Mitty, 2010).

Medication Adherence and Outcomes

Medication adherence is a key factor that is back by scientific evidence for contributing to positive health outcoming. According to research “increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments” (Brown & Bussell, 2011, p. 304). With adherence to therapies being “a primary determinant of treatment success”, patients, practitioners and health care systems should be implementing strategies to improve adherence (Jimmy & Jose, 2011, p. 155).

Implementation Science

Implementation science is the study of methods to promote “the systematic uptake” of evidence-based practices” (Bauer & Kirchner, 2020, p. 3). In turn, with this approach the “quality and effectiveness of health services” for patients and practitioners can improve (Bauer & Kirchner, 2020, p. 3). The field focuses on the need to ensure interventions are able to be placed into clinical practice. Research notes that, although an intervention may be deemed as

effective, it's effectiveness does not guarantee uptake and scaling. Data have established, that “fewer than 50% of clinical interventions” end up being applied by practitioners (Bauer & Kirchner, 2020, p. 1). With this low uptake rate there is a need to investigate how practitioners can better apply what has been learned from implementation science.

Conclusion

The literature is replete with scholarly information in regard to the disease burden of hypertension, treatment, medication adherence and strategies for improving quality of care. There is clear evidence that there is an unusually high rate of hypertension impacting the region of Sub-Saharan Africa. Evidence suggests that there are several factors impacting the delivery of care such as workforce availability and health system structure. There are international and regional entities working to address the health crisis, but there are further assessments needed to determine how to apply evidence-based guidelines and strategies.

Implementation science plays a key role in measuring the practical success of the evidence-based interventions that the literature suggests. With the participation of stakeholders and implementation science, researchers will be able to attest to the impact of following guidelines for hypertensive care.

Chapter III – METHODS

This study utilized a systematic review and focus group methodology to assess the implementation outcomes of evidence-based interventions for antihypertensive medication adherence in Sub-Saharan Africa. These two methods allowed for both scientific literature and practical insight to be established in regard to the topic. This chapter presents the methods of research for the two aims: 1) A systematic review assessing evidence-based interventions for medication adherence in hypertensive patients in Sub Saharan Africa, and 2) a qualitative analysis of data collected from a focus group of practicing health professionals.

Aim 1: Systematic Review Methodology

Upon review of the literature, I identified a gap in relation to assessing the implementation of evidence-based interventions for addressing hypertension in Sub-Saharan Africa. A majority of the reviews on the topic focused on evaluating singular interventions and not the applications that enable them to be successfully implemented in different country systems. Therefore, the purpose of this systematic review was to compile literature that addressed medication adherence for hypertension patients in Sub-Saharan Africa and those evidence-based approaches that facilitated adherence. The articles collected helped to identify the evidence-based interventions that have been successfully implemented in this region of the world. The studies were specifically assessed on three outcome levels: implementation, service and patient outcomes. The implementation outcomes include acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, scalability, and sustainability. The service outcomes include efficiency, safety, effectiveness, equity, patient-centeredness and timeliness.

Lastly, the singular patient outcome is increased medication adherence with a reduction of blood pressure. The theoretical framework for assessing implementation outcomes among these studies was adapted from “*Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda*” (Proctor, E. et al., 2011). By assessing the information from these references in the literature, country systems can make better conclusions when deciding on what protocols to implement in their countries.

The specific objectives of this systematic review were thus to:

1. Outline existing evidence-based interventions for addressing medication in hypertension patients.
2. Assess the implementation outcomes of the interventions outlined through the uses of predetermined outcome categories
3. Describe the findings and barriers that interfere with successful implementation.

Systematic Review Protocol

Systematic reviews allow for the easy consumption of practice-based evidence in one piece of comprehensive literature. This form of review is meant to organize a group of primary research articles on a topic while also limiting “bias and random error” (Owens, 2021, p. 69). With the fast paced growth of published literature, clinicians are not always privy to the most recent practice-based evidence comparisons taking place across the field. With systematic reviews, articles of research relevant to a specific topic can be gathered, assessed for validity and shared for consumption by “decision-makers in areas of research, policy, and patient care” (Owens, 2021, p. 69). This ultimately allows for evidence from the literature to be “more accessible” (Green & Allegeante, 2020, p. 947).

Systematic reviews are a practical methodology in the sense that it does not take prior knowledge of the process to properly conduct one. Before beginning the review, it is important for the researcher to construct a research question using the PICO format, with the PICO acronym standing for Patient, Intervention, Comparison, and Outcome (Owens, 2021). The researcher is also encouraged to register the review at its start with the International Prospective Register of Systematic Reviews (PROSPERO). By registering the review, other researchers can stay informed about “review status to provide transparency and avoid duplication” (Owens, 2021, p. 69). The systematic review performed for this study was registered at PROSPERO with the Review ID: CRD42023360315.

When conducting a systematic review the researcher must understand that the process for producing the manuscript must be “explicit, rigorous, and reproducible” (Owens, 2021, p. 71). The “Preferred Reporting Items for Systematic reviews and Meta-Analyses literature search extension” (Owens, 2021, p. 69), PRSIMA-S for short, is a 16-item checklist that assists in organizing the systematic review process (Rethlefsen et al., 2021, p. 4). Divided in to four sections, the checklist covers “Information Sources And Methods”, “Search Strategies”, “Peer Review” and “Managing Records” (Rethlefsen et al., 2021, p. 4). By using the PRISMA-S checklist, future researchers can follow the same protocol in order to retrieve the breadth of articles used for the systematic review. With modern technology, the management of systematic reviews has been streamlined to allow for easy article sorting, team coordination, and extraction of information. Programs such as Covidence, a software initially developed for conducting Cochrane Systematic Reviews, helps those producing systematic reviews to manage records (Macdonald et al., 2016). Covidence was the program used to conduct the systematic review for this study.

Identification of Research Question

In order to properly construct the research question that was used to start the systematic review, the PICO format was implemented. Research questions need to be specific in formulation and the PICO format helps to identify the variables that must be included for the precise retrieval of clinical information (Schiavenato & Chu, 2021). “P” or population specifies the population of interest or problem to be addressed, and the demographics of this group (ex. “the age range, sex, presenting complaint, and history”) (Aslam & Emmanuel, 2010, p. 48). “I” represents the intervention and specifies the “plan to treat” the population (Aslam & Emmanuel, 2010, p. 48). “C” represents the “control or comparison intervention treatment” but is not applicable to all research projects so it may be omitted from the research question (Aslam & Emmanuel, 2010, p. 49). Lastly “O” or outcome specifies the desired effect of the outcome used to treat the population. When determining an outcome it should be “quantifiable, specific, valid, reproducible, and appropriate” (Aslam & Emmanuel, 2010, p. 48).

- Population: Hypertensive adult population in Sub-Saharan Africa
- Intervention: Evidence based interventions for medication adherence
- Comparison: Non implementable evidence based interventions for medication adherence
- Outcome:
 - Increased adherence to antihypertensive medication supported by managed or decreased blood pressure (BP) in patients
 - Implementable within the Sub-Saharan African population (implementation outcomes)

Research Question: Among the adult hypertensive population in Sub-Saharan Africa, what evidence-based interventions (EBIs) for medication adherence can be effectively implemented?

Search Strategy

After the formation of a research question a search strategy was built in order to conduct the search for relevant studies. The search strategy for the systematic review was created to represent the preestablished inclusion criteria. The search terms were placed in four groups: Sub-Saharan Africa, hypertension, medication adherence and evidence-based interventions (EBIs). Using PubMed MESH subject heading and keywords the search strategy was made more complex. The databases for the search of relevant studies included CINAHL, EMBASE, Global Index Medicus, PubMed/Medline, PsycINFO and Web of Science Biosis (All Databases). There were a total of two searches done for this systematic review. The first search was conducted on October 26, 2022, and an update was conducted on October 1, 2023. The registration for the review is with PROSPERO under the registration number (CRD42023360315), https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023360315.

Figure 5

Systematic Review Search Strategy

Date of last search

26 10 2022

Search Strategy

(blood pressure determination OR hypertensive OR hypertension OR high blood pressure OR systolic OR diastolic OR elevated blood pressure OR blood pressure monitoring) AND (evidence-based interventions OR health promotion OR evidence-based practice OR evidence-based health care OR evidence-based healthcare OR interventions OR uptake OR facilitators) AND (Medication adherence OR medication compliance OR patient adherence OR patient compliance) AND (Africa South of the Sahara OR Africa OR African OR Algeria OR Algerian OR Algerians OR Angola OR Angolan OR Angolans OR Benin OR Beninese OR Botswana OR Botswanan OR Botswanan OR Burkina Faso OR Burkinabé OR Burkinabés OR Burkinabe OR Burkinabes OR Burundi OR Burundian OR Burundians OR Cameroon OR Cameroonian OR Cameroonians OR Canary Islands OR Canary Islander OR Canary Islanders OR Canarian OR Canarians OR Cape Verde OR Cabo Verde OR Cape Verdean OR Cape Verdeans OR Central African Republic OR Central African OR Central Africans Chad OR Chadian OR Chadians OR Comoros OR Comoran OR Comorian OR Comorians OR Congo OR Congolese OR Democratic Republic of the Congo OR Djibouti OR Djiboutian OR Djiboutians OR Egypt OR Egyptian OR Egyptians OR Equatorial Guinea OR Equatorial Guinean OR Equatorial Guineans OR Equatoguinean OR Equatoguineans OR Eritrea OR Eritrean OR Eritreans OR Ethiopia OR Ethiopian OR Ethiopians OR Gabon OR Gabonese OR Gabonese OR Gambia OR Gambian OR Gambians OR Ghana OR Ghanaian OR Ghanaians OR Guinea OR Guinean OR Guineans OR Guinea Bissau OR Bissau-Guinean OR Bissau-Guineans OR Ivory Coast OR Cote d'Ivoire OR Ivorian OR Ivorians OR Kenya OR Kenyan OR Kenyans OR Lesotho OR Mosotho OR Basotho OR Liberia OR Liberian OR Liberians OR Libya OR Libyan OR Libyans OR Libia OR Madagascar OR Malagasy OR Madagascan OR Madagascans OR Malawi OR Malawian OR Malawians OR Mali OR Malian OR Malians OR Mauritania OR Mauritanian OR Mauritanians OR Mauritius OR Mauritian OR Mauritians OR Morocco OR Moroccan OR Moroccans OR Mozambique OR Mocambique OR Mozambican OR Mozambicans OR Namibia OR Namibian OR Namibians OR Niger OR Nigerien OR Nigeriens OR Nigeria OR Nigerian OR Nigerians OR Principe OR Reunion OR Rwanda OR Sao Tome OR Sao Tome and Principe OR São Toméan OR São Toméans OR Sao Tomean OR Sao Tomeans OR Senegal OR Senegalese OR Seychelles OR Seychellois OR Sierra Leone OR Sierra Leonean OR Sierra Leoneans OR Somalia OR Somali OR Somalis OR Somalian OR Somalians OR South Africa OR South African OR South Africans OR Sudan OR Sudanese OR Swaziland OR Swazi OR Swazis OR Tanzania OR Tanzanian OR Tanzanians OR Togo OR Togolese OR Tunisia OR Tunisian OR Tunisians OR Uganda OR Ugandan OR Ugandans OR Western Sahara OR Sahrawi OR Sahrawis OR Saharawi OR Saharawis OR Zaire OR Zairian OR Zairians OR Zambia OR Zambian OR Zambians OR Zimbabwe OR Zimbabwean OR Zimbabweans OR West Africa OR West African OR West Africans OR Western Africa OR Western African OR Western Africans OR East Africa OR East African OR East Africans OR Eastern Africa OR Eastern African OR Eastern Africans OR North Africa OR North African OR North Africans OR Northern Africa OR Northern African OR Northern Africans OR Southern Africa OR Southern African OR Southern Africans OR sub Saharan Africa OR sub Saharan African OR sub Saharan Africans OR SubSaharan Africa OR SubSaharan African OR SubSaharan Africans)

Identification of Relevant Studies

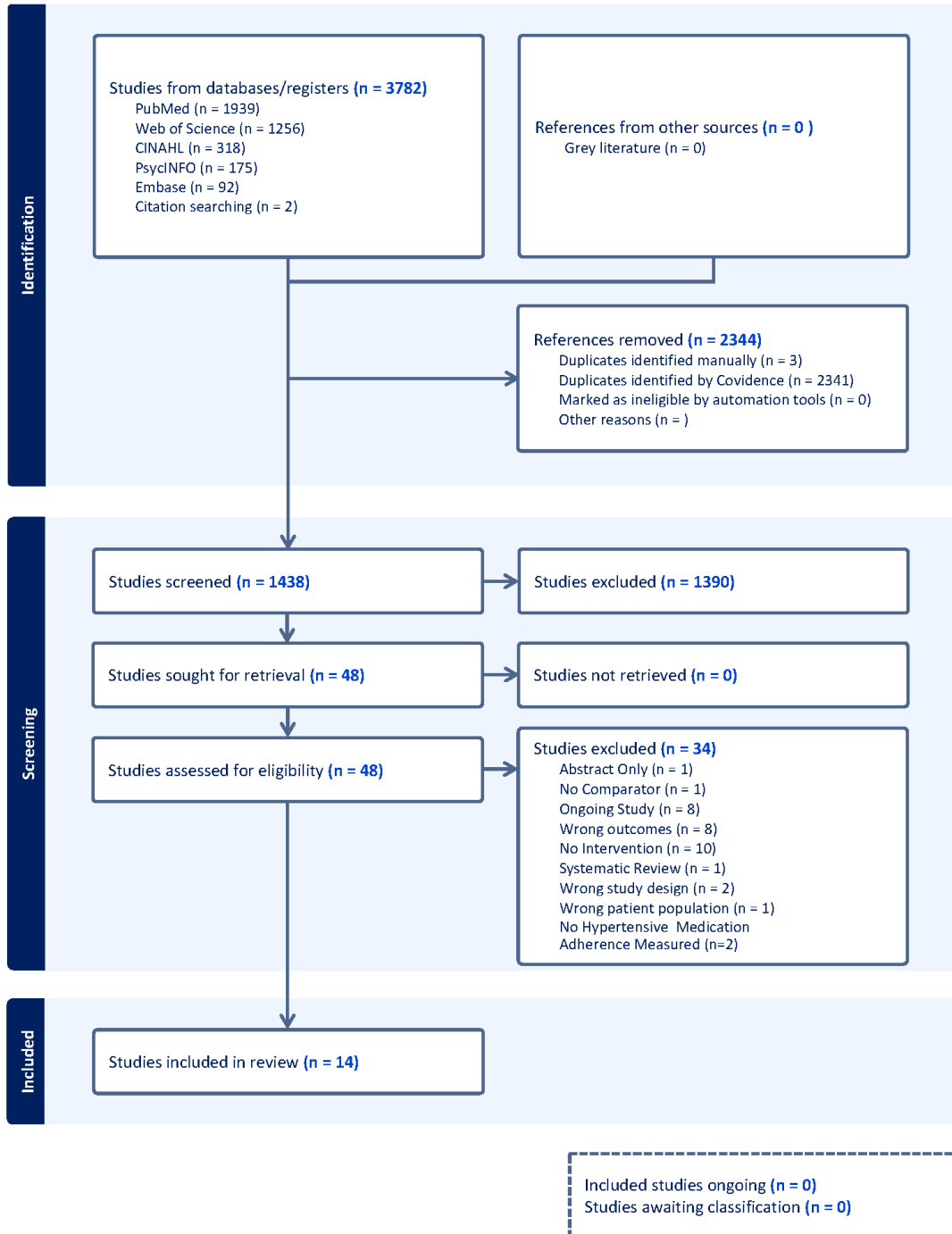
In order to identify relevant studies during the screening processes inclusion and exclusion criteria were set. The inclusion and exclusion criteria are as follows: 1) study published in Sub-Saharan Africa, 2) study addresses hypertension management, 3) study reports on intervention (s) that address an increase in medication adherence to antihypertensive medication, 4) study reports on implementation outcomes of the intervention(s), and 5) study is written in English. For the systematic review there were no restrictions placed on publication date during the search.

Selection of Relevant Studies

The selection of relevant studies was conducted in two phases of screening: title and abstract screening, and full text review. By using the article databases, the searches yielded 3,780 studies. In addition, 2 studies were added through a method called snowballing. Snowballing or reference checking is when the citations of articles are checked for relevant articles that may apply to the study. A total of 3,782 studies were imported for screening and extraction using Covidence. During the duplication process 2,344 studies were removed using Covidence. Title and abstract screening was done independently by two reviewers. A total of 1,438 studies underwent title and abstract screening for relevancy and 42 studies were found to be relevant. These 42 studies proceeded to full text screening and 14 studies were found to be eligible for inclusion in the systematic review. Any discrepancies during the screening process were resolved between the two reviewers and if necessary a third reviewer.

Figure 6

PRISMA-S flow diagram



Data Extraction

The 14 articles moved on to data extraction after meeting all inclusion criteria. The data extracted from the studies was based upon the information needed to fulfill the objectives of the review. To start, reviewers collected identifying information for the article each article which also included the type of study, the country in which the study took place and the aim of the study. Furthermore, the remaining information extracted from the studies included: “1) intervention type (ex. health education, mobile reminders etc.), duration, setting and description of population; 2) mean adherence post/pre intervention, mean adherence difference, scale/tool used to measure adherence; 3) mean BP (mmHg) post/pre intervention, mean BP difference; 4) implementation outcome(s), outcome assessment (qualitative, quantitative or both), challenges; and 5) service outcomes, outcome assessment (qualitative, quantitative or both)” (Egekeze et al., 2024, p. 7).

To identify outcomes in each of the studies, the various implementation elements were derived from Proctor, et al.’s Outcomes for Implementation Research and Gyamfi, et al.’s Assessment of Descriptors of Scalability. Studies that did not meet the predefined study inclusion criterion and review, were excluded.

Table 1

Implementation Outcomes Defined

Implementation Outcome	Definitions
Acceptability	Extent to which implementation stakeholders perceive a treatment, service, practice, or innovation to be agreeable, palatable, or satisfactory
Adoption	Intention, initial decision, or action to try or employ an innovation or evidence-based practice. Adoption may also be called “uptake.”

Appropriateness	Perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation or evidence-based practice to address a particular issue or problem.
Cost	Financial impact of an implementation effort. May include costs of treatment delivery, cost of the implementation strategy, and cost of using the service setting.
Feasibility	Extent to which a new innovation or practice can be successfully used or carried out within a given agency or setting.
Fidelity	Degree to which an intervention or implementation strategy was delivered as prescribed in the original protocol or as intended by program developers. May include multiple dimensions such as content, process, exposure, and dosage.
Penetration (Uptake)	Extent to which an innovation or practice is integrated within a service setting and its subsystems.
Scalability	Large scale improvement of clinical practice; reduce illness and disease prevention (impact); sustainment of intervention over time to decrease burden of disease;
Sustainability	Extent to which a recently implemented practice is maintained and/or institutionalized within a service setting's ongoing, stable operations.

Note. Definitions derived from “Eight toolkits related to Dissemination and Implementation”, by Gerke et al., 2017, Available from://sites.wustl.edu/wudandi; “Assessing descriptions of scalability for hypertension control interventions implemented in low-and middle-income countries: A systematic review”, by Gyamfi et al., 2022

Table 2

Service Outcomes Defined

Service Outcome	Definitions
Efficiency	The avoidance of waste, including waste of equipment, supplies, ideas and energy.
Safety	The avoidance of injuries to patients from the care that is intended to help them.
Effectiveness	Provision of services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).

Equity	Provision of care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location and socioeconomic status.
Patient-centeredness	Provision of care that is respectful of and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions.
Timeliness	Reduction of waits and sometimes harmful delays for both those who receive and those who give care.

Note. Definitions derived from “Implementation outcomes of policy and programme innovations to prevent obstetric haemorrhage in low- and middle-income countries: a systematic review” by Ryan et al., 2020

Quality Assessment

The risk of bias assessment for the studies identified in this review, were conducted by two reviewers (Chioma O. Egekeze and Chinenye R. Chukwu). The assessment tools included the Mixed Methods Appraisal Tool (MMAT) (Hong QN & M-P, 2018), the Cochrane risk-of-bias tool (Julian PT Higgins, 2023), and the JBI Critical Appraisal Tool for Quasi-Experimental Studies (Tufanaru C, 2017). The studies included in the review consisted of the following formats: RCT, non-RCT, and Mixed Methods. The tools were formatted into a Google Form to conduct the assessments. The studies were graded as low, high, or unclear risk of bias according to the categories established by the specific appraisal tool. Low indicated that the item was clearly explained, high risk indicated that the item was not clearly explained and unclear indicated the item was not identified.

Aim 2: Focus Group Methodology

Focus groups are often used as a “qualitative approach to gain an in-depth understanding of social issues” (O.Nyumba et al., 2018, p. 20). Information is collected from a group of participants that is representative of the broader population addressed in the study (O.Nyumba et al., 2018). Focus groups are a “popular method for assessing public experience and understanding of illness” (Wong, 2008, p. 256). They are an efficient tool for exploring “the

attitudes and needs of healthcare providers” (Wong, 2008, p. 256). Focus groups are usually executed in the format of a moderator engaging the selected participants. At times, variations of this method are applied such as having a dual moderator, a moderator who is also a participant or an online focus group. For this particular study the focus group will be conducted over the digital meeting platform Zoom. Due to the location of the participants, an online focus group is best suited for reasons such as cost and availability to travel.

The planning of a focus group consists of “formulating research questions, developing protocols” and “soliciting participants” (Wong, 2008, p. 256). The research question for this study is “From the systematic review conducted, what EBIs and implementation strategies for hypertensive medication adherence are supported by practitioners for implementation?” With this a discussion guide will be developed. The discussion guide is used assist the moderator to probe conversations during the session. The questions start of by being more general and then become narrower over time. The purpose of the guide is to anticipate other relevant questions that may be generated during the discussion (Wong, 2008). Recruiting participants can be achieved through several avenues such as “hospitals, community centres, via advertising in the local newspaper or by writing letters to local organisations” (Wong, 2008, p. 257). Additionally, participants can be recruited in something called a snowball technique which means that initial participants can recruit more people (Wong, 2008).

Study Population and Setting

According to The World Bank Databank, as of 2019, there are 0.2 physicians per 1,000 people in the region of Sub-Saharan Africa (The World Bank, 2019). The region also carries “25% of global diseases, and only 3% of health workers globally” (Chikezie et al., 2023, p. 1650). For the focus group study, I pulled from this population to gather health practitioners with

experience treating hypertension. These health practitioners could be doctors, nurses, pharmacists, community health workers, or any other type of health practitioner that directly treated and interacted with hypertensive patients.

Study Protocol & Procedures

For this study, participant recruitment was done through email, social media, and referrals. To conduct the recruitment process, an email letter, a flyer and a Google Form were created. The email introduced the study and welcomed eligible participants to fill the Google Form. The flyer properly depict the study, the health care professionals needed and their level of participation. The Google Form was created to collect the following information from the participants: name, age, occupation, years of experiences, setting of work, and experience. Recruitment started by the flyer being shared over the social media platforms of WhatsApp, Instagram, and Cohort Sistas. Additionally, my contacts in the field of hypertension and cardiovascular health shared the flyer and email to possible participants.

During the recruitment process there were a total of 43 health practitioners from Sub-Saharan Africa filled the Google Form to participate in the focus group sessions. The countries represented in the recruitment included Ghana, Kenya and Nigeria. The titles of these health practitioners included: doctor, nurse (community health nurse), community health worker, physician assistant, respiratory therapist, occupational therapist, midwife, dietitian, community mental health worker, medical laboratory specialist, direct support professional, and medical student. The most common practitioner type was nurse, 25.6%. The age range of the participants was from 22 to 53, with a median age of 27 years. In terms of experience, 20.9% had “More than 10 years”, 11.6% had “5-10 years”, 27.9% “2-5 years”, and 39.5% “1-2 years”. When it came to work environment settings, 55.8% of practitioners have worked in both rural and urban settings,

20.9% in rural settings, and 23.3% in urban settings. In regard to work facilities, 76.7% work in hospitals, 11.6% work in clinics, 7% community based, 2.3% research institute, and 2.3% at health centers.

Of the 43 individuals that requested to be a part of the focus group, 12 were selected, 6 participants in each group. In addition to the 12 selected, a total of 6 floaters were selected. Of the selected participants several were unable to join the study due to no response or last minute emergencies; family and work related. With the help of floaters and recruitment by referral a total of 11 individuals participated in the focus group study. These individuals represented two countries; Ghana and Nigeria. When the focus groups were conducted, a total of 3 sessions were held instead of the intended 2. The first session had 5 participants: 1 dietician, 2 nurses, 1 physician assistant, and 1 midwife. The second session had 3 participants: 1 medical doctor, 1 physician assistant, and 1 nurse. Lastly, the third session had 3 participants, represented as 3 nurses.

The focus group protocol included introductions and six questions, in which the participants took turns answering. There was not much deviation from the questions except for the moderator asking the participants to clarify their answers or elaborate on certain details. The questions were used to gather information on how the participants viewed the systematic review findings, how the findings related to their experience, what interventions they have encountered treating hypertension and how implementation can be improved overall. The focus group study sessions took place over the digital video software, Zoom. At the specified time participants logged in to collaborate and were recorded; both on video and audio. The focus group sessions were all scheduled for 1 hour and 30 minutes.

Table 3

Focus Group Questions

Focus Group Questions	What are your initial thoughts on the systematic review findings and how does it relate to your experience treating patients with hypertension in Sub-Saharan Africa?
	During your time as a healthcare professional in Sub-Saharan Africa were any of the mentioned interventions utilized and if so what were the successes and challenges in implementing them? (Mentioned Interventions – Pharmacist-led, Nurse-led, Mobile, Group, and Health education)
	From the assessed implementation outcomes, which outcome(s) carry the most impact when implementing successful care? (Assessed Implementation Outcomes – acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration (uptake), scalability and sustainability)
	In what ways can governments better support, national, regional and local health systems to ensure continuous access to medication and care for patients?
	As a health professional, have the following international guidelines for hypertension management (WHO HEARTs, PASCAR, WHF, etc.) or national guidelines for your country ever been referenced in your role and if so how were they implemented?
	What are your recommendations for improving quality of care for hypertensive patients in your country of work and Sub-Saharan Africa as a whole?

Transcription

After a focus group has been conducted, the next step is the “transcribing, analyzing data, and reporting the findings” (Wong, 2008, p. 256). For the focus group the recordings were transcribed using Zoom closed captioning, Notta Ai, and hand transcription by the primary researcher, Chioma Ogechi Egekeze. Due to the variety of accents and speaking structures, the primary researcher went back through all automated text to transcribe 3 hours of recordings.

Thematic Analysis

In order to analyze the transcriptions of the focus group, Atlas.ti was used. Atlas.ti is a qualitative data analysis software that allows researchers to identify themes within the context of

their research. This program works to help researchers in analyzing transcriptions qualitatively with features that allow for coding and the assignment of quotations. Researchers are able to develop themes and subthemes that help to develop a qualitative story with the data.

Thematic analysis is a qualitative research method that allows for “systematically generating robust qualitative research findings by identifying, analysing, and reporting patterns (themes) within data.” (Saunders et al., 2023, p. 1). This way of analysis is one of the most common and flexible when it comes to “health services research” (Saunders et al., 2023, p. 1). The type of thematic analysis conducted on this dataset was inductive. This means that themes were developed based off of the data and not off of a preexisting theory. Therefore, the themes developed from this data may in a way be not related to the questions asked. Additionally, in my approach to thematic analysis, there was no distinction between codes and themes. In many thematic analysis approaches, “these terms are used interchangeably, or coding is conceptualised as a process of allocating data to predetermined themes” (Braun & Clarke, 2020, p. 340). I took four steps in order to conduct the thematic analysis: get familiarized with the data, search for and generated initial themes, define themes and assign quotations, produce the report. In the first step, I became well versed with the data in order to gain an understanding of the responses. As I read across the three session transcripts, it became clear what some the similarities and differences were in terms of county, experience and profession. In the second step, I began to develop initial themes as I read through and read through the information that was shared. In the third step, after developing the initial themes, I began to define each theme in relation to the concept that it was describing and matching quotations to each theme (ex. Access to Care, Barriers to Implementation). The results of steps three (define themes and assign quotations) and four (produce the report) can be found the chapters four and five of this dissertation.

Conclusion

The methodology applied in this study was thoughtfully considered in order to accurately research the topic and provide findings that would have utility. The use of a systematic review methodology allowed for a deep inspection of the literature in relation to evidence-based interventions and their impact of medication adherence for hypertensive patients. With the findings of the systematic review, practitioners were able to relate to and assess the information found for use in their everyday practical care routines. The focus group methodology and thematic analysis, thus provide a qualitative assessment of how practitioners can make informed decisions and participate in the improvement of quality of care for hypertensive patients.

Chapter IV – RESULTS

This chapter presents the results of the systematic review and focus group conducted for this study. The systematic review results outline the studies that included evidence based interventions for the treatment of hypertension and their implementation outcomes. The focus group results present the experiences of health practitioners in Sub-Saharan Africa and their recommendations for implementation and improved quality of care.

Results of Aim 1: Systematic Review

Research Question: Among the adult hypertensive population in Sub-Saharan Africa, what evidence-based interventions (EBIs) for medication adherence can be effectively implemented?

Study Characteristics

During the full text review of articles, a total of 48 articles were identified. A total of 34 studies were removed for one of the nine reasons: “Abstract Only” (n=1), “No antihypertensive medication adherence measured” (n=2), “No comparator” (n=1), “No intervention” (n=10), “Ongoing study” (n=8), “Systematic review” (n=1), “Wrong outcomes” (n=8), “Wrong patient population” (n=1), or “Wrong study design” (n=2). Of these remaining studies, a total of 14 were included in the study and moved onto the extraction process.

The included studies were all conducted in Sub-Saharan Africa (n=14) and targeted adults that were diagnosed with hypertension or had experience a raised blood pressure. All interventions carried a positive effect on medication adherence and some had an impact on the patient’s overall blood pressure measurement. The countries included Ghana (n=2), Nigeria

(n=8), South Africa (n=1), and Uganda (n=3). The included studies took place in the following studies: Clinics (n=4), Community Based (n=2), Hospitals (n=3), Pharmacies (n=4), and Primary Health Care Facilities (n=1). Though there were 5 main intervention types, all of the 14 interventions carried a health education element. The intervention types included were Health education (n=3), Group (n=2), Pharmacist-led (n= 4), Mobile (n=3), and Nurse-led (n=2).

Pharmacist-led interventions applied the skills of pharmacists to address issues related to a patient understanding antihypertensive medication prescriptions (Ayogu et al., 2022). Nurse-led interventions allowed for personalized care, one on one counseling, and task shifting when advising patients about blood pressure measurement (Bolarinwa et al., 2019). Mobile interventions provided easily accessed health education, contact with providers, reminders for medication adherence (Mugabirwe et al., 2021). Group interventions introduced peer support and accountability with adherence clubs (Isiguzo et al., 2022). Health education interventions emphasized a patient's self-care and a patient's knowledge of hypertension for better quality of care (Ozoemena et al., 2019). Of the included studies, one was developed from an international guideline and treated hypertensive patients the comorbidity of HIV (Muddu et al., 2022) and another was developed from national guidelines (Oparah et al., 2006).

Study durations ranged from 30 days to 12 months, dependent upon the intervention used. The intervention types that influenced medication adherence the most were pharmacist-led, nurse-led, and mobile; these findings are similar to that of a previous scoping review (Onakomaiya et al., 2022). The three types of studies identified across the articles were randomized control trials (RCT) (n=4), Non-randomized control trials (Non-RCT) (n=6), and Mixed Methods (n=3). For one of the studies, no study type was described (Olubodun et al., 1990).

Medication Adherence Scales

Several medication adherence scales were used in the 14 studies. Each scale measured medication adherence differently while also accounting for limitations and bias. The scales used included: Morisky Medication Adherence Scale (MMAS) (n=5), The Visual Analogue Scale (VAS) (n=1), The Medication Adherence Report Scale (MARS-10) (n=1), The Self-Care of Hypertension Inventory (SC-HI) (n=1), and EuroQol Group 5-Dimension Self-Report Questionnaire (n=1). For the remainder of studies self-reporting was used (n=4) and one reported no scale type (Muddu et al., 2022). The MMAS assess nonadherence when it comes to “feelings of pressure and reasons other than forgetfulness” (Sharma et al., 2023, p. 4). There were several MMAS based on the number of items being measured such as modified MMAS-8 (n=1), MMAS-8 (n=3), MMAS-4 (n=1). The VAS is a one item scale that measures adherence frequency over time (Rickles et al., 2023). The MARS-10, measures 4 domains that deal with “behaviour”, “attitude”, “negative attitude”, and “overall adherence” (Ayogun et al., 2022, p. 5). The SC-HI measures the ability to self-care using 23 items and 3 subscales: self-care maintenance, self-care management and self-care confidence (Zhao et al., 2022). EuroQol Group 5-Dimension Self-Report Questionnaire measures quality of life using the following dimensions: “mobility, self-care, usual activities, pain/discomfort, and anxiety/depression” (Tripathy et al., 2015, p. 283).

Table 4*Intervention and Medication Adherence*

Article (Authors, Year, Country)	Intervention	Duration of Intervention	Pre - Intervention Medication Adherence (%)	Post - Intervention Medication Adherence (%)	Scale/Tool Used to Measure Adherence
Odusola et al., 2015, Nigeria	Group (health education, three group-based educational sessions)	6 months	50	72.1	MMAS-8 - Morisky Medication Adherence Scale *percentages represent high adherence
Spies et al., 2019, Uganda	Nurse-led & Group (adherence clubs, health education and weekly text messages)	9 months	70	77.10	Self-Care of Hypertension Inventory (SC-HI).
Mugabirwe et al., 2021, Uganda	Mobile (mobile application designed to facilitate self-monitoring, social support, and engagement in care)	30 days	0	88	Self-Reported
Ozoemena et al., 2019, Nigeria	Health Education (hypertension knowledge, prevention and self-care practices)	4 months	NR	NR	4-item Morisky Medication Adherence Scale (MMAS-4) or Morisky Scale
Bolarinwa et al., 2019, Nigeria	Nurse-led (home-based follow-up care, health education and counseling)	12 months	64.5	78.5	MMAS-8
Ayogu et al., 2022, Nigeria	Pharmacist-led (health education and training)	6 months	6.8	8.1	Medication Adherence Rating Scale (MARS-10)
Isiguzo et al., 2022, Nigeria	Group (Peer-support adherence clubs, medication adherence, BP monitoring, and monthly medication delivery)	6 months	41.4	57.3	Visual Analogue Scale (VAS)
Aguwa, C.N et al., 2008, Nigeria	Pharmacist-led (health education)	10 months	66.3	83.5	Self-Reported
Sarfo et al., 2019, Ghana	Mobile (health education, blue-toothed blood pressure measuring device and smartphone with an app to monitor measurements)	3 months	NR	NR	Medication possession ratio score & Modified Morisky Medication Adherence Score

Olubodun et al., 1990, Nigeria	Health education (hypertension management)	3 months	0	75	Self-Reported
Muddu et al., 2022, Uganda	Health education (lifestyle counseling)	6 months	NR	NR	NR
Bobrow et al., 2016, South Africa	Mobile (Information only vs. SMS-Text adherence Support [StAR] vs Usual care)	12 months	NR	NR	EuroQol Group 5-Dimension Self-Report Questionnaire
A. Marfo, and F. Owusu-Daaku, 2017, Ghana	Pharmacist-led (health education and adherence counseling)	6 months	NR	NR	Morisky self-reported scale
Oparah et al., 2006, Nigeria	Pharmacist-led (health education and counseling)	6 months	19	83	Compliance Survey

*NR = Not Reported

Implementation and Service Outcomes

The studies were assessed for implementation research outcomes were categorized according to framework developed by Proctor E, et al. (Proctor et al., 2011) and the scalability element developed by Gyamfi J, et al. (Gyamfi et al., 2022). All outcomes were assessed as qualitative methodology, quantitative methodology or a mixed methods approach.

Appropriateness

Appropriateness was the most reported outcome (n=10). The outcome was explained as; modification of intervention for specific needs (Bolarinwa et al., 2019; Odusola et al., 2015; Oparah et al., 2006; Ozoemena et al., 2019; Spies et al., 2019), the application of sufficient treatment for the improvement of outcomes (Aguwa et al., 2008; Muddu et al., 2022; Olubodun et al., 1990; Sarfo et al., 2019), and the similarity to other relevant findings (Mugabirwe et al., 2021).

Feasibility

Feasibility (n=9) was reported as “ease of use”, successful methods (Mugabirwe et al., 2021, p. 3), meaningful improvement (Muddu et al., 2022), and measurable outcomes even in a resource limited environment (Bobrow et al., 2016; Bolarinwa et al., 2019; Sarfo et al., 2019). Two studies highlighted how educating pharmacists (Oparah et al., 2006) and extending the scope of pharmaceutical care (Marfo & Owusu-Daaku, 2017) are feasible strategies for antihypertensive medication adherence.

Acceptability

In several of the studies, acceptability (n=7) was established with the engagement of stakeholders (Isiguzo et al., 2022), the willingness to participate (Aguwa et al., 2008; Mugabirwe et al., 2021; Oparah et al., 2006), and establishment of the consensus on an intervention (Muddu et al., 2022; Olubodun et al., 1990).

Cost

A total of seven studies (n=7) identified the cost outcome during implementation. Interventions that used educational sessions, proved to be little to no cost. Two studies (n=2) showed that group health education (Oduola et al., 2015) and pharmacist-led counseling (Oparah et al., 2006) were suited for low resource communities. An additional two studies found that text messaging interventions were low cost (Bobrow et al., 2016) and practical (Spies et al., 2019) for instilling health education and adherence. A study that implemented an adherence club determined that patients would be able to purchase medication at a lower rate (Isiguzo et al., 2022). The remainder of the studies that assessed for cost (n=2) had no or a negative impact in relation to cost. A mobile app intervention was associated with high costs in relation to medication and blood pressure measurement devices (Mugabirwe et al., 2021). Lastly, no

difference in medication cost was found between the intervention and control group in a pharmacist-led educational intervention (Ayogu et al., 2022).

Adoption

The findings of adoption (n=6) were described as; completion of the intervention program (Oduola et al., 2015), lifestyle modifications (Spies et al., 2019), improvement of disease outcomes (Muddu et al., 2022; Spies et al., 2019), and the establishment a standard (Ayogu et al., 2022). Of these studies, a study in Nigeria and one in Ghana (n=2) mentioned the benefits of a pharmacist centered intervention (Marfo & Owusu-Daaku, 2017; Oparah et al., 2006).

Scalability

Scalability was identified in several studies (n=5). One study in Uganda produced a medication protocol that was adopted by the Ministry of Health to form guidelines for hypertension management into HIV care (Bobrow et al., 2016). Additional studies mentioned how nurse-led interventions (Spies et al., 2019), reliable internet access (Mugabirwe et al., 2021), and for mobile interventions (Bobrow et al., 2016; Mugabirwe et al., 2021) were easily scalable in low resource settings.

Fidelity

Fidelity (n=3) was described in the studies as protocol alignment (Aguwa et al., 2008; Bobrow et al., 2016) and the success implementation as intended (Bolarinwa et al., 2019).

Sustainability

Researchers described sustainability (n=2) as an intervention creating positive outcomes over time (Aguwa et al., 2008) and the intervention being a component of primary healthcare (Oduola et al., 2015).

Penetration

Identified in one study (n=1), penetration was described as by the production of a BMI tool, educational resources, and the encouragement of pharmacists to implement change.

Service Outcomes

All studies (n=14) described effectiveness as a service outcome and showed that the interventions were impactful in executing positive outcomes. Researchers noted effectiveness as ensuring “ongoing relevance for the study participants” (Spies et al., 2019, p. 550), “statistically significant” changes (Marfo & Owusu-Daaku, 2017, p. 5), and improvement in medication adherence behavior. Patient-centeredness (n=8) was expressed as a patient’s satisfaction (Marfo & Owusu-Daaku, 2017; Oparah et al., 2006; Sarfo et al., 2019), empowerment (Isiguzo et al., 2022; Mugabirwe et al., 2021), needs (Oduola et al., 2015; Spies et al., 2019), and improved quality of life (Ayogu et al., 2022). Efficiency was shown in four studies (n=4) and was described as innovative systems (Bobrow et al., 2016) and a modified intervention for better interaction (Spies et al., 2019). Safety (n=2) was shown as addressing (Aguwa et al., 2008) and minimizing side effects (Muddu et al., 2022). Equity was identified (n=1) and spoke to the willingness of pharmacists to provide additional services at no extra cost (Oparah et al., 2006). Lastly, timeliness (n=1), was discussed as the simplicity of real-time and convenient instruments for measuring blood pressure (Mugabirwe et al., 2021).

Table 5

Intervention and Outcomes

Article (Author, Yr, Country)	Study Type	Intervention	Implementation Outcomes Identified	How was the implementation outcome (s) assessed?	Service Outcomes Identified	How was the service outcome(s) assessed?
Oduola et al., 2015, Nigeria	Pre-Post	Group (health education, three group-based educational sessions)	Adoption; Appropriateness; Cost; Sustainability	Qual & Quant	Effectiveness; Patient-Centeredness	Qualitative

Spies et al., 2019, Uganda	Mixed Methods	Nurse-led & Group (adherence clubs, health education and weekly text messages)	Acceptability; Adoption; Appropriateness; Cost; Scalability	Qual & Quant	Efficiency; Effectiveness; Patient-Centeredness	Qualitative
Mugabirwe et al., 2021, Uganda	Mixed Methods	Mobile (mobile application designed to facilitate self-monitoring, social support, and engagement in care)	Acceptability; Appropriateness; Feasibility; Scalability	Qual & Quant	Efficiency; Effectiveness; Patient-Centeredness; Timeliness	Qualitative
Ozoemena et al., 2019, Nigeria	Quasi-Experimental	Health Education (hypertension knowledge, prevention and self-care practices)	Appropriateness	Qualitative	Effectiveness	Quantitative
Bolarinwa et al., 2019, Nigeria	Unblinded Individual Open Randomized Controlled Trial	Nurse-led (home-based follow-up care, health education and counseling)	Appropriateness; Feasibility; Fidelity	Qual & Quant	Effectiveness	Qualitative
Ayogu et al., 2022, Nigeria	2-arm Parallel Single-blind Randomized Control Trial	Pharmacist-led (health education and training)	Adoption; Cost	Other: Qualitative & Quantitative	Effectiveness	Qualitative
Isiguzo et al., 2022, Nigeria	Mixed Methods	Group (peer-support adherence clubs, medication adherence, BP monitoring, and monthly medication delivery)	Acceptability; Cost; Feasibility; Scalability	Qual & Quant	Effectiveness; Patient-Centeredness	Qualitative
Aguwa, C.N et al., 2008, Nigeria	Non-randomized, single-site, crossover design	Pharmacist-led (health education)	Acceptability; Appropriateness; Feasibility; Fidelity; Sustainability	Qual & Quant	Efficiency; Safety; Effectiveness; Patient-Centeredness	Qual & Quant
Sarfo et al., 2019, Ghana	Two-arm pilot cluster Randomized Control Trial	Mobile (health education, blue-toothed blood pressure measuring device and smartphone with an app to monitor measurements)	Appropriateness; Feasibility	Qualitative	Effectiveness; Patient-Centeredness	Qualitative
Olubodun et al., 1990, Nigeria	NR	Health education (hypertension management)	Acceptability; Appropriateness	Qual & Quant	Effectiveness	Quantitative
Muddu et al., 2022, Uganda	Pre-Post	Health education (lifestyle counseling)	Acceptability; Adoption; Appropriateness;	Qual & Quant	Safety; Effectiveness	Quantitative

			Feasibility; Scalability			
Bobrow et al., 2016, South Africa	Single-Blind, 3-arm, Randomized Control Trial	Mobile (Information only vs. SMS-Text adherence Support [StAR] vs Usual care)	Cost; Feasibility; Fidelity; Scalability	Qualitative	Efficiency; Effectiveness	Qual & Quant
A. Marfo, and F. Owusu-Daaku, 2017, Ghana	Quasi-Experimental	Pharmacist-led (health education and adherence counseling)	Adoption; Feasibility	Qual & Quant	Effectiveness; Patient-Centeredness	Qual & Quant
Oparah et al., 2006, Nigeria	Non-Randomized Single-Site Study	Pharmacist-led (health education and counseling)	Acceptability; Adoption; Appropriateness; Cost; Feasibility; Penetration	Qualitative	Effectiveness; Equity; Patient-Centeredness	Qualitative

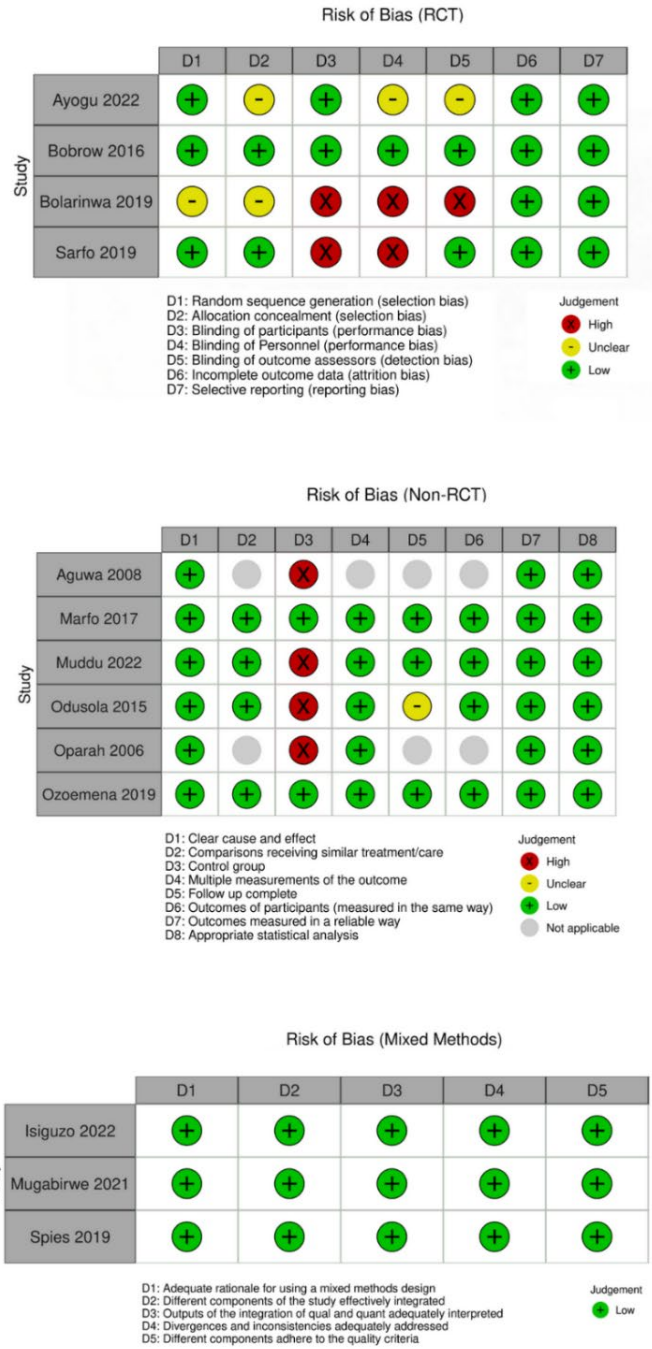
*NR = Not Reported

Risk of Bias Analysis

For the RCTs, all studies (100%) were classified as low risk of bias for incomplete outcome data (attrition bias), and selective reporting (reporting bias); however, 50% studies did not blind study personnel or participants. For the non-RCTs, the studies (100%) were classified as low risk for the following: clear cause and effect, outcomes measured in a reliable way, and appropriate statistical analysis. Unfortunately, 2/3 (66%) of the studies did not have a control. For the mixed methods, all studies (100%) were classified as low risk of bias across all five categories assessed.

Figure 7

Risk of Bias in Tabular Presentation

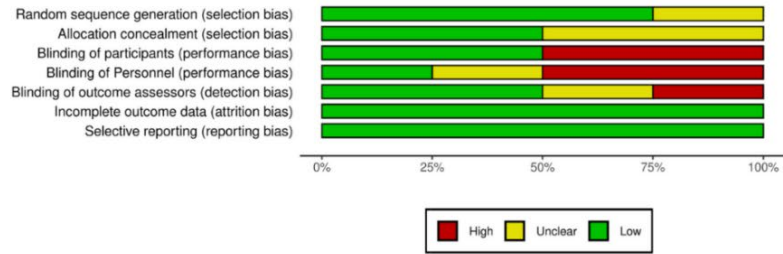


Note: Olubodun 1990 is the only study not included in any Risk of Bias analysis due to no identified study type in the article.

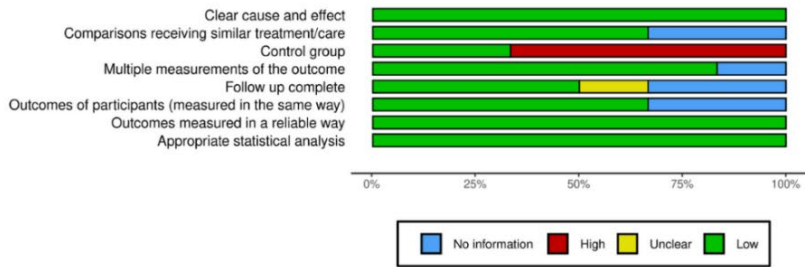
Figure 8

Risk of Bias in Graphic Presentation

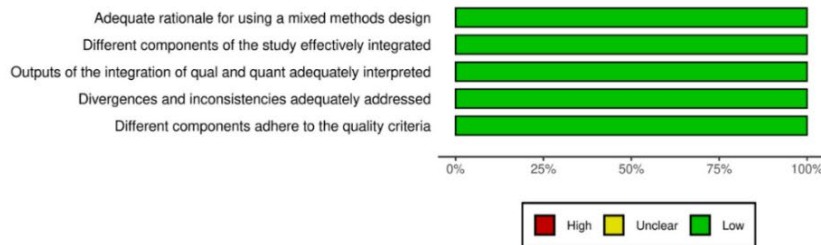
Risk of Bias (RCT)



Risk of Bias (Non-RCT)



Risk of Bias (Mixed Methods)



Note: Olubodun 1990 is the only study not included in any Risk of Bias analysis due to no identified study type in the article.

Results of Aim 2: Focus Group

Research Question: From the systematic review conducted, what EBIs and implementation strategies for hypertensive medication adherence are supported by practitioners for implementation?

Participant Characteristics

As shown in the table below, there were a total of 11 participants across the three focus group sessions. The participants represented two countries in Sub-Saharan Africa; Ghana and Nigeria. The participants carried the following occupations: medical doctor (n=1), physician assistant (n=2), nurse (n=6), midwife (n=1), and dietitian (n=1). Of the participants there were 4 women and 7 men.

Table 6

Characteristics of Healthcare Participants

Healthcare Practitioners	Medical Doctor	1	11
	Physician Assistant	2	
	Nurse	6	
	Midwife	1	
	Dietitian	1	

Thematic Analysis

The themes that were identified through the focus group dialogue are shown in the table below. These themes capture the experiences of the healthcare practitioners implementing hypertensive treatments and their recommendations for improved quality of care.

Table 7*Themes Established and Number of Supporting Quotations*

Themes	Number of Quotations
Alignment to Practice	2
Access to Care	21
Barriers to Implementation	22
Facilitators to Implementation	20
Government Participation	16
Workforce Availability	14
Drug Regulation and Policy	10
Tools for Quality Care	17

The information collected helps to answer the research question for aim 2: From the EBIs identified, which are accepted for implementation by health practitioners in Sub-Saharan Africa. During the focus group participants were asked a series of seven questions which are displayed in the table below. These questions dealt with the use of the identified EBIs, implementation strategies, experience using guidelines, government support and recommendations for quality of care.

Alignment to Practice

Health Practitioners have many experiences that are sometimes directly related to what is in the literature or not related at all. The practitioners in this study are individuals who have worked in both rural and urban settings during their time treating hypertension. The practitioners expressed that they had a “similar experience with” the findings of the systematic review.

Whether it was the intervention type or setting, the systematic review “was really in tune to what” they “normally experience in the work field.”

Table 8

Alignment to Practice

Theme	Selected Quotations
Alignment to Practice	<p>“So I’m not surprised, I have similar experience with your findings, what was captured in the systematic review.”</p> <p>“I realized that they were really in tune to what we normally experience in the work field.”</p>

Access to Care

Access to care was a widely communicated theme during the focus group discussions. The health practitioners described affordability, transportation burdens, and convenience as ways access to care can be influenced. One practitioner expressed that the affordability of hypertensive treatment would always be a point of concern for the average patient. This concern stems from a struggle to provide for basic needs, “talk of money to cater healthcare.” Financial support for “timely regular visits” or to “purchase the medication” needed to upkeep a treatment regimen was found to be a common pattern in the Sub-Saharan Africa region. Another aspect of affordability mentioned was the “insurance component,” which served to provide some but not all services free of charge in the countries represented. Many practitioners expressed that the national insurance schemes found in their countries have flaws when providing complete care and therefore “without insurance” care “should still be free.” Transportation burdens also played a role in limiting the accessibility of patients. The cost of transportation discouraged patients from traveling to receive care “especially in the rural areas where facilities are far away.” Some patients who were elderly, “they come with their younger ones” and must pay transportation for an additional person. Patients would “default treatment because of transportation” and “reduce

the progress in improving” their health. Besides the cost of transportation, “lack of routes” to health facilities and the availability of transport in certain areas also contributed to transportation burdens. Convenience was the subtheme with a positive sentiment in relation access. The health practitioners identified convenience as “bringing the hospital to the people” with the use of vans and sending “out nurses to go into the various communities.” Bringing the care to the patient or meeting them in a “venue” that was more convenient, provided more opportunities for adherence and removed the transportation burden. Additionally, the use of mobile technology for patients to “communicate with their caregivers,” allows for care to be performed while reducing “the number of visits to the hospital.”

Table 9

Access to Care

Theme	Subthemes	Selected Quotations
Access to Care	Affordability	<p>“So I think the government should just scrap the insurance component. So just take the insurance component. You shouldn’t have insurance before you can access anti-hypertensive medications. Even without insurance, it should still be free for you.”</p> <p>“We will always talk about cost, because of the living standard of the average Ghanaian. Even to come by a three square meal is very, very, very difficult. Not to talk of money to cater healthcare.”</p> <p>“they don’t even have money to access basic healthcare and timely regular visits for medical checkup, they don’t normally do it.”</p> <p>“most of these pharmacies and health centers, they don’t check blood pressure free of charge, and that is not good.”</p> <p>“Through the health education and the home visits, sometimes we come to find out that it’s all financial problems and complications. Because if you go to their doorstep and you ask them, why are you people not coming for your medication? They will just tell you; I don’t have money. My husband took the motorbike to the farm. Maybe my wife sent the motorbike to the market, that’s why I couldn’t come. Sometimes they</p>

		<p>always tell me that, oh, money is not there. This month, money is not there to come and purchase the medication”</p> <p>“some of these people per my experience they are in the rural setting, and they don’t have money, and they are walking around with high blood pressure.”</p>
	Transportation Burden	<p>“And the most of them because they are elderly or they are aged, they come with their younger ones. So they may even spend about 100 Ghana cedis before they get to their destination or to their nearest facility for their medications.”</p> <p>“especially in the rural areas where facilities are far away from the various village centers, patients tend to default treatment because of transportation”</p> <p>“the chief compounds and the health centers and all that, we can even make sure they get the anti-hypertensive medications as when needed or they should have them in stock so that these patients can get them easily from them without them traveling long distances to bigger facilities for these medications.”</p> <p>“So they have these difficulties coming all the way from their villages to the big city to come and then see a doctor for their medications.”</p> <p>“they will tell you, oh, where I’m coming from is far, the cost of transportation from where I’m coming from will be about close to maybe 50 Cedis in and out, just for one person.”</p> <p>“Now, most times there is lack of, lack of routes to the health center, there’s lack of transportation, low communication systems and the rest of them. So all these things hinder, all these things reduce the progress in improving the healthy life of these patients in Sub-Saharan region here in Nigeria”</p> <p>“there’s a community close to me, the roads link to the hospital, it’s very bad.”</p> <p>“those on transportation may be a distance for them to move from their villages to where the health center is a problem.”</p> <p>“Sometimes we do not have the means because in Northern region, transportation is not accessible like in the southern regions of the country.”</p> <p>“If you come for the medication like once a month, you will tell them they should come for the other months, they will not come. There will default, maybe two to three months. One day, you will be there and they will come. If you ask them, they will tell you they don’t have money for transportation,”</p>
	Convenience	<p>“So if one has a mobile intervention where they can communicate with their caregivers through this particular</p>

	<p>medium, they tend to reach their caregivers, their caregivers monitor their BP's or in this case BP's and then put in implementations whenever necessary and then so the number of visits to the hospital reduces.”</p> <p>“they can try and get these mobile vans and then get more healthcare personnel to go to these villages and then bringing the hospital to them, you get it, bringing the hospital to the people, if the people can't come, you bring it to them”</p> <p>“The government should also implement these nurse-led interventions that are being used for the antenatal care to other important non-communicable diseases like hypertension. I believe if the government sets out nurses to go into the various communities to increase the coverage of health education on these various illnesses, to also dispense drugs through them, sometimes people have difficulties coming to the various health facilities.”</p> <p>“So what we'll do is, we'll pick up a venue that will be convenient for everybody.”</p> <p>“So they can even set mobile clinics or mobile van, which will be sent to the various communities, especially the villages.”</p>
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Barriers to Implementation

When it came to addressing the implementation of the evidence-based interventions (EBIs), the health practitioners note that there are several barriers that prevent them from properly applying an intervention. These barriers were categorized into the following subthemes during analysis: Lack of Acceptance, Lack of Awareness, Cost, Medication Interactions, Misleading Information, Traditional Alternatives and Payment.

It was made known during the focus groups that many patients “are not even aware of their condition”. There are also individuals that are not fully aware of what hypertension is and take it as “a normal condition” and “that without medication they can live with it.” Patients also lacked acceptance of their diagnosis. One recommendation was that governments should “improve the literacy rates” because increased literacy effects a patient’s “acceptance” of their diagnosis and adherence. Religious beliefs were also linked to lack of acceptance as some

patients did not want to accept their diagnosis and receive medication. Lack of acceptance is sometimes influenced by the opinions of others. In some communities, hypertension is stigmatized so practitioners have utilized adherence “clubs” so that patients have a place to convene and talk to their peers about experiences.

Implementing an intervention also relies on how many resources are made available to health practitioners. Cost is not only a barrier for patients but also for the institutions providing care. It was mentioned in the focus group that cost has been a “constraint” when it comes to “trying to undertake such projects like health education and group intervention.” This overall has restricted practitioners in the quality of care and outcomes they can provide for their patients. The practitioners stated that patients would avoid adhering to medication “as a result of some small side effect.” Additionally, several practitioners expressed how men specifically would be concerned about the effect of the medication on their sexual activity. When questioned about not keeping to their regimen, “they will be giving you excuses that because of this issue, they can’t take the medication.” The spreading of misleading information was common during the implementation of group and peer to peer interventions. Some people in these adherence groups would encourage their peers that they had a solution that was better than the current care they were receiving for their hypertension. A hypertensive patient may say this worked for me “hence you to go and do the same thing.” This would lead to the breakdown of the group and negative adherence outcomes.

Traditional alternatives are a commonly sought option when patients do not agree with prescribed medicines or do not have the means to pay for medical care. “Traditional healers” are “quite well versed” in the culture of specific countries and communities and therefore are more relatable when patients seek care. With this relatability, they can “convince” hypertensive

patients “to go for their treatment instead” of taking on the evidence based medication from health practitioners. The treatment options provided “sometimes tend to contradict” orthodox medicine options and patients receive “herbs that have not gone through clinical trials to prove their efficacy and their safety.” Additionally, these traditional healers give “false information about the drugs”, which, in turn, negates the effects of health education efforts. The practitioners stated that when patients sought treatment from “traditional healers” there were alternate ways to pay that were not money. Their “their mode of payments” were more “flexible” for those seeking care and patients could pay with “their produce instead of money.” For example, “today they will bring a bucket of cassava and they can bring the rest later.” These methods were not “cheap necessarily” for patients but it was “appropriate for them.” Unfortunately, “patients tend to spend more there and then they don’t get treated.”

Table 10

Barriers to Implementation

Theme	Subthemes	Selected Quotations
Barriers to Implementation	Lack of Awareness	<p>“My initial thoughts, I have also come to realize that most of the patients are not even aware of their condition.”</p> <p>“So sometimes they take this as a normal condition. You don’t take it, you know. They believe that without medication they can live with it they will be ok.”</p>
	Lack of Acceptance	<p>“I think the government has to improve the literacy rates in the country. Literacy rates has a very great effect on the patients acceptance of the diagnosis and understanding the disease, which helps in adherence to treatment”</p> <p>“most of them even find it very difficult to accept that they are having hypertension and they are to take their medication for, maybe for life”</p> <p>“So it’s very difficult to understand that they are going to take anti -hypertensive for life. That’s quite new to them.”</p>

		<p>“if he had not accepted his condition, even though it was his first time, I wouldn’t have been able to also assist him to overcome the situation, and now he’s fine.”</p> <p>“I don’t want to check. They don’t want to know their reading. Yeah, and that is normal, especially in male patients because they wouldn’t want to know what’s wrong with them.”</p> <p>“like here I am working, it’s a Muslim community. And sometimes when they come to the health facility and we tell them we check your BP and we need to put you on medication they will tell you no. Sometimes they don’t accept. They just tell you Allah is in control”</p> <p>“But when you are seen every day going to the clinic and then you are going for hypertension medications, you are kind of seen as some in a different way. So we tried forming clubs so that they would be able to talk about some of these things and then to prevent the stigma that was going to come with hypertension in my community”</p>
	Cost	<p>“Cost has always been a constrained whenever we are trying to undertake such projects like health education and group intervention.”</p>
	Medication Interactions	<p>“And with the medication, from my experience, as a result of some small side effects of the medication, most of them don’t really adhere to their medication. As soon as we started getting the medication, then they’ll say it’s really having effects on the health”</p> <p>“And then for the men, for instance, as I said, most of them even think about their sexual activity and all that. So they will come, you tell them, this is the, your BPs are high, they should go ahead and then take their medication and all that. And they will be giving you excuses that because of this issue, they can’t take the medication.”</p>
	Misleading Information	<p>“But we realized that in the end, people were spreading false information amongst themselves. So because something worked for one person, they decided that anybody that tells them about that particular condition or that particular sign or symptom that happened to the person, they would say, oh, I did this, hence you to go and do the same thing.”</p>
	Traditional Alternatives	<p>“One challenge we have here in Ghana is that we have the traditional healers who are quite well versed in our culture and their treatment options sometimes tend to contradict ours and they tend to give herbs that have not gone through clinical trials to prove their efficacy and their safety but they are able to convince the patients, they are able to convince them to go for their treatment instead of the orthodox treatment we offer in the hospital.”</p> <p>“And they’ve been giving false information about the drugs, like what it does to their system whenever they take it, for instance, the men. They learn that when, they take those</p>

		<p>drugs, they'll be impotent. And due to that, they refuse to take the drug. And so they tend to consult the traditional healers in our community, you know, in Ghana here"</p> <p>"the traditional healers have so many impacts on the people around. So they will discourage people from taking the orthodox medicine."</p> <p>"They know that our ancestors used to use the herbs to treat patients"</p> <p>"I think we mentioned a particular challenge that's with those treating patients with the herbal treatment. I think the government needs to regulate that field."</p> <p>"They'll tell you they have medications for HBP, where when these people take their medications, the HBP will be cured and then they'll be free."</p> <p>"So these same patients will come to your room, you educate them, you talk to them and tell them all these things, but at the end, they'll go back to the rural areas, they'll go back home and then they'll be, they'll meet these herbal practitioners and they'll give them certain medications, telling them that after taking their medication, maybe in two months or so, their disease is going to be cured"</p>
	<p>Payment</p>	<p>"And their payments, their mode of payments are quite flexible. Some of the patients may be farmers and can pay with their produce instead of money, which they may lack. And they may pay in, they may pay in installments, perhaps today they will bring a bucket of cassava and they can bring the rest later. So their method is quite appropriate for the patients and that seems a little more attractive to them."</p> <p>"They are not cheap necessarily, but it's just appropriate for them because sometimes calculating the overall cost, the patients tend to spend more there and then they don't get treated."</p>

Facilitators to Implementation

There are several elements that facilitate successful implementation of interventions. These facilitators were represented in two subthemes: cultural appropriateness and health education. Cultural appropriateness explains that for an intervention to be well "appropriate" for a "particular group of people", the predominant culture, "beliefs", and "values" must be understood. The element of cultural appropriateness is well understood by "traditional healers"

and “herbal medicine practitioners;” “they are good at reaching out to the patients because they go along with the culture of the people.” For evidence-based interventions, practitioners should work to ensure the services rendered are “appropriate to the culture of the people” they are serving. Health education is another facilitator to implementation. Practitioners have stated that patients “have a lot of misconceptions about HBP” and through health education they get to know the reality of hypertension. In the region of Sub-Saharan Africa, “patients are quite used to these infectious diseases” and are not familiar with the lifelong treatment of hypertension. Without the proper education, patients are convinced that once they consume one course of hypertension medicine they are cured. Practitioners would like to educate whole communities on hypertension, especially “on the need to do regular medical checkups and screening”. Bring health education to “churches, mosques, schools” and “marketplaces” helps to build accountability in the community and establish earlier diagnosis of patients. “Putting more advocates on the television” and “giving out more flyers” is also another approach to address health education on a national scale.

Table 11

Facilitators to Implementation

Theme	Subthemes	Selected Outcomes
Facilitators to Implementation	Cultural Appropriateness	<p>“One has to know the people living in the particular area, the predominant culture, their beliefs, their values, and one needs to make the intervention appropriate to the particular group of people.”</p> <p>“I think my colleague on the other side talked about the traditional healers and the herbal medicine practitioners. They are usually good at reaching out to the patients because they go along with the culture of the people.”</p> <p>“And one reason for that is that they are well embedded in our culture, their way of, their intervention, the way of presenting their treatment is well understood by the local people. That’s why any local person would rather go for this than the orthodox treatment.”</p>

		<p>“I think every intervention should learn the culture and then be appropriate to the culture of the people who are rendering services to them.”</p>
	<p>Health Education</p>	<p>“They take the medications, when they run after the medications, they believe they are cured. So they need to be educated.”</p> <p>“And so through the health education system, it has helped a lot. And so we go to their houses, through home visits, health education in churches, mosques, schools, marketplaces, anywhere that you come across.”</p> <p>“I always deal with the health education aspect. Some of them have a lot of misconceptions about HBP. And they’ve been giving false information about the drugs”</p> <p>“And so through the health education, they get to know the reality of the medication that you have to be on the drugs for the rest of their life.”</p> <p>“Sometimes it’s difficult to understand it because there are no symptoms. Like down here malaria is very common. They know they will have a fever, they will know they’ll feel sick. But if you are hypertensive, you don’t have any symptoms.”</p> <p>“Again, with the health education, in my practice, I realized that non-adherence is mainly due to ignorance. Patients don’t know, especially with hypertension, down here, patients are quite used to these infectious diseases.”</p> <p>“putting more advocates on the television, giving out more flyers to create more awareness about the condition and then building the knowledge strength of the people.”</p> <p>“we now settle down to, you know, explain some things to them like help to educate them on the need for regular, let’s say, checking of your blood pressures without you having crisis or falling sick.”</p> <p>“Most of the patients we see, they are not aware, they don’t have knowledge about a lot of things, right?”</p> <p>“So they will stop taking the medication then in the next two months or a few time, they will come with complications, stroke, hypertensive heart disease and all that. So with the adherence, I think health education, health education, especially those are the rural community.”</p> <p>“And most of them to after we screen them and those who are not even having high blood pressure, we educated them”</p>

		<p>“now they’ve been sensitized well about the signs and symptoms of hypertension. So some of them, headache and dizziness, soon as they experienced the symptoms, they rushed to the facility.”</p> <p>“So I think there have to be some grants for establishing programs to educate the masses on the need to do regular medical checkups and screening”</p> <p>“Also for the people in the academia or in the scientific community, I think that we should create more educational programs to communities to increase their awareness of the condition and also encourage them to come for screening any time they see one or two symptoms.”</p> <p>“We shouldn’t choose a group of people who are having the conditions. Whether you have it or you don’t have it. We should educate the whole population or the entire community about it. So that when you come later and we tell you about the conditions, you will be able to accept it because you already have health knowledge and understanding on the conditions.”</p> <p>“We go there sometimes to teach them health education. Like we call them as a group They come from the various houses and we talk to them. Sometimes we ask them about their problems, why they are not coming”</p>
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Government Participation

The participation of the government is essential for consistent and reliable hypertensive care. Government participation was divided into three subthemes during analysis: stakeholder engagement, quality of care, and financial support. Financial support was composed of comments regarding the government covering the cost of hypertensive care. In the countries represented, the “national health insurance” schemes were criticized because “many” of the medications were not covered. This caused patients to struggle with upkeeping their treatment regimen due to incomplete prescription fills. “Free, frequent screening” and “provision of free mobile Wi-Fi at health centers” was recommended to alleviate due to the heavy cost burden on patients. Overall, there was a notion that “the government should fully fund hypertensive control programs” to alleviate “challenges in acquiring” medications. The participants stated their

support for partnering with Non-Governmental Organizations (NGOs) “to increase the reach” to rural communities with the use of “mobile vans.” NGOs can provide “medications,” help with “creating awareness” and “educate people, especially about hypertension”. This not only helps make services more accessible but additionally when NGOs collaborate with the government, the “cost aspect” of treatment can be covered in full for all patients. With “deliberate efforts” from the government it is also possible to improve quality of care. In Sub-Saharan Africa, it is common to hear of government officials and high wealth individuals “traveling outside their country to assess healthcare,” but it is never the same with others coming to the region. Practitioners expressed that it is time for quality of care “measures and mechanisms” to be implemented at healthcare facilities.

Table 12

Government Participation

Theme	Subthemes	Selected Quotations
Government Participation	Financial Support	<p>“I believe also that our national health insurance scheme needs to be improved to help cover for most of the medications used to the treatment hypertension. Many of them are not, the common ones are covered on the insurance scheme. Obviously the more expensive ones are not, which is understandable. I think it needs to be broadened up to include many of the poor communities so that they wouldn't have challenges in acquiring their medications.”</p> <p>“So, if the government can make an effort of reducing the cost of anti-hypertensives with insurance and making it feasible.”</p> <p>“the government should fully fund hypertensive control programs”</p> <p>“I also think the government can also help by organizing free, frequent screening for the aged”</p> <p>“So I think successive governments in Sub-Saharan African countries need to make a deliberate attempt to set aside a</p>

		<p>specific fund that will be used in the treatment and management of hypertension.”</p> <p>“government should include all the anti-hypertensives, they shouldn't just select some and then leave some”</p> <p>“Everything boils down to finances, especially undertaking a project it all requires stakeholders, the Ministry of Health, they have to come into play and form and make policies about how to get this implementation done.”</p> <p>“Another one is a provision of free mobile Wifi at health centers. Yeah, free mobile Wifi and data at health centers for proper communication and reach out.”</p>
	<p>Stakeholder Engagement</p>	<p>“So I think the government can support some NGOs that are really doing well in that aspect. My friend and his foundation are doing great job. They have a mobile van, that goes to rural areas in the Ashanti region of Ghana, where they educate people, especially about hypertension and diabetes.”</p> <p>“I think for me, the cost aspect as stated in your study, it makes it throw more light on it that it's about time we need to collaborate with various agencies, and then maybe opinion leaders or possibly government to maybe find special way of assisting patients who find themselves trapped in hypertension so that they can easily come out successful.”</p> <p>“I believe the government can support these various NGOs that are working hard to upscale and to increase the reach of healthcare into the various rural areas”</p> <p>“The government they should collaborate with NGOs so that they can do the cost.”</p> <p>“I recommend that the government, they should collaborate with NGOs, such as the World Health Organization and the World Heart Federation so that they can help support, for example, with the medications, creating awareness with the people, health education”</p>
	<p>Quality of Care</p>	<p>“You see, leaders need to take deliberate efforts in improving the quality of care for its members. You see, I've never heard the United States president traveling to Sub-Saharan African countries to assess healthcare. But in our part of the world, you always hear the ministers, the MPs, the CEOs traveling outside their country to assess healthcare. Why are they going there? It is because those people have put measures and mechanisms in place.”</p> <p>“So I think leaders need to take deliberate efforts to equip the various hospitals so that they will be able to give quality of healthcare to its members.”</p>

		<p>“Having the drug alone doesn't mean the problem is solved. Before you can give anti-hypertensive medication, you need to do a lot of labs before you can give anti-hypertensives. But come to our part of the world, a lot of the facilities, they don't have the logistics to do this; to give specific drug for specific conditions.”</p>
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Workforce Availability

Workforce availability in relation to hypertension in Sub-Saharan Africa was addressed in three subthemes: insufficient staff, task shifting, and capacity building. In the region, the ratio of trained staff to patients makes it difficult to receive one on one care. A practitioner gave an example of “a community of about 5,000 people” having “only one doctor or two doctors”. This ratio does not allow for “quality time” and “the necessary attention” for the patient, stating that “some might end up stop taking their medication”. Some of these limitations are due to lack of trained health professionals and the outflux of health professionals due to better opportunities abroad. There was a suggestion made that governments in the region can “train more nurses and doctors” in an effort to replace “those who have left.” Another way to address the workforce availability is by introducing task shifting. Task shifting allows for individuals in the health field to be trained in a specific task that will in turn create more efficiency when treating a large volume of patients. In the case that a “doctor is not around” or “a nurse is not around,” with task shifting a hypertensive patient can still be “cared for.” Additionally, capacity building is also needed for the health system as a whole to address the workforce availability and increase quality of care. According to the World Health Organization (WHO), capacity building is “the development of knowledge, skills, commitment, structures, systems and leadership to enable effective health promotion...[with] actions to improve health at three levels: the advancement of knowledge and skills among practitioners; the expansion of support and infrastructure for health promotion in organizations, and; the development of cohesiveness and partnerships for health in

communities” (DeCorby-Watson et al., 2018). From the experience of the practitioners, there was a need for more multidisciplinary or task shifting approaches at the higher levels of the health system. This essentially relates to there being more hands-on care when it comes to patient treatment. More training needs to be provided that is evidence-based and effective. hypertensive care. For health practitioners in this region, the health system “should implement all the evidence-based guidelines that are made available”. This will in turn improve “the techniques used” for hypertensive care implementation and improve “some of the medication adherence skills” that patients are attaining.

Table 13

Workforce Availability

Theme	Subthemes	Selected Outcomes
Workforce Availability	Insufficient Staff	<p>“you may also even get dieticians on board. You also get the pharmacist on board and then they will all come together to help these patients. But that's not what is happening in sub - Saharan Africa.”</p> <p>“And so, the government should train more nurses and doctors to place those who have already left the country so that they can occupy what those who have left were doing.”</p> <p>“We normally work in the rural community, where doctors are not willing to be posted.”</p> <p>“And even with the few ones that are aware, because they don't get quality time and then the necessary attention, some might end up stop taking their medication.”</p> <p>“Because if you come to my place like this, a community of about 5,000 people, we have only one doctor or two doctors. How can the patient get access to the doctor day in and day out?”</p>
	Task Shifting	<p>“A lot of health workers should be trained, not specifically nurses and doctors. But all health workers, whether they are nutrition officers, disease control officers, any health worker at the facility should be trained so that in case a doctor is not around, a nurse is not around, and then if a HBP patient comes to the facility, he or she can be cared for.”</p> <p>“in my facility, for instance, when you are the nurse, you are the doctor, you are the pharmacist”</p>

		<p>“For example, when it comes to a work as nurses, we are just allowed to take and record. Just like task shifting, taking and record the vital signs.”</p>
	Capacity Building	<p>“Secondly, I will say that more healthcare givers should be trained in these countries. We know that we do not have a lot of doctors, we have a physician assistant, we have nurses of various degrees, including community nurses that go into the community and then can implement interventions to help improve the care of a bit of patients in the country.”</p> <p>“And then also there's one thing about management of hypertension, that's the management is multidisciplinary. But when it comes to our part here in Sub-Saharan Africa, I would say it's just the tertiary facilities and then maybe some few secondary facilities where this multidisciplinary approach is being used. But when you get to the primary health level and then most of the secondary level, that's not what we see.”</p> <p>“So if it can be more feasible by bringing it down to the least level and then empowering the rural centers also by giving them on the job training or giving them capacity building to be able to give the initial treatment of hypertension.”</p> <p>“Because when you tell them now that their BP is high, they start panicking, they start panicking. So most of these people, most of these patients, we start to cool them down. We have assure them, we have a psychologist in our team.”</p> <p>“Also, I think that healthcare workers should also implement some evidence, or in fact, they should implement all the evidence-based guidelines that are made available, and they should abreast themselves with new guidelines as and when they come, to improve the care that we render to the patient”</p> <p>“gone through the literature review and we've seen some of the some of the techniques used and some of the medication adherence skills that you've used, which most of us don't really know and we are learning new things and we think that maybe going forward we might also implement in both urban and rural areas and then see how far it goes.”</p>

Drug Regulation and Policy

Issues around drug regulation and policy were expressed in the focus group. These issues were split into two subthemes, shortages and restrictions in relation to how medication is managed in the region. Anti-hypertensive medication shortages are a reoccurring issue in Sub-Saharan Africa. At some facilities shortages can be for as long as “one or two months” and a

“person might be asked to go to the next level for help with those medications.” Restrictions concerning the dispensing of medications by certain facilities was also a concern from the health practitioners. For example, “health centers” and “chief compounds are not allowed to give certain hypertensive drugs” like “amlodipine.” On the other hand, “hospitals at some levels are able to give all the hypertensive medications from calcium channel blockers and then to diuretics, inhibitors, and the rest.” One recommendation for giving lower level facilities more freedom for dispensing drugs was to have them keep “close communication with the various doctors in the district hospitals.” Otherwise, governments would need to provide “the accreditation” for giving out “anti-hypertensives” and initial treatments to these more rural facilities.

Table 14

Drug Regulation and Policy

Theme	Subthemes	Selected Outcomes
Drug Regulation	Shortages	<p>“There shouldn't be such shortage of medications. For instance, a patient might come to your facility and the person might not get those hypertensive drugs and the person might be asked to go to the next level for help with those medications.”</p> <p>“Most of the medications sometimes, as I said in our earlier submissions, the drugs are not always available.”</p> <p>“And then another thing is that even in the urban areas, you can be in a facility for more than one or two months, the drugs are not available.”</p>
	Restrictions	<p>“As I was saying, there shouldn't selective facilities which will provide medication for those HBP patients.”</p> <p>“But especially the health centers and the chief compounds. Those people should be given access so that they can prescribe or give anti-hypertensive drugs to patients, which will help them take their medication at the right time so that they don't default whenever their medication is finished.”</p> <p>“And also to even dispense their drugs there whilst they will be in close communication with the various doctors in the district hospitals”</p>

		<p>“But unfortunately, those at the rural areas are not covered because the facility level at the rural areas don't have the accreditation to give out the anti -hypertensive or to give the initial treatment of the anti-hypertensive drug.”</p> <p>“They should allow some of those small clinics or let me say in, that is how we call them, small clinics also give some of those medications”</p> <p>“when you are in a chief compound, you are not allowed to even give amlodipine at that level.”</p> <p>“chief compounds are not allowed to give certain hypertensive drugs. Health centers are not allowed to give certain hypertensive drugs. Hospitals at some level are able to give all the hypertensive medications from calcium channel blockers and then to diuretics, inhibitors, and the rest.”</p>
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Tools for Quality Care

Practitioners can provide better quality of care through the use of preestablished protocols or technologies that help the patient better control their condition. Guidelines, both international and national, provide a standard to diagnosing and treating hypertension. The World Health Organization provides guidance “when it comes to the treatment and management of hypertension” and some nations have “cardiovascular disease guidelines.” The recommendation from the focus group was that more health providers “should get trained to have access to the latest guidelines, especially evidence-based practices.” In terms of infrastructure, health facilities can work to provide more specialized care services such as a “unit” or “special clinic.” This tool for quality care would allow for patients to receive needed attention. Technology is another tool that can be used to increased quality of care. Technology such as apps, SMS messages and databases can help to track a person’s blood pressure measurements and conduct interactions with their health provider. With proper “information management” a patient’s information is analyzed over time and helps to make decisions around medication intake. Additionally, systems such as telemedicine assist with the “accessibility, quality and the affordability of health care.”

Table 15

Tools for Quality Care

Theme	Subthemes	Selected Outcomes
Tools For Quality Care	Guidelines	<p>“Yeah, the standard treatment guideline is helpful. And we have a national cardiovascular disease guidelines.”</p> <p>“Most of our health providers are not properly trained. So I recommend you should get trained to have access to the latest guidelines, especially evidence-based practices”</p> <p>“Sometimes we wait for the solution or response from the higher authorities, and it will not come.”</p> <p>“You see, when it comes to hypertension, in one or two occasions we've been to several workshops and then they will tell you the standards of a World Health Organization when it comes to the treatment and management of hypertension.”</p> <p>“You can't just check somebody's BP today and then like you just come out with your conclusion that the patient is having hypertension or not. No. There is a World Health Organization policy that states that you need to check the patient for at least not less than a week or two before you can maybe come out with your final conclusion that maybe the person is hypertensive or not.”</p>
	Infrastructure	<p>“When you come to the biggest or the highest level of a health facility, I think they have a unit for HIV, but they don't have a unit for hypertension and other conditions. So I think I'll recommend that they have a unit and get a special clinic for them, just like they attend to the retro patient's attentively. So that if there's a problem, they could also share, and then we help them resolve it.”</p>
	Technology	<p>“where the clients, the doctor would have the app and the clients would also have the app and then the clients could go to any pharmacy or anywhere they can assess the BP machine, check them, input them in the app, and then the doctor would review these BP's as time goes on, at some point in time, the patient would have to come to the clinic and the doctor would adjust their medications based on the inputs they put in.”</p> <p>“I think we need to implement several other interventions, through the SMS, through mobile applications, through mini vans, reaching out to various remote areas. We have to reach out as much as we can to our people.”</p> <p>“Many patients are lost to follow up during treatments. So patients treated with hypertension should be in some form of a database. So they can be called in at any point where we realize that they are defaulting treatments.”</p>

		<p>“Okay. National cardiovascular diseases guidelines. And this national cardiovascular disease guideline has an app on play store and then the iPhone one. It's called Akuma Care. And that is designed after the national guideline for cardiovascular diseases. So they are the main guidelines we use for our management of hypertension.”</p> <p>“Another recommendation is to implement strong health information management to improve the quality of care. One of these health information systems. It's like patient data collection and analysis. We should know, we should keep a very good records of hypertensive, non-hypertensive patients, and the number of hypertensive patients we see in a particular month or in a year to have prompt and good health information system.”</p> <p>“Yeah, telemedicine, like I said earlier on. So it may improve the management of hypertension by increasing the accessibility, quality and the affordability of health care”</p> <p>“And also e -health, use of text messages, emails and the mobile apps. I also recommend that too, it makes it easier for communication and to curtail hypertension.”</p> <p>“There are some communities, they don't even have network connection, not even talk of when educating them or giving them education, radio connection for FM station, they won't take care of it to know they have to get access to healthcare.”</p>
	Follow Up	<p>“We should also support patients for self -management at home. Setting up a system to ensure patients follow up care after clinical encounter.”</p> <p>“We encourage them on the need to follow up care.”</p> <p>“The need for follow up care, e -health and telemedicine.”</p>

Chapter V – DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

The purpose of this study was to identify the implementation elements of effective, evidence-based interventions for successful treatment and improved life quality of hypertensive adults in Sub-Saharan Africa, with the input of healthcare stakeholders.

This chapter begins with a discussion of the key findings from both the systematic review and focus group. The chapter goes on to discuss strengths and limitations, and implications for policy, public health and research before concluding. The final portion of this chapter presents recommendations for future research.

Discussion

The systematic review study has shown that there are many interventions that are implementable and efficient for improving medication adherence and hypertension management. For this review, we assessed studies for implementation outcomes to identify the important collaborations needed to provide quality care for hypertension across countries.

There are several key points that can be made from the analysis of this review. First, the review established that there is a need for the task shifting of health professionals, such as, pharmacists and nurses to properly address the lack of coverage (Bolarinwa et al., 2019). The studies show that patients improve from one on one interactions with health professionals, or group interactions that involve health education. Pharmacist-led and nurse-led interventions are essential for providing more established and comprehensive care for hypertensive adults. Second, health system funding should implement increased support for these individuals to do their jobs effectively. There are also issues to address on the national level. In Uganda, for

example, a study protocol was adopted into national guidelines for hypertension treatment (Muddu et al., 2022). Third, several international agencies, such as, the World Health Organization (WHO), the World Heart Federation (WHF), and the Pan African Society of Cardiology (PASCAR), have created hypertension treatment guidelines for implementation in Africa. Unfortunately, only two studies referred to guidelines when forming the intervention for implementation. Without guidelines, evidence-based interventions (EBIs) that work to improve disease burdens are difficult to implement.

Some challenges that were identified included: maintaining patient engagement after the improvement of blood pressure, lack of access to resources on a consistent basis, and expenses associated with the intervention (Mugabirwe et al., 2021; Olubodun et al., 1990). After the measured improvement in blood pressure, patients were often lost during the follow up process; this being due to poor telecommunication and a patient's perceived change in need to treatment (Isiguzo et al., 2022; Marfo & Owusu-Daaku, 2017). Importantly, this review has shown that health education is an essential element for medication adherence and hypertension management. A possible solution is for health education to be expanded upon and include the importance of continued care. Additionally, several studies had mobile application or a texting element as part of implementation. Though mobile devices are convenient, having access to stable internet connection is an issue. Finally, the challenges of cost applied to medications, tools for hypertension management, and the salary of professionals for implementing interventions were also discovered. For these challenges, the collaboration of stakeholders would be of utmost importance. Governments and ministries of health would be ideal collaborators because of their capacity to take on challenges financially. All of these studies took place in Low-Middle Income Countries (LMICS) and noted that the communities where the interventions were applied were

low resource. If national health insurance could cover with medication cost and provide free mobile data, the scalability of the evidence-based interventions could increase.

The focus group study provided insight to the perspectives of health practitioners who treat hypertension in Sub-Saharan Africa. The participants shared that the literature was accurate in depicting their experience in the field. Though some admitted that there were techniques and interventions they were unfamiliar with, their reception of the systematic review findings were positive.

“Access to Care” for patients was described as affordability and transportation burdens. The practitioners explained that patients were at a disadvantage in relation to accessing care due largely to financial burdens. In some cases, the burden was in relation to the cost of continuously purchasing medication and in others it was in relation to not being able to afford transportation. Both scenarios deterred patients from seeking care in a timely matter. “Barriers to Implementation” was described as lack of awareness, lack of acceptance, cost, medication interactions, misleading information, traditional alternatives and payment. All of these were factors that prevented practitioners from effectively implementing care. There were several patients who were not aware of their hypertensive status and others refused to accept their diagnosis. These factors combined with false information about treatment, contradicting traditional medication alternatives and medication interactions would cause patients to default on their medication adherence. Additionally, patients preferred payment options that included a bartering system while some practitioners had not received resources from their employers to implement the interventions in their specific community.

“Facilitators to Implementation” included cultural appropriateness of the intervention and health education. Both of these aspects are essential to providing care for patients that will make

a lasting impact. Practitioners expressed the fact that patients were not well versed with hypertension and needed information in order to adhere to medication and treatment. Additionally, the implementation of the intervention had to be culturally appropriate or many would seek other options for care that fit their cultural norms.

“Government Participation” was described as financial support, stakeholder engagement and quality of care. During the recommendation segment of the study, the practitioners advocated for the importance of governments making substantial contributions in an effort to improve patient health outcomes. Partnerships with Non-Profit Organizations was expressed due to the positive impact they are having in several remote community. By encouraging stakeholder engagement, more people could receive care with waiting for governments to implement actions. Additionally, the participants supported the concept of governments providing more financial support to cover health care and the removal of national health insurance schemes.

“Workforce Availability” was described as insufficient staff, task shifting and capacity building. The focus group conversations confirmed the evidence found in the literature in relation to the lack of healthcare workers in the region. Many facilities have found success in task shifting in order to compensate for the loss of trained healthcare workers. Lastly, the practitioners urged health facilities to be more equipped so that all staff would be updated and trained with the latest evidence-based guidelines.

Strengths and Limitations

There are several limitations that must be noted when it comes to the review. The first limitation is that several studies used for this systematic review had small sample sizes. With this it can be difficult to have a realistic understanding of these interventions and their implementation on a larger scale. The second limitation was the reporting of medication

adherence on various scales of differing measurements. Though each scale provided a measure of adherence, the tools were not consistent. This can make it hard to get an accurate measure of medication adherence.

In relation to the focus group, there were several limitations as well. The first limitation was that even after a successful recruitment phase for participants, many did not respond. I found that emailing participants was not the most effective method of communication. Instead, the use of WhatsApp was more effective in reaching participants in a timely manner. For future research, all communication should be done through the use of WhatsApp. The second limitation was connectivity to the internet. The focus group was conducted over the Zoom platform and though participants were able to join many could not use their video functions and people often dropped from the call. Buying data and connecting to the internet can often be expensive for many Sub-Saharan Africans. Due to the region, I would suggest that any future focus groups be conducted in person. The third limitation is the limited representation of countries in the Sub-Saharan Africa region. There were over 40 more nations not represented in the study due to the individuals that were recruited and their backgrounds. This limits the information gathered and does not accurately represent Sub-Saharan Africa as a whole.

Despite these limitations, the review had several notable strengths. Most notably, the process in which this systematic review was conducted was rigorous and in accordance with the PRISMA-S standards. The studies included used detailed data collection methods to thoroughly inform the implementation of their intervention. This allowed for significant input to further adopt and scale said interventions. Additionally, a risk of bias assessment was conducted. With this assessment, the quality of the research was clearly established. The focus group also had strengths to note. One strength is that the study provided detailed firsthand accounts of

practitioners. Another strength is that there was a variety of occupational backgrounds represented in the study. This helped to provide insight of what occurs at the different levels of the healthcare systems in the region. Also, some professionals had experience working in either an urban setting, a rural setting, or both.

System Level Interventions

When looking collectively at the data from both studies, it is evident that system-level challenges are a recurring issue. With just the implementation of individual level interventions, only the patient issues are being addressed. Successful medication adherence for patients spans across individual level interventions and requires consistent systemic support. Thus, the successful implementation of individual-level interventions requires a fully supported healthcare system that is able to render high-quality care consistently. Unfortunately, the systems for treatment support in this region lack adequate financing and infrastructure. If these areas were properly addressed and more adequately resourced, patients would have greater success with maintaining their medication adherence. The system level interventions would have to address the following: the cost of medication and tools for care, the cost of transportation, healthcare worker salaries, the upkeep of health facilities and city planning for roads.

A key question in addressing this issue would be, who are the stakeholders that can assist in implementing system level interventions for the healthcare systems in the region? During the focus group sessions, the notion of incorporating nonprofits to fill the healthcare gap for remote areas was supported, but this is just the start. Government officials and lawmakers would have to join the conversation. These are individuals who can help to write policies that address quality of care standards specifically for hypertensive patients. Additionally, we can engage economists as stakeholders to advise on the best ways to fund and support our healthcare systems. Ultimately, it

will take several stakeholders from different specialties to address the systemic issues effecting the implementation of EBIs for antihypertensive medication adherence.

Implications for Policy, Public Health, and Research

When it comes to policy, this study may inform appropriate approaches for the implementation of evidence-based care in the region of Sub-Saharan Africa. Implementation science establishes that it takes more than just an effective intervention to ensure uptake. This study assessed the implementation outcomes of several evidence-based interventions and presented that there are several challenges that must be addressed through policy in order to see a change.

When it comes to public health, effective implementation approaches can lead to a reduction of the prevalence of hypertension in the region and help to smoothly run health systems.

When it comes to research, there is a need for the standardized measurement of antihypertensive medication adherence. The studies used different scales to measure medication adherence and each scale had criteria on what needed to be accounted for when measuring adherence. This makes it difficult to compare medication adherence across studies. Additionally, there is the need for larger studies that incorporate the experiences of health practitioners. Health practitioners are where treatment starts and they their opinions are highly valuable.

Conclusions

This review was able to identify measurable implementation outcomes for the EBIs found in the literature. To properly address medication adherence for hypertensive adults in SSA, stakeholders need to commit to addressing the challenges that were emphasized in the literature.

The focus group was able to identify tangible actions that can be feasibly implemented in order to improve antihypertensive medication adherence in the region. The practicality of the evidence-based interventions found in the literature was either established or dismissed by the health practitioners who had participated in the focus group study.

Overall, this study has shown that implementation is not as easy as copy and paste, but instead researchers must take into consideration how healthcare systems function as a whole. International and national guidelines provide excellent guidance for implementing evidence-based care but may need to be adjusted in order to cater to the population in need. Practicality is the true measure of success and countries should ensure that the interventions are implemented in a way that is culturally relatable.

Recommendations for Future Research

There are several challenges when it comes to addressing antihypertensive medication adherence in Sub-Saharan Africa, and the following recommendations take a multidisciplinary approach to the needed actions.

Many of the themes and issues established from the systematic and focus group studies, stem from a lack of infrastructure, a lack of coordination and a lack of financial resources. When addressing the state of the health system in the region of Sub-Saharan Africa, one must look to systems in the region as a whole. Poor management of resources, lack of security and the state of livelihood for the average individual in this region all have an impact on how healthcare is delivered. “Government Participation” was supported by the health practitioners in the study. Governments are the ruling and decision making bodies in countries and it is their responsibility to establish healthcare systems that reduce morbidity and mortality rates in their respective

countries. To further improve the implementation of evidence-based interventions for medication adherence in Sub-Saharan Africa, the following recommendations are made:

1. Effective Training and Job Security

All health professionals treating hypertensive patients in the region should have the necessary training to treat patients in a way that is consistent with international and national standards. The care that one receives from a practitioner should be the same at all levels. Quality of care should be high no matter the level of healthcare facility. Additionally, all practitioners should be provided with a livable wage, so as to encourage working in the region. Many health practitioners have emigrated due to poor working conditions and lack of job security.

Governments should create incentives for those who are health practitioners. Additionally, those pursuing a health related degree should be offered educational support a secured position upon graduation.

2. Stable Funding for Healthcare

Funding was one of the reoccurring challenges when it came to implementing care for hypertensive patients. A majority of patients in the region do not earn a livable wage and therefore do not have additional money to contribute to medical care. Additionally, national health insurance schemes do not do well to cover the complete expense of care for patients. Also, health practitioners in some counters encounter funding issues in relation to implementing interventions. Overall, there should be stable funding for healthcare. Countries in Sub-Saharan African should consider ways to fund universal health care for all. This can be done by governments responsibly allocating annual funds for medication, staff salaries, and the upkeep of infrastructure. With stakeholder engagement, governments can work with Non-Profit Organizations to find ways to increase coverage of care. Often times various Non-Profit

Organizations are operating in countries at the same time and conducting similar work but not in communication with one another. Governments can assign Non-Profits to certain regions where infrastructure and resources have been a challenge. In this way gaps of care can be addressed while the government works through long-term economic solutions to improve healthcare in the country.

3. Standardized Evidence-Based Care

Evidence-based care is an effective way to ensure patients will achieve their health goals and live a healthy life. Governments should work with practitioners and health facilities to inquire about the effectiveness of certain methods and interventions. International guidelines can be applied in this region, but it is up to the stakeholders to determine if those methods are best suited for the population. By standardizing care, patients will not have to worry if the care they are receiving at a tertiary facility is lower in quality to that of care in a primary facility.

4. Culturally Competent Educational Initiatives

Culturally appropriate interventions are necessary to achieve the desired outcome in a community. Through the focus group it was established that many patients would opt to go to traditional healers because they were more relatable. Health practitioners and health systems need to create materials and media that provides information to patients in a way that is relatable. This may mean sharing information in different languages, using storytelling, or even just showing images and graphics that accurately depict the population. Additionally, individuals in this region are familiar with the treatment of communicable diseases such as malaria and typhoid to name a few. These are diseases that are non-chronic and often cured with a course of medication. Since hypertension is a chronic condition, treatment looks different in the aspect that

it is long term. This needs to be accurately communicated as well so that patients are adherent to their medication over time and are going for frequent checkups with their practitioners.

5. Larger Focus Group Study

The health practitioners who participated in the focus group study, were excited to share their experience and were adamant about seeing change when it came to quality of care for their hypertensive patients. Many of the practitioners even gave feedback that they appreciated the monetary award but that it wasn't necessary for their participation. These health practitioners are stakeholders and decision-makers in their communities, nations, and region. They work firsthand to help patients achieve their goals in relation to antihypertensive medication adherence. They should carry more influence in the decision making of government policies and guidelines. A more in depth focus group study can be conducted to gather more information on how medication adherence interventions are implemented in order to further push governments to change quality of care for patients.

The focus group sessions should take place across as many countries in Sub-Saharan Africa as possible. When planning practitioners with experience in either rural or urban regions should be considered. Due to the challenges that were experienced using a digital video platform to conduct the focus groups, the groups should be conducted in person. Until network infrastructure and costs are addressed in the region, it will be difficult to effectively conduct this study online. To recruit for the focus groups, WhatsApp should be used in addition to partnering with facilities. Another recommendation in conducting this larger focus group session, would be providing more language options for the practitioners to choose from. Though many countries in Sub-Saharan Africa have English as an official language, many participants may find it easier to fully express their sentiments if they are more fluent in a native tongue. During the focus group

study, individuals with higher levels of education (i.e., physicians) were more confident expressing their ideas in English than other providers. Some participants who were not fluent in English, took a longer time to fully express their thoughts. By offering more language options, more transcriptionists will be required to properly assess the data.

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Appendix A – IRB Approval Letter

Attachments:

- Informed Consent IRB - C.O.Egekeze.pdf
- Expedited Review Approved by Chair - IRB ID: 24-187.pdf



Teachers College IRB

Expedited Approval Notification

To: Chioma Egekeze
From: Justin Brown, Research Compliance Manager
Subject: IRB Approval: 24-187 Protocol
Date: 01/19/2024

Please be informed that as of the date of this letter, the Institutional Review Board for the Protection of Human Subjects at Teachers College, Columbia University has given full approval to your study, entitled "Assessing Implementation Outcomes To Address Antihypertensive Medication Adherence in Sub-Saharan Africa: A Systematic Review and Focus Group Study," under **Expedited Review** on 01/19/2024: Category (6) Collection of data from voice, video, digital, or image recordings made for research purposes

The approval is effective until **01/18/2025**.

The IRB Committee must be contacted if there are any changes to the protocol during this period. **Please note:** If you are planning to continue your study, a Continuing Review report must be submitted to either close the protocol or request permission to continue for another year. Please submit your report by **01/04/2025** so that the IRB has time to review and approve your report if you wish to continue your study. The IRB number assigned to your protocol is **24-187**. Feel free to contact the IRB Office (212-678-4105 or irb@tc.edu) if you have any questions.

Please note that your Consent form bears an official IRB authorization stamp and is attached to this email. Copies of this form with the IRB stamp must be used for your research work. Further, all research recruitment materials must include the study's IRB-approved protocol number.

As the PI of record for this protocol, you are required to:

- Use current, up-to-date IRB approved documents
- Ensure all study staff and their CITI certifications are on record with the IRB
- Notify the IRB of any changes or modifications to your study procedures
- Alert the IRB of any adverse events

You are also required to respond if the IRB communicates with you directly about any aspect of your protocol. Failure to adhere to your responsibilities as a study PI can result in action by the IRB up to and including suspension of your approval and cessation of your research.

You can retrieve a PDF copy of this approval letter from Mentor IRB.

When your study ends, please visit the IRB Mentor site. Go to the Continuing Review tab and select "terminate" from the drop-down menu.

Best wishes for your research work.

Sincerely,
Justin Brown,
Research Compliance Manager
askirb@tc.edu

Appendix B – Study Recruitment Email

Hello,

My name is Chioma Ogechi Egekeze, MPH. I am a doctoral candidate at Teachers College, Columbia University, where I am undertaking my dissertation research project on hypertension and medication adherence, under the supervision of Professor Dr. John Allegrante.

You are invited to participate in this research study called “Assessing Implementation Outcomes To Address Antihypertensive Medication Adherence in Sub-Saharan Africa: A Systematic Review and Focus Group Study.”

My dissertation seeks to determine which evidence based interventions (EBIs) for antihypertensive medication adherence are supported by practitioners for implementation in Sub-Saharan Africa. **Your participation in this study will provide a clearer understanding of a health professional’s perspective on the practicality of implementing said effective interventions in order to:** 1) improve quality of care for patients and 2) establish useful guidelines that can be used across national health systems. This study has been approved by the Teachers College Institutional Review Board.

During the focus group you will be asked to discuss your views on the provided systematic review and your experience as a health professional treating hypertension in Sub-Saharan Africa. The questions that will be asked during the focus group will be provided prior to it taking place.

You will be compensated \$10 USD for your participation at the end of the focus group study. Participants must complete the focus group in order to receive the \$10 for participation. **To express interest in this study please take 10 minutes to fill out the recruitment screening form** [insert link]. You will be contacted if chosen to participate.

If you have any questions please contact Chioma Ogechi Egekeze at coe2105@tc.columbia.edu. Otherwise, I appreciate your consideration of my request.

Sincerely,

Chioma Ogechi Egekeze, MPH

HEALTH PROFESSIONAL WITH EXPERIENCE TREATING HYPERTENSION IN SUB-SAHARAN AFRICA?

YOU COULD BE ELIGIBLE TO PARTICIPATE IN A FOCUS GROUP ABOUT MEDICATION ADHERENCE AND IMPLEMENTATION OUTCOMES.



FEBRUARY 1ST, 2ND OR 3RD!

PARTICIPANT CAN LIVE ANYWHERE IN THE WORLD, NO RESTRICTION



PARTICIPANTS WILL BE ASKED TO

DISCUSS THEIR VIEWS ON THE FINDINGS OF A PROVIDED SYSTEMATIC REVIEW AND SHARE THEIR EXPERIENCE AS A HEALTH PROFESSIONAL TREATING HYPERTENSION IN SUB-SAHARAN AFRICA.



YOUR PARTICIPATION WILL BE COMPENSATED!

*WILL TAKE PLACE OVER ZOOM



INTERESTED?

PLEASE VISIT THE LINK BELOW AND FILL OUT THE FORM. IF SELECTED, YOU WILL BE CONTACTED!

LINK

QUESTIONS? - COE2015@TC.COLUMBIA.EDU

Appendix D – Informed Consent Form

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212-678-3000 | www.tc.columbia.edu

INFORMED CONSENT

Protocol Title: Assessing Implementation Outcomes To Address Antihypertensive Medication Adherence in Sub-Saharan Africa: A Systematic Review and Focus Group Study

Subtitle: Focus Group Consent

Principal Researcher: Chioma Ogechi Egekeze, MPH, Doctoral Candidate,
Teachers College, Columbia University
(732)-882-4794, coc2105@tc.columbia.edu

INTRODUCTION You are invited to participate in this research study called “Assessing Implementation Outcomes To Address Antihypertensive Medication Adherence in Sub-Saharan Africa: A Systematic Review and Focus Group Study.” You may qualify to take part in this research study because you are 1) 18 years of age or older, 2) work as a healthcare professional (physician, nurse, pharmacist, community health worker etc.), 3) are fluent in English and 4) have experience treating hypertensive patients in Sub-Saharan Africa. Approximately, 12 people will participate in this study (split into two groups), and it will take 90 mins (1.5 hours) of your time to complete over the course of one day.

WHY IS THIS STUDY BEING DONE This study is being done to determine which evidence based interventions (EBIs) for antihypertensive medication adherence are supported by practitioners for implementation in Sub-Saharan Africa. Ultimately, this study will provide a clearer understanding of a health professional’s perspective on the practicality of implementing said effective interventions in order: 1) to improve quality of care for patients and 2) establish useful guidelines that can be used across national health systems.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY?

If you decide to participate, the primary researcher will reach out to you after you have stated your interest through the recruitment email form detailing the study. The email will include a screening form and a copy of the systematic review for reference. The screening form will collect information to determine if you are eligible for participation in the study. This form will ask for name, health professional title, years of experience, the Sub-Saharan Africa country or countries you have worked in, and the capacity in which they worked to treat hypertension in Sub-Saharan Africa.

Page 1 of 5

<p>Teachers College, Columbia University Institutional Review Board</p> <p>Protocol Number: 24-187 Consent Form Approved Until:</p>

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During the focus group you will be asked to discuss your views on the provided systematic review and your experience as a health professional treating hypertension in Sub-Saharan Africa. The questions that will be asked during the focus group will be provided prior to it taking place. The questions will be in relation to evidence-based interventions, implementation outcomes, patient interactions, guidelines, resource management and the expectations of healthcare professionals. The order in which the questions are asked during the focus group might change in relation to the flow of the conversation.

The focus group will be audio-recorded and video-recorded using Zoom. Additionally, live captioning will be used during the focus group to capture the words of participants as they speak and display them visually on the screen. The primary researcher will ask the participants to keep all comments made during the focus group confidential and not discuss what happened during the focus group outside the meeting. Your identity will be known to other focus group participants and the primary researcher cannot guarantee that others in the group will respect the confidentiality of the group.

After the focus group, the audio/video recording will be uploaded onto a qualitative data software for analysis and transcribing. After the analysis and transcribing of the audio/video recording, the recording will be deleted. The focus group will take approximately 90 mins (1.5 hours). In the analyzed/transcribed data, you will be referred to by pseudonym and your identity will be kept confidential. If you do not want to be audio-recorded and video-recorded you will not be eligible to participate in the focus group study. The focus group will be conducted in two groups (approximately six participants each) at times that are decided upon based on a participant's availability.

The focus group will be done remotely via Zoom in the comfort of the participant's location.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY? This is a minimal risk study, which means the harms or discomforts that you may experience are not greater than you would ordinarily encounter in daily life while taking routine physical or psychological examinations or tests. However, there are some risks to consider.

You might feel uncomfortable discussing problems that you experienced while working as a healthcare professional treating hypertension in Sub-Saharan Africa. You do not have to answer any questions or share anything you do not want to talk about. You can stop participating in the study at any time without penalty. You might feel concerned that things you say might be shared but your information will be kept confidential.

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The primary researcher is taking precautions to keep your information confidential and prevent anyone from discovering or guessing your identity, such as using a pseudonym instead of your name and keeping all information on a password protected computer and locked in a file drawer.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS

STUDY? There is no direct benefit to you for participating in this study. However, your participation will benefit the dissertation project by providing insight during the focus group on your experiences.

WILL I BE PAID FOR BEING IN THIS STUDY? You will be compensated \$10 USD for your participation at the end of the focus group study. Participants must complete the focus group in order to receive the \$10 for participation.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS? The study is over when you have completed focus group session. However, you can leave the study at any time even if you have not finished.

PROTECTION OF YOUR CONFIDENTIALITY Any electronic or digital information will be stored on a computer that is password protected. There will be no record matching your real name with your pseudonym.

For quality assurance, the study team, the study sponsor (grant agency), and/or members of the Teachers College Institutional Review Board (IRB) may review the data collected from you as part of this study. Otherwise, all information obtained from your participation in this study will be held strictly confidential and will be disclosed only with your permission or as required by U.S. or State law.

HOW WILL THE RESULTS BE USED? The results of this study will be published in journals and presented at academic conferences. Your identity will be removed from any data you provide before publication or use for educational purposes. Your name or any identifying information about you will not be published. This study is being conducted as part of the dissertation of the primary researcher.

CONSENT FOR AUDIO AND VIDEO RECORDING Audio recording and video recording is part of this research study. You can choose whether to give permission to be recorded. If you decide that you do not wish to be recorded, **you will not be able to participate** in this research study.

<p>Teachers College, Columbia University Institutional Review Board</p> <p>Protocol Number: 24-187 Consent Form Approved Until:</p>

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_____ I give my consent to be recorded _____
Signature

_____ I **do not** consent to be recorded _____
Signature

WHO MAY VIEW MY PARTICIPATION IN THIS STUDY

___ I consent to allow video and audio-recorded materials viewed at an educational setting or at a conference outside of Teachers College, Columbia University

Signature

___ I **do not** consent to allow video and audio-recorded materials viewed outside of Teachers College, Columbia University

Signature

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

If you have any questions about taking part in this research study, you should contact the primary researcher, Chioma Ogechi Egekeze, at 732-882-4794 or at coe2105@tc.columbia.edu.

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 10027, Box 151. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read the Informed Consent Form and have been offered the opportunity to discuss the form with the researcher.
- I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.

<p>Teachers College, Columbia University Institutional Review Board</p> <p>Protocol Number: 24-187 Consent Form Approved Until:</p>

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- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at the researcher’s professional discretion (if you do not want to be audio and video recorded).
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the researcher will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- Identifiers will be removed from the data. De-identified data may be used for future research studies, or distributed to another researcher for future research without additional informed consent from you (the research participant or the research participant’s representative).
- I should receive a copy of the Informed Consent Form document.

This study is being conducted by the principal investigator (PI) for her dissertation project as a student-researcher at Teachers College, Columbia University. The PI is dedicated to keeping your data confidential. Your participation in this study is completely voluntary and you may refuse to participate or withdraw participation at any time.

My signature means that I agree to participate in this study:

Print name: _____ **Date:** _____

Signature: _____

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