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Application of the Andersen Health System Utilization Framework in the Investigation of the use of Traditional Medicine in Kumasi, Ghana

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APPLICATION OF THE ANDERSEN HEALTH SYSTEM UTILIZATION FRAMEWORK IN THE
INVESTIGATION OF THE USE OF TRADITIONAL MEDICINE IN KUMASI, GHANA

by

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(Under the Direction of Bettye Apenteng)

ABSTRACT

There is a gap in theoretically-based-research on the use of Traditional Medicine (TM) in Low and Middle-Income Countries (LMIC). The Andersen Health System Utilization (AHU) framework was used to explore the factors associated with TM use among chronically ill patients seeking care from the Komfo Anokye Teaching Hospital (KATH), Ghana, West Africa. Two research questions allowed a focused application of the AHU model. The first research question sought to identify the need, predisposing, and enabling factors associated with TM use. The second research question sought to examine the relationship between TM and perceived health status. Multinomial logistic regression and instrumental variable (IV) Tobit regression analyses were used to address the research questions. Applying the AHU framework, predisposing factors were identified as significant predictors of TM use, including marital status, the use of TM by family/friends, and favorable beliefs regarding TM. The presence of comorbidities – a need factor – was also found to be associated with TM usage. However, in contrast to the AHU framework, enabling factors were not associated with TM use among the study population. Additionally, the study did not find an association between TM use and perceived health status. This study's results contribute to the general understanding of the use of TM for preventive and curative purposes in LMIC.

INDEX WORDS: Traditional medicine, Ethno-medicine, Andersen Health System, Kumasi, Ghana, Low- Middle- Income Country, Multivariate, Tobit, Endogeneity, Spearman, Factor analysis.

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DEDICATION

It was with great humility that I researched a topic that captures humanity's struggles with itself and its environment. I dedicate this work to those who for millennials, have contributed to our understanding, unbeknownst to themselves. It is their various realities spanning this globe that have inspired and instructed this research.

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better equipped to take on professional challenges.

Instrumental to this dissertation we Dr. Bettye Apenteng whose tutelage and mentorship will not be

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DEFINITIONS AND ACRONYMS

Term	Definition
AM	Alternative Medicine
CAM	Complementary Alternative Medicine
CM	Conventional Medicine
TM	Traditional Medicine
UN	United Nations
UNDRIP	United Nations Declaration on the Rights of Indigenous People
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

Background/Significance

Traditional Medicine (TM) is the name given to indigenous practices used to treat or cure diseases. The World Health Organization (WHO) describes TM as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as the prevention, diagnosis, improvement or treatment of physical and mental illnesses." TM is sometimes erroneously grouped in the same category as pseudo-medicine and, as a result, is often perceived negatively by some. However, the tides are changing globally, and TM is recognized increasingly for its potential contribution to health and wellness (Gyasi, 2015). When used with or instead of conventional medicine, TM is known as Complementary or Alternative Medicine (CAM).

In 2000, the WHO estimated that approximately 60% of the world's population used TM to treat illnesses. On the African continent, this proportion increases to 80% (Gyasi, Mensah, Adjei, & Agyemang, 2011). In 2008, TM's utilization contributed more than $83 billion to the global market (Gyasi, Siaw, & Mensah, 2015). Under the umbrella of Complementary or Alternative Medicine (CAM), TM is used to treat several conditions. A good example is the pain management of multiple sclerosis (MS). MS is a disabling disease where the immune system attacks the nerve fibers (Multiple Sclerosis, 2019). Specifically, 82% of patients with MS in Australia, 70% in Canada, and 41% in Spain use such an approach to manage multiple sclerosis (WHO Traditional Medicine Strategy: 2014-2023).

TM can be used alone or in combination with other forms of medicine. When TM is used with conventional/orthodox medicine, it is called Complementary Medicine (CM). The National Institute of Health's (NIH) National Center for Complementary and Integrative Health (NCCIH)

defines CM as non-mainstream medical interventions used simultaneously with conventional medicine. However, TM could be used instead of conventional medicine, and in such an instance, is classified as alternative medicine (AM). Complementary and Alternative Medicine (CAM) incorporates TM uses for the pursuit of health and wellness. The WHO refers to CAM as health practices considered exogenous to the country that uses it. Therefore, CAM uses certain aspects of Traditional Medicine in the delivery of natural medicine, non-conventional medicine, and holistic medicine. A 2012 American national survey indicated that 30% of adults and approximately 12% of children used health care approaches that are not conventional per their respective standard of care (Complementary, Alternative, or Integrative, 2018).

TM is currently benefiting from the visibility afforded by the WHO. Two documents mainly facilitate such visibility; 1) the Traditional Medicine Strategy of 2002-2005, and 2) the Traditional Medicine Strategy of 2014-2023. The 2002-2005 Traditional Medicine Strategy focused mostly on the responses to the needs identified by member states. The 2002-2005 Strategy prioritized the optimization of its member states' health services and systems, including Traditional and Complementary Medicine (T&CM) products, practitioners, and associated practices. Specifically, the 2002-2005 Strategy required member states to understand the situation within their respective borders better as it relates to T&CM and subsequently develop and regulate the implemented guidelines. The 2014-2023 Strategy proposes that the WHO member states; a) expand on their knowledge to allow the active management of T&CM, b) improve on the quality assurance associated with T&CM and, 3) encourage universal health coverage through the incorporation of T&CM (WHO Traditional Medicine Strategy: 2014-2023).

The evolution of TM's importance would be incomplete without placing the WHO Traditional Medicine Strategy within the context of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). The document was finally adopted on September 13, 2007, after almost 25 years of deliberation and had for mission the protection of collective rights that were not necessarily addressed in other human rights constitutions. These collective rights include the

protection and transmission of traditional knowledge that include traditional medicine. Such protections are well-received after centuries of discrimination, exploitation, dispossession, and colonization (Traditional Knowledge, 2019).

Purpose of the Study

Due to the scarcity of resources to sustain conventional medicine usage, developing countries continue to rely on TM to support the health of their population (Gyasi, Mensah, & Siaw, 2014). Whereas individual determinants of health are a research focus in high-income countries, this is mostly not the case for low-income countries (Babitsch, Gohl, & von Lengerke, 2012). Therefore, there remains a dearth of research on TM utilization and outcomes in developing nations (Tabi, Powell, & Hodnicki, 2006). Thus, the purpose of this research was to fill gaps in knowledge on the factors associated with the use of TM as a complementary or alternative to conventional medicine for chronic disease management in low-income settings, specifically Kumasi, Ghana. Kumasi is the second-largest city in the West African nation of Ghana and is home to approximately 2 million Ghanaians. In this context, traditional medicine is commonly used by the population (Gyasi, Mensah, Adjei, & Agyemang, 2011). Within the Ghanaian context, TM is synonymous with herbal medicine. Thus, henceforth the two terms will be used interchangeably.

Scope of the Study

The study examined the factors associated with traditional medicine (also known as herbal medicine) in Kumasi, Ghana, among individuals living with chronic diseases. The study population was limited to patients with chronic conditions seeking care at the Komfo Anokye Teaching Hospital (KATH), one of two national tertiary healthcare institutions. The chronic diseases of interest were; diabetes, hypertension, asthma, chronic heart failure, stroke, arthritis, sickle cell, HIV/AIDS, cancer, kidney disease, and other diagnosed chronic diseases.

Research Questions and Implementation

This research aimed to answer the following questions:

a) What are the need, predisposing, and enabling factors associated with the use of TM/herbal medicine among chronically ill patients seeking care at KATH, Kumasi?

b) What is the relationship between TM/herbal medicine use and perceived health status?

Design

The study was a descriptive cross-sectional quantitative study. The study's research questions were answered using primary collected survey data.

Study Setting and Sample

The data collection site was the Komfo Anokye Teaching Hospital (KATH). It is a tertiary referral center for six of the ten regions of Ghana. Furthermore, it is the second-largest teaching hospital in Ghana. The survey was administered to patients with chronic conditions seeking care from the following departments of KATH: Dermatology, Diabetes, Dialysis, Family Medicine, Female Fever Ward, Main Surgery Theater, Male Fever Ward, Male ICU, Oncology, Out Patient Department (OPD), Female Preoperative Ward, and Thyroid departments. Patients were recruited using a convenience sampling approach. Recruitment occurred for two weeks as approved by the Research and Development Unit of the KATH and in partnership with the departments, as mentioned earlier.

Research Assistants (RA) from Georgia Southern University (GSU) were recruited and trained before traveling to Kumasi. The Principal Investigator ensured the recruitment and confirmation of required IRB training. The GSU RAs were paired with the Kwame Nkrumah University of Science and Technology medical students for the data collection efforts. The collaboration of members of both institutions was necessary to facilitate the successful administration of the surveys. It was paramount to this dissertation's success to have such

collaboration because the primary language of the region is Twi. Voluntary participation was emphasized, and patients did not receive incentives for participation.

The inclusion criteria required that the individual: a) be a patient of KATH, b) be an adult of at least 18 years of age, c) be capable of articulating consent and responding to survey questions and, d) have been diagnosed with one or more of the chronic conditions of the following chronic conditions: 1- diabetes, 2- hypertension, 3- asthma, 4- chronic heart failure, 5- stroke, 6- arthritis, 7- sickle cell, 8- HIV/AIDS, 9- cancer, 10- kidney disease, and 11- other diagnosed chronic diseases.

Instrument

The survey (Appendix A) was developed based on an extensive review of the existing literature and informed by Andersen's Healthcare Utilization Model (AHU). The AHU posits that factors influencing health care utilization include need, predisposing, and enabling factors. According to the model, health care utilization influences an individual's health status. Construct validity of the survey was determined based on the survey review by subject matter experts who understand the cultural context in Ghana. The survey's administration was conducted by co-investigators that underwent all the necessary Institutional Review Board training and clearance. Students of the Kwame Nkrumah University of Science and Technology (KNUST) School of Medicine solely facilitated the survey's administration to bridge the language barrier experienced by the students of Georgia Southern University.

Analysis

Survey data were analyzed using descriptive statistics such as frequencies, means, and standard deviations. The validity and internal consistency reliability of the scales included in the survey were assessed using exploratory factor analysis and Cronbach's alpha, respectively.

Multivariate regression analyses were used to examine the factors associated with herbal medicine use among patients with chronic diseases in Kumasi and their impact on perceived health status.

Overview of Conceptual Framework

This study used Andersen's Healthcare Utilization Model (AHU) as its conceptual framework. The AHU has been widely used to assess the factors associated with individual health-seeking behavior. The model categorizes such factors under three domains: predisposing, enabling, and need factors. Commonly assessed individual predisposing factors encompass age, sex, education, occupation, ethnicity, social relationships, and health beliefs (Babitsch, Gohl, & von Lengerke, 2012).

Enabling factors consider the individual's ability to finance and navigate the organizational terrain that would allow for service utilization. They are a function of the individual's ability to absorb the cost of healthcare. They also encompass an organization's ability to offer a reliable source of care that is apropos to the patient's primary complaint. The most investigated enabling factors are income/financial situation, health insurance, consistency of a source of healthcare, and medical services (Babitsch, Gohl, & von Lengerke, 2012).

Need factors relate to an individual's perceived need for care. When it comes to this dimension of the AHU model, it is essential not to confuse the patient's perceived needs with the patients' physician-evaluated needs. The need factors that have recently received the most attention are self-reported severity of the chronic disease or prior medical conditions (Azfredrick, 2016). Figure 1 provides a visual representation of the AHU operationalization in this study. Specifically, the individual characteristics of the patient were categorized as predisposing, enabling, and need factors. The predisposing factors captured demographics (i.e., age and gender), social standing, and belief when it came to the use of traditional medicine. In this study, the individual's social standing included education, religion, rural/urban dwelling, marital status, and family/friends support system.

In terms of the enabling factors pertinent to this study, financing and organizational infrastructure were topics of interest. Financing was a focus because a person's ability to defray healthcare costs facilitates its use. Because TM tends to be less of a financial burden, a person in financial distress may find TM more attractive than conventional medicine. Organizational infrastructure was also the focus of this research's enabling factors. Therefore, a patient's ability to secure healthcare is a function of what is offered by the organization(s) frequented by the patient. In terms of financing, the salient point was whether the patient had health insurance. Organizational infrastructure took into consideration transportation, distance, and cost. The need factors captured evaluated needs. All three factors (predisposing, enabling, and need) informed the health behavior of the patient.
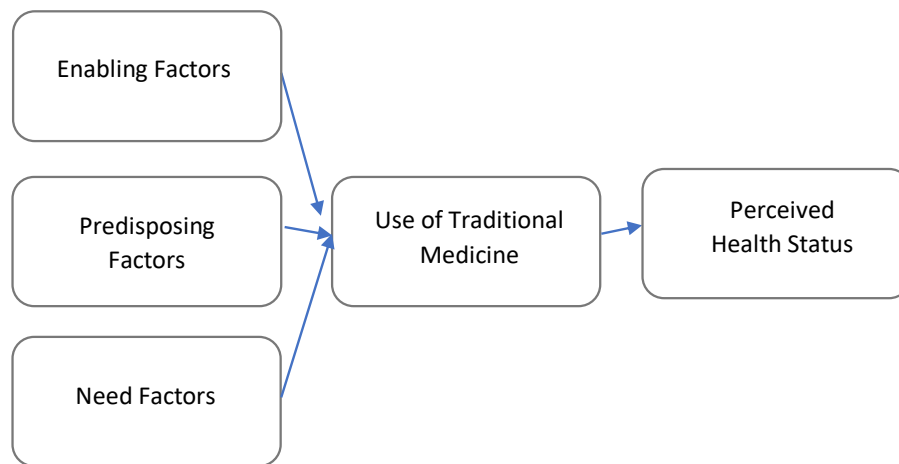
Figure 1. *Contextual Application of the AHU model.*

The AHU model has primarily been used in research projects in the United States and other developed countries such as the United Kingdom and is less used within the context of low-income countries, like Ghana (Babitsch, Gohl, & von Lengerke, 2012). Following the AHU, it is generally hypothesized that the use of traditional medicine will be influenced by predisposing, need, and enabling factors and will, in turn, influence health status (Figure 1).

Research Hypothesis

Following from the AHU model, the study sought to test the following hypotheses:

1- Enabling, need, and predisposing factors are associated with TM/herbal medicine use among

patients with chronic conditions seeking care at KATH. However, need factors have the most

substantial explanatory potential for TM/herbal medicine use.

2- The use of TM/herbal medicine is associated with perceived health status.

Delimitations

This research focused on the patient population of the Komfo Anokye Teaching Hospital

in Kumasi, Ghana. The research further restricted its sampling and subsequent analysis to patients

diagnosed by a physician with a specified chronic condition captured in a preapproved survey

instrument. If a chronic condition was not captured in the survey, a field was available to the

administrator to register the chronic condition. To best facilitate cross-sectional sampling, patients

with chronic diseases were conveniently sampled over two weeks in various departments of

KATH. The sample only included patients 18 years old and older who understood the informed

consent form they were asked to sign before the survey was administered.

Limitations

This research was limited because its findings mostly would apply to the population of

Kumasi and its surroundings. The study was cross-sectional and was not able to assess the

longitudinal use of traditional medicine of patients. Information obtained from participants was

self-reported; the researcher thus could not verify the accuracy of any information provided. As

with most researcher-administered surveys, there is also a potential for bias from participants

providing socially desirable responses.

Outline of the Remaining Chapters

The subsequent chapters are organized as follows: Chapter 2 examines and discusses the existing literature as it applies to the usage of herbal medicine worldwide, on the African continent, and specifically in Ghana. Chapter 2 also presents the Conceptual Framework used in this study (AHU). Chapter 3 summarizes the methodological approach of the study. Chapter 4 presents the results of the study. Finally, Chapter 5 discusses the study's findings, examines the outcomes of the research questions and the global health implications of the research results.

CHAPTER 2

LITERATURE REVIEW

The History of Traditional Medicine

Traditional Medicine (TM) has been used to prevent, diagnose, and treat diseases since pre-historic times. Nearly all cultures have relied on TM products to prevent illnesses and, when possible, return its members to health (Gyasi, Siaw, & Mensah, 2015). The driving force behind the newfound interest in TM in some parts of the world is associated with "new ageism" and cultural identities (Tsey, 1997). TM is part of the toolkit humanity requires for its welfare. The prevailing reasons for the use of TM are that a) it is one of the primary sources of health care in some countries, especially those with relatively fewer resources, b) it is used for the preservation of history and culture (i.e., indigenous knowledge), and c) it is used as a complementary therapy, mostly in the healthcare systems of developed countries.

The utilization of TM as a tool to satisfy a need (e.g., treatment/cure of disease) is a relatively logical reason for its acceptance; however, a priori consideration must be given to its existence as a conduit to the history of a people. That history can also be viewed as traditional knowledge that is foundational to indigenous people's identity, and in many instances, has provided coping options for centuries (Abdullahi, 2011). As such, history or traditions must be protected and preserved because of the various ways, it benefits indigenous people and, to a greater extent, humanity.

The individuals' perception of the efficacy of any treatment and their knowledge of ailments is a function of their tradition and social environments (Gyasi, Mensah, & Siaw, 2014). To aid in recognizing and protecting traditional knowledge and indirectly traditional medicine, the United Nations has at its core the Rights of the Indigenous Peoples, which is an extension of the Universal Declaration of Human Rights. The Declaration on the Rights of Indigenous Peoples

(UNDRIP) was finally adopted on September 13, 2007, after almost 25 years of deliberation and had for mission the protection of collective rights not addressed in other human rights constitutions. It is interesting that indigenous knowledge's critical role is being recognized internationally, simultaneously as the importance of traditional medicine (Traditional Knowledge, 2019). Indeed, it is fortuitous that two world bodies (WHO and UN) recognized the importance of traditional knowledge, which includes traditional medicine, around the same time.

Herbal medicine refers to the adaptation of preparations that involve plants (whole or parts), aimed at relieving mental or physical ailments. One of TM's foundational units is herbal medicine, and in 2008, it was estimated that herbal medicine had a world market of $83 billion (Gyasi, Siaw, & Mensah, 2015). These numbers support traditional medicine's economic importance, but we should be forewarned of the over-exploitation of flora that initially supported communities and is now asked to support global markets. When placing traditional medicine in the various contexts that allowed for its convergence, it became clear that it was used to respond to proximal needs. In today's market, the harvest of a plant used in TM could be collected to support distant patients' needs (s). For that reason, the flora could be exploited for present and future needs, which ultimately leads to over-exploitation. There are concerns that such over-exploitation may contribute to biodiversity loss, the use of medicinal plants that is not evidence-based, and bio-piracy (Gyasi, Siaw, & Mensah, 2015).

The Contribution of Traditional Medicine to Healthcare

The World Medicines Situation Report states that 70-95% of developing countries' populations use TM and that all countries make use of TM to a certain extent (WHO, 2011). Nowadays, individual needs dictate the usage of Traditional and Complementary Medicine (T&CM), and patients suffering from chronic conditions are more likely to use TM (Gyasi, Mensah, & Siaw, 2014). This is because standard treatments of chronic diseases associated with internal medicine are not as effective or work as suspected. Therefore, patients afflicted by such

diseases turn to TM to address their medical needs and potentially associated psycho-spiritual issues (Gyasi et al., 2016). In the USA, patients complaining from musculoskeletal issues accounted for 23% of visits to osteopathic physicians, who adopt a holistic approach to the treatment/healing of their patients (Sun, Desai, Pucci, & Jew, 2004). This suggests that such patients prefer a holistic approach to their healing process. TM practitioners often employ a holistic approach. When it comes to multiple sclerosis, patients seeking relief from CAM range from 41% in Spain, 70% in Canada, and 82% in Australia (WHO Traditional Medicine Strategy: 2014-2023).

One of the most important reasons for using T&CM is economics. The literature suggests that patients seen by a general practitioner, who incorporated CAM, have a lower economic burden associated with their illnesses and lower mortality rates (Peltzer. 2009). Whereas developed countries' TM usage is complementary mainly, developing countries' reliance on TM addresses their populations' primary needs (Gyasi, 2015).

TM can be integrated into healthcare, and to a certain extent, such integration has already begun. The integration varies as a function of the context, and consideration should be given to a) the setting's history and culture being considered for T&CM adoption. This would yield an appreciation of the art once the risks and benefits are assessed, b) the examination of the national health resources to include financing and human resources associated with the healthcare system, c) establishing or reinforcing the regulatory framework to support T&CM products, practices and practitioners and d) promoting fair access to the integrated T&CM into the national health system that would facilitate reimbursement, and collaborations (WHO Traditional Medicine Strategy: 2014-2023).

A recent example of national integration of T&CM is in Sweden, where many lessons were learned from the activity. Primary care and other issues were emphasized as a function of the integration process. The major areas that are important when considering national integration of T&CM are 1) proper T&CM training for general practitioners, 2) multi-modular management of the primary complaint, 3) the adoption of mixed-methods research, and 4) the encouragement of

interdisciplinary collaboration (WHO Traditional Medicine Strategy: 2014-2023). The issues experienced by Sweden are mirrored in many other member states.

It is essential to understand that T&CM can be a preventive and curative approach to illnesses. Therefore, as a potential low-cost approach, it should be considered for the health maintenance of populations. The 2013-2024 WHO strategy offers three critical strategic objectives for the implementation of TM in member states. The strategic objectives are then associated with strategic directions, expected outcomes, and critical indicators. Figure 2 provides details of these strategic objectives.

Strategic objective		Strategic direction		Expected outcomes	Critical indicator
4.1	To build the knowledge base for active management of T&CM through appropriate national policies	4.1.1	Understand and recognize the role and potential of T&CM	■ T&CM practices and practitioners identified and analysed by Member State and country profile devised for T&CM. ■ T&CM policies and programmes established by government.	■ Number of Member States reporting a national/provincial/state T&CM policy. ■ Number of Member States reporting increased governmental/public research funding for T&CM;
		4.1.2	Strengthen the knowledge base, build evidence and sustain resources	■ Strengthened knowledge generation, collaboration and sustainable use of TM resources.	
4.2	To strengthen quality assurance, safety, proper use and effectiveness of T&CM by regulating products, practices and practitioners.	4.2.1	Recognize the role and importance of product regulation	■ Established and implemented national regulation for T&CM products including registration. ■ Strengthened safety monitoring of T&CM products and other T&CM therapies. ■ Technical guidelines and methodology developed for evaluating safety, efficacy and quality of T&CM.	■ Number of Member States reporting national regulation for T&CM products ■ Number of Member States reporting national/provincial/state regulation for T&CM practice ■ Number of Member States reporting national/provincial/state regulation/registration for T&CM practitioners
		4.2.2	Recognize and develop practice and practitioner regulation for T&CM education and training, skills development, services and therapies	■ Standards for T&CM products, practices and practitioners developed by government. ■ Established education/training programme, benchmarks and implementation capacities for T&CM practitioners ■ Improved safe and effective use of T&CM	
4.3	To promote universal health coverage by integrating T&CM services into health care service delivery and self-health care	4.3.1	Capitalize on the potential contribution of T&CM to improve health services and health outcomes.	■ Integration of T&CM into the health system. ■ Improved T&CM services and accessibility. ■ Improved communication between conventional medicine practitioners, professional bodies and T&CM practitioners concerning the use of T&CM.	■ Number of Member States reporting national plan/programme/approaches for integrating T&CM service into the national health service delivery ■ Number of Member States reporting consumer education project/programme for self-health care using T&CM
		4.3.2	Ensure consumers of T&CM can make informed choices about self-health care.	■ Better awareness of and access to information about the proper use of T&CM. ■ Improved communication between conventional medicine practitioners and their patients about T&CM use.	

Figure 2. Strategic Objectives to be considered in the implementation of TM in national healthcare programs (WHO Traditional Medicine Strategy: 2014-2023).

The Contribution of Traditional Medicine to Conventional/Orthodox Medicine

History has not always been accurate regarding the scientific contributions made by the traditional knowledge of indigenous people of various continents. Unfortunately, credit is not given to the many technological fields' innovations and medicine emerging from immemorial indigenous traditional knowledge and genetic information. It is unfortunate that the monetary remunerations are seldom disbursed to the communities that willingly or otherwise made them available. However, the future may be brighter for indigenous people and the recognition of their traditional knowledge with the advent of the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP).

Traditional Medicine paved the way for ethnobotany's scientific discipline that came to existence due to economic necessity and colonialism. Its existence helped the new inhabitants of various parts of the world survive their new environments by mimicking the local indigenous populations. When colonialism reached the critical mass needed to invest in infrastructure, hospitals were erected, and TM gardens were part of the compound. This was seen in French colonies, where state-appointed physicians were also contributors to their colonial knowledge base (Fuller, 2013).

The approval of the UNDRIP was facilitated by 144 member states, with 11 abstentions and four rejections of the instrument (Global Actions). Since the initial vote, the four countries opposed to the document have since changed their positions (Global Actions). The "unanimous" acceptance of such a document is essential in an era when plants used in traditional medical practices are targeted for the isolation of novel bioactive compounds. However, the recognition of plants and their contribution to health captured in TM is not a novel concept. Human use of plants goes as far as the Middle Paleolithic era, approximately 60,000 years ago. Since then, systems were generated and institutionalized to capture various health approaches that benefit current generations (Fabricant & Farnsworth, 2001).

Allsobrook (2012) identified a critical philosophical approach that has affected TM in its various forms. This approach was the positivism aspect of colonization. This approach gave the illusion of a broader intellectual tradition of dispassionate objectivity, which at that time provided the mechanism to marginalize certain matters (i.e., traditional medicine) to the point of discreditation. In short, Allsobrook presented positivism as a tool to negate "subjective" judgment when faced with quantifiable data (Allsobrook, 2012). Perhaps, the sentiments of the marginalization of TM can be best captured in the words of Hassim et al. (n.d.):

> "… a century of colonialism, cultural imperialism and apartheid in South Africa have held back the development of African traditional health care in general and medicines in particular. During several centuries of conquest and invasion, colonizers introduced European systems of medicine. Pre-existing African systems were stigmatized and marginalized. Indigenous knowledge systems were denied the chance to systemize and develop" (Abdullahi, 2011).

One should note that colonial patriotism provided an imperative of sort because of the understanding of science and, most importantly, its applications were part of a universal project. A project that supported and, at best, showed commitment to European civilization (Allsobrook, 2012).

The issues associated with the incorporation of TM are multifaceted, and the economic burden of such an endeavor should also be considered. Nowadays, in the United States, the process of proposing a new therapeutic agent first requires the formulation of a strategy. Following that strategy, it becomes necessary to obtain, screen, and isolate the active compound(s). Following suit are the preclinical testing and chemical investigations. These are the precursors to the submission of an Investigational Drug Application that would allow for clinical trials. Assuming that the trials are successful, a New Drug Application can then be submitted, and commercial production can commence. This process could take 10-20 years and easily cost USD 250 million. This investment assumes that there will be a return on the initial investment (Fabricant & Farnsworth, 2001).

Contemporary Views on the Usage of Traditional Medicine

It is understood and relatively accepted that the Aboriginal Australians and the Maori of New Zealand are reverting to traditional medicine as part of their cultural re-appropriation as a function of anti-colonial struggle (Fuller, 2013). These countries are considered developed countries whose budgetary constraints are not comparable to those of developing countries. Australia and New Zealand can celebrate their heritage and give credibility to their indigenous citizens' practices.

Cultural re-appropriation seems to be a logical defense for the continued use of TM. However, there are more practical reasons associated with its use. TM is a function of the realities of developing countries' rural settings where there tends to be a chronic lack of access to conventional medicine (Gyasi, Mensah, & Siaw, 2014). TM's use in developing countries is widespread and the first approach to care taken by most of its population. When speaking specifically about HIV in the Ghanaian context, people infected by the virus tend to be partial to alternative/complementary therapies that make use of herbs mostly in non-prescription drugs, vitamins, and minerals supplements (Laar et al., 2017). At times, such partiality could be a function of preference, but there are instances where TM's uptake is due to other options' unavailability. This lack of access to conventional medicine and drugs is worsened by the absence of medical options complicated by politics. When unfairly applied, politics negatively affect economies and societies at the international, national, and community levels and ultimately contribute to the misappropriation of pertinent medical goods (Gyasi, Mensah, & Siaw, 2014).

A UNAIDS publication deduced that 2/3 of the HIV/AIDS patients in developing countries use traditional medicine to manage the symptoms, address secondary infections, and stimulate their immunity (Gyasi, Mensah, Adjei, & Agyemang, 2011). Interestingly, TM tends to be a supplement to conventional medicine, but for the treatment of malaria, herbal substitutes may be the only path forward (Gyasi, Mensah, Adjei, & Agyemang, 2011). This is because the malarial

parasite (*plasmodium falciparum*) seems to have developed resistance to most anti-malarial drugs. What is encouraging about traditional medicine is that most traditional healers tend to be specialized in conditions such as malaria, thereby increasing their chances of success when dealing with their patients. This is analogous to Western medicine's current practice of specialization that contributed to its overall success when dealing with specific ailments.

Culture and preference are essential aspects associated with the use of TM. However, economic is also an important point to consider. TM is relatively affordable and used by the rural inhabitants of developing countries who may find conventional medicine cost-prohibitive (Gyasi, Mensah, Adjei, & Agyemang, 2011). The affordability of TM is of great significance and the WHO clarifies that out-of-pocket contributions are the least efficient and most inequitable healthcare financing methods. Such an approach, albeit popular, prevents people from pursuing medical care and may worsen poverty. When it comes to healthcare, it is not surprising that those without insurance will experience poorer health outcomes. Belonging to society's lower socioeconomic group could have destructive influences on health-seeking behaviors (Gyasi, 2015). With the ever-rising cost of conventional healthcare, TM helps those of humble means to reclaim their health when facing communicable and chronic non-communicable illnesses

The importance of TM is not restricted to developing economies. The literature shows that Americans tend to spend more on CAM than on their hospitalization (Gyasi, 2015). In the USA, CAM usage is not reimbursable, whereas hospitalization is. This points to the fact that CAM and, to some extent, TM plays an integral part in the preventive healthcare of Americans. When considering how a health crisis could place most Americans in financial distress, alternatives should be explored to decrease such possibilities. It has been proposed that TM be reimbursable by insurances for financially challenged environments that often are underserved. Such an approach would lessen the financial burden and improve the health of the population (Gyasi, 2015).

As mentioned earlier of TM/CAM into standard US healthcare, a germane approach to the integration could be Taiwan's national health care insurance system that provides

reimbursement for TM usage. The system depends on TM's relative affordability because its "raw" ingredients tend to be herbal and are easily extracted from the communities that require them. Such easy extraction reduces the transactional costs associated with medicines that the patients can use for other healthcare aspects such as nutrition (Gyasi, Mensah, & Siaw, 2014).

Such integration of TM/CAM would also facilitate full disclosure on the patient's part regarding their usage of TM/CAM. Unfortunately, 70% of HIV patients in the United States use TM but are not likely to share that information with their physicians. The same has been seen in Canada, but proportionally less (53%). In such settings, it was found that garlic was antagonistic to ART uptake (Gyasi et al., 2013), and perhaps such non-disclosure could have uncharacterized effects on the infected and non-infected populations.

Traditional Medicine Usage in Africa

Per the WHO, sixty percent of the world's population uses herbal/traditional medicine to combat illnesses, and that number escalates to eighty-percent in Africa, where herbal medicine is a function of primary health care (Gyasi, Mensah, Adjei, & Agyemang, 2011). A contributing factor to herbal medicine's popularity is its preventive applications, irrespective of a person's health status (Laar et al., 2017). Herbal medicine, which is an integral part of TM, has a preventive aspect. Most "outsiders" may not understand that there is a religious and social aspect to illness that the healer may correct. Such corrections may come in the form of suggestions relevant to the reestablishment of health (Geest, 1997).

At times, food can also have a curative aspect. For example, rural Togolese people make use of plants for their nutritional and medicinal properties. In other African countries, these traditionally used plants attract researchers through surveying and pharmaceutical screening (Karou et al., 2011). Such an approach shortens the needed time from pharmaceutical discovery to production and, ultimately, sales. Irrespective of the potential needs of the global market, TM continues to serve local needs. In rural Nigeria and Ethiopia, children are important consumers of

TM. Additionally, the Nigerian urban population afflicted with hypertension has been shown to disproportionately use TM. TM use among this population has been associated with gender, marital status, and supernatural beliefs. In sub-Sahara Africa and many developing countries, women consider TM mostly in managing their ailments (Gyasi, Mensah, Adjei, & Agyemang, 2011).

Sub-Sahara Africa is a severely affected region when it comes to people living with HIV (PLHIV), capturing 69% of that segment of the world's population. Approximately one in twenty adults (4.9%) live with the disease, but there are reports of a downward trend. The treatment of the infection and subsequent disease is complicated by the therapy's cost and its inconsistency in availability in the region. Therefore, the management of HIV may incorporate multiple therapeutic and non-therapeutic prescriptions/non-prescriptions and CAM (Laar et al., 2017). In Zambia, 75% of the patients hospitalized at the Zambia University Teaching Hospital and 68% of the patients seeking care for HIV/AIDS-related conditions make use of TM (Chinsembu, 2016). This is the case because Zambia's conventional medicine establishments believe that TM practitioners can contribute to the control of the HIV/AIDS pandemic. In Tanzania, more than 60% of the population uses TM to manage various ailments, including HIV/AIDS (Kisanga, Lyaruu, Hosea, & Joseph, 2007). However, the reason for such reliance in Tanzania differs from that of Zambia. Tanzanians use TM for HIV/AIDS management because of the scarcity of the necessary conventional medications. These countries share a border but experience different realities regarding the management of HIV/AIDS. Such realities are not isolated incidents, nor are they limited to HIV/AIDS. In Ghana, Mali, Nigeria, and Zambia, 60% of children experiencing fevers associated with malaria use home remedies (i.e., TM) as the first course of action (Peltzer, 2009). In Ethiopia, 40% of plants treat two or more ailments (Tuasha, Petros, & Asfaw, 2018).

It is important to note that TM and conventional medicine do not operate as separate entities in the African health context. Conventional scientific approaches to health are frequently indigenized, thereby adjusted to be better suited to address local needs and expectations. It is not uncommon for hospitalized patients to receive herbs and popular concoctions from family

members while adhering to conventional medicine protocols. Additionally, it is not uncommon in the African setting to encounter preachers in the hospital setting to aid with various illnesses' spiritual aspect. It should be noted that traditional healers and preachers aim to address diseases' spiritual aspect (Geest, 1997).

The use of TM has been used and continues to be utilized for various ailments on the African continent and elsewhere. Of note is TM usage for diarrhea, skin issues, malaria, tuberculosis, and general sexually transmitted infections in Zambia (Chinsembu, 2016). The popularity of specific TM use will be dependent on the incidence of a particular epidemiologic agent/condition. However, it is crucial to recognize that the utilization of conventional healthcare services will also be dependent on the stigma associated with the condition(s) requiring treatment. Therefore, a patient could be less willing to use a health care service/institution, if there a stigma associated with them (i.e., HIV/AIDS clinics) (Chinsembu, 2016).

Antiviral Therapy (ART) clinics in Sub-Sahara Africa chronically experience low retention due to the financial burden associated with the management of the infection, the stigma associated with the locale's visitation, and the journey made to attend the clinic and food insecurity. These points are worsened by incomplete/incorrect information, therapeutic burden, and the preference for alternatives (such as faith remedies). These alternatives are gaining popularity because they allow for a flexible approach, which stands in sharp contrast to the rigid protocol associated with conventional medicine, especially in the ART regimen. Should the patient make use of the ART regimen, some side-effects may require management, such as nausea and diarrhea (Laar et al., 2017). In the Gulu District (and other districts) of Uganda, the most popular plant species used for HIV/AIDS-related ailments are *Aloe, Erythrina abyssinica DC, Sarcocephalus latifolius, Psorospermum febrifugum spach, Mangifera indica L, and Warburgia* salutaris (Nyeko, Tumwesigye, & Halage, 2016).

Thanks to the advances in HIV/AIDS management, it is now considered a chronic condition compared to when it was initially characterized. TM also has treatment protocols for

other chronic conditions such as diabetes mellitus and hypertension. When it comes to the management of hypoglycemic activities, Togolese researchers identified *Ocimum gratissimum*, *Momordica charantia*, *Phyllanthus amarus*, *Allium sativum*, and *Aloe vera* (Karou et al., 2011). The list of plants used to address hypertension and many of the TM remedies identified by Karou et al. are used in Morocco and Nigeria.

As it stands today, inasmuch TM is safe and its efficacy can be established, it could be considered as an alternate course of action for developing countries. This is because of its associated cost-effectiveness, accessibility, and the fact that it is readily accepted by indigenous/local people (Gyasi et al., 2013). However, it should be noted that some pathologies are best resolved with conventional medicine, and this adds to the complexity of health-seeking behaviors and their downstream repercussions. For example, African knowledge contains approaches that are unknown when compared to popular conventional medicine practices. This can lead to competition between these two approaches or complimentary usage.

The way TM is used may provide insight into its imperfect approach to the maintenance and reestablishment of health. The possibility of such improvement is a practical reason why TM and conventional medicine should find a way to cooperate and provide the best care to their respective/collective patients. Such collaboration could prevent adverse effects that could have disastrous effects on the patients due to a lack of communication. As previously mentioned, the lack of communication could stem from not knowing the potential dangers of drug interactions or fear of the reaction from clinicians who strictly adhere to biomedical remedies.

One should note that with regard to collaboration, Traditional Medicine (TM) practitioners tend to be more amiable to such undertakings than their conventional medicine counterparts. TM practitioners feel that they can learn from their conventional medicine counterparts, but conventional medicine practitioners do not always reciprocate these feelings. These sentiments are warranted when viewed through the prism of scientific methodology. TM practices simply do not undergo the same scientific scrutiny as conventional medicine practices.

However, the cost associated with such scrutiny would increase TM utilization costs, decreasing cost-effective options for patients. As such, the various healthcare systems must find a way to encourage further and facilitate the necessary collaborations whose absence forces the patients to choose one approach over the other when the solution to their medical issue(s) could be a combination of the two and perhaps more approaches (Kretchy, Owusu-Daaku, & Danquah, 2014).

Traditional Medicine Usage in Ghana

The simultaneous usage of conventional medicine and TM in Ghana is a phenomenon that is not fully explained for various reasons (Laar et al., 2017). Such a phenomenon is well documented in conventional medicine and CAM use in cancer patients (Yarney et al., 2013). In the Ghanaian context, TM is substituted for CAM; therefore, these terms are interchangeable (Gyasi et al., 2013). This is the case in Ghana and other parts of the world (Gyasi et al., 2013). In Ghana, TM practitioners could include traditional birth attendants, bonesetters, fetish priests, spiritual and non-spiritual herbalists, spiritual diviners, and people performing circumcisions (Sato, 2012). Presently, the Ghanaian TM system is mostly unregulated, where most practitioners are not qualified by the state to operate (Aziato & Antwi, 2016). Such qualification and, to a certain extent, authorization to practice is given by the communities that have come to recognize the individual's competency after many years of successful practice. Furthermore, TM in Ghana uses specialties in specific illnesses with their pertinent approaches to diagnostics and treatment protocols (Sato, 2012).

The Ghanaian Ministry of Health in 2000 created the Traditional Medicine Practice Council (TMPC) to promote, control, and regulate traditional medicine practice. Additionally, the TMPC had for mandate the registration of TM practitioners who complied with governmental guidelines. The existence of the TMPC encouraged the standardization of TM practitioners, thereby gaining more credibility in the eyes of the government and the public they serve. With such encouragement, there has been an increase in the training and education opportunities for TM practitioners. The TMPC is not the only organization that represents TM practitioners. The

Ghanaian Ministry of Health also established the Ghana Federation of Traditional and Alternative

Medicine (GHAFTRAM) to capture formerly independent traditional healers' associations. There

are seven associations encompassed by GHATRAM, and they all have different takes on TM

(O'Brien et al., 2012).

These programs provide the necessary infrastructure of the Ghana Health Service (GHS)

to promote and encourage TM and CM's collaboration. However, such collaboration is promoted

without the rigors of regulations and thorough documentation. However, Ghana's health programs

are more robust than the rest of sub-Sahara Africa and aids its poorest through its National Health

Insurance Scheme (NHIS). The NHIS is fashioned after Britain's National Health Services and

provides reimbursement to public facilities for common diseases like malaria, hypertension, and

tuberculosis. The scheme aims to provide affordable care and medicines to promote the usage of

services. The Ghana National Drugs Policy states that the principle of traditional medicine in

healthcare is captured in the Traditional and Alternative Medicines Directorate of the GHS.

Furthermore, the governance practice of TM is to eventually fall under one national organization

whose mandate is to standardize the practice. Ghana's approach to TM stands as an example to

follow, even though it is incomplete. Its biggest shortcoming is that it is a top-down approach that

did not consider the user during its conceptualization/implementation (Sato, 2012).

In the Ghanaian TM context, the Centre for Research and Plant Medicine assesses the

active herbal ingredient for efficacy and safety before the licensing process commences.

Furthermore, the Food and Drug Authority licenses the manufacturers of herbal medicine. It is

important to note that Ghana is among the countries that have implemented compulsory herbal

medicine training for its providers and ensure its practitioners are informed about the specificity of

their usage (Aziato & Antwi, 2016). This reduces the variability associated with frequenting

different TM practitioners. Therefore, Ghanaian patients tend to use herbal medicines because they

appreciate their natural sources, which tend to have minimal side-effects (Aziato & Antwi, 2016).

Another salient reason for frequenting TM practitioners is the waste of time (and at times money),

when confronted with inefficacious orthodox medications. In short, the Ghanaian patient enjoys a part in the decision-making processes associated with their health and access to healthcare options. This is of great value where some lack faith to fully trust conventional medicine (Aziato & Antwi, 2016).

There is a scarcity of research to identify the decision-making process associated with the uptake of healthcare choices in countries with functional traditional and conventional medical systems. Ghana is a country with said dualities and is divided into ten regions, and each region has a regional hospital. In our context, accessibility to health care is defined as residing 3-5 miles from institutions that can provide the necessary aid. One of the issues associated with access to health care in Ghana is that 70% of its population lives in rural settings (Tabi, Powell, & Hodnicki, 2006). Furthermore, the medical doctors' ratio is 1:20,000, whereas the traditional healers' ratio is 1:200 (Tabi, Powell, & Hodnicki, 2006). The difference in ratios provides an opportunity for the standardization of traditional medicine. However, said opportunity might introduce issues regarding the assimilation of nonstandard approaches to "healing." Such nonstandard approaches may place patients in greater peril (Tabi, Powell, & Hodnicki, 2006). Even though it is difficult and sometimes impossible to ignore the contributions of modern/conventional medicine, Traditional Medicine in Ghana is extensively used by citizens in the management of various conditions (Abdullahi, 2011). This is because of its accessibility and effectiveness. It is a contributor to the resolutions of ailments that have affected and continues to plague humanity (Gyasi, Mensah, Adjei, & Agyemang, 2011).

Even though there is value in TM usage as specified previously, one needs to be wary of its improper applications. Azato and Antwi list the following dangers associated with TM; 1) wrong dosage, 2) unqualified provider, 3) misleading packaging, 4) counterfeit/adulterated product and, 5) severe side-effects (Azato and Antwi, 2016). Additionally, Addo (2007) presents issues associated with the lack of herbal use documentation of admitted patients in the Department of Obstetrics and Gynecology at the Komfo Anokye Teaching Hospital in Ghana (p.150). The issues

associated with herbal use included pelvic inflammatory disease (PID) and ectopic pregnancies (Addo, 2007).

Ghana remains a country that experiences limited medical supplies. In terms of its medical establishment, the country is experiencing a transition in regards to its culture and associated beliefs (Tabi, Powell, & Hodnicki, 2006). The Ghanaian's views on health care are associated with personal views on health and life. The individual's personal views are instrumental in the decision-making process of seeking services from a traditional healer or conventional medicine practitioner (Tabi, Powell, & Hodnicki, 2006). Furthermore, it should be noted that the health-seeking behavior in Ghana is a negotiated process that is social where cultural beliefs are a priori considerations when contemplating the use of unconventional remedies (Gyasi et al., 2016). As previously mentioned, the philosophies of individuals that encompass cultural norms and health beliefs create an impetus to want to be part of the healing process. Therefore, the healing process considers the way the illness is perceived, its etiology, and the TM options/efficacy/safety (Gyasi et al., 2016).

The priest or priestess is the most common type of traditional healers in Ghana. As such, the Ghanaian traditional medicine practice incorporates beliefs in deities and gods through divinations and rituals (Tabi, Powell, & Hodnicki, 2006). Is it important to note that such an approach to traditional medicine is not limited to Ghana but is a cultural aspect of Africa and her diaspora. Traditional medicine incorporates various approaches to maintain and restore health. However, many aspects of traditional medicine have contributed to its eroding popularity that include the at-times more efficacious modern medicine. However, unpopular TM practices are in today's medical terrain; they existed before the advent of conventional medicine and provided solutions when none previously existed.

Because of its continued relevancy in the treatment/cure of contemporary malaises and diseases, it is argued that assigning the term "traditional" could be seen as pejorative. A case in point is the sophisticated CAM systems developed by China (through Acupuncture) and India

(Ayurvedic) (Gyasi, Mensah, Adjei, & Agyemang, 2011). An encouraging aspect of traditional Ghanaian medicine is that it has been assimilated as a formal course of study in its universities, and it is the case for other African countries (Gyasi, Mensah, Adjei, & Agyemang, 2011). For example, the Kwame Nkrumah University of Science and Technology (KNUST) provides a Bachelor of Science (BSc) degree recognized by the Traditional and Alternative Medicine Council. The completion of the program allows the graduate to be recognized as an herbal medicine practitioner. Additionally, the graduates can counsel and prescribe herbal medication for the private and public sectors (Aziato & Antwi, 2016).

Currently, there is a mutual indifference when it comes to traditional and conventional medicine. That situation is present around the world, and Ghana is no exception. Irrespective of indifference sentiments, the approaches to healthcare have for mission, the betterment of the patient. The indifference is partially supported by human migration to densely populated areas (i.e., metropolis) to improve socioeconomic situations. In the urban setting, the new settlers' views on TM are somewhat accommodated in a situation where conventional medicine tends to be the standard of care. Therefore, the new migrants are somewhat forced to mostly adopt healthcare approaches that are foreign to them because TM is not supported the same way in urban settings as they would be in rural settings. Using "urban" healthcare approaches, these new migrants distance themselves physically and emotionally from their traditions.

The distancing allows for the subsequent adoption of the cultures to which they are in close proximity. Such a transition does come at a cost that is not always considered when criticizing the existence of traditional medicine. For simple ailments (and assuming that such ailments do not have underlying complications), in rural/traditional settings where traditional medicine is primarily practiced, it is not uncommon for patients to pay for services rendered without legal tenders (Tabi, Powell, & Hodnicki, 2006). However, the burden of paying for services using currency is inescapable in big cities.

The feelings of mutual indifference can morph into a contentious environment when "east meets west" in the application of medicine. The literature captures a situation where a patient had to be transferred from a TM practitioner's care to a hospital. Before the patient could see a medical doctor, it was deemed necessary for the patient to be washed to remove natural concoctions from the body. This news was not well received, and practitioners of the different belief systems became adversarial. The situation was eventually diffused because a sagacious physician recognized that neither the patient nor the TM practitioners were the culprits in the affair; the blame must be given to the cost-prohibitive nature of Western drugs (Gyasi, Mensah, Adjei, & Agyemang, 2011).

Sentiments of indifference explain the various reasons why there is a persistent lack of collaboration between TM and conventional medicine practitioners in Ghana. They include the perceived lack of respect from those practicing conventional medicine, where there should be a call towards collaborative efforts for better patient outcomes. There is a strong belief by TM practitioners that collaborative efforts would be positive where both arts could benefit from it (O'Brien, et al., 2012). Such a belief is pertinent because no difference was seen between the usage of TM by insured and noninsured (in the national health program) alike in Ghana (Gyasi, 2015).

There are many advantages associated with traditional medicine, and it would be irresponsible not to speak about its shortcomings. Said shortcomings may have fatal effects attributed to the lack of hygiene in the various preparations. Contaminated/adulterated products may easily worsen the conditions of people who are already immunocompromised, thereby potentially sending them on an uncorrectable downward spiral towards their death. Perhaps, more public health attention should be given to such practices, and standardization may be the path of least resistance. Essentially, with the scientific progress made by humanity, we would all be well served by applying such methodologies to TM instead of relying on the systematic usage of trials and errors (Gyasi, Mensah, Adjei, & Agyemang, 2011).

However, by effectively modernizing TM, its products' price would increase, which would defeat one of its primary appeals (Gyasi, Mensah, Adjei, & Agyemang, 2011). Another

shortcoming of traditional medicine in Ghana has to do with the three ways one could come to "master the art"; 1) one can learn the art of TM through a close family member, 2) one can also learn the art through structured apprenticeship from an established practitioner, 3) the third and final way to become a practitioner is through spiritual calling. One should note that it is not uncommon for the TM practitioner to refer the patient to a hospital if the issue is out of his/her skill set.

The literature makes it clear that the practice of conventional medicine in Ghana is not equipped to address mental health and psychosocial issues, and it is the spiritual-based practitioners that provide relief to most Ghanaians (Gyasi, Mensah, Adjei, & Agyemang, 2011). A point should be made about TM and conventional medicine's concurrent usages because such application could interfere with the treatment program and contribute to drug interaction. The number of cases attributed to interactions has increased/worsened because some Ghanaians use TM after visiting conventional medicine practitioners. At times, TM can be a second, third or, fourth choice (Sato, 2012). As previously mentioned, the poorer/rural segment of developing countries' population tends to use TM as a first course of action. Drug-herb interaction(s) could be prevented if TM usage disclosure were made to conventional medicine practitioners. However, the contentious relationship between these two fields creates an environment where patients are not asked if they use TM or prior experiences with physicians make them fearful of broaching the subject.

A fundamental commonality between TM and conventional medicine is that they converge towards maintaining and re-establishing health. Apart from that, it seems that philosophically speaking, they tend to be divergent. Such a philosophical divergence can prove problematic at best and could have catastrophic results if the two approaches are used simultaneously. This is problematic in a country that practices therapeutic pluralism to achieve the best health outcomes (medical and spiritual) for the majority (Gyasi, Siaw, & Mensah, 2015).

TM is involved with the treatment of cancer in Ghana and specifically Kumasi. In an NIH publication, O'Brien et al. (2012) established the understanding of traditional medicine practitioners

(TMP) regarding cancer (p. 7). Their research showed that TMPs understood cancers characterized by visible masses, fungus-like lesions, ulcerations, and bleeding to indicate the advanced states of types of cancers encountered by them. TMPs believed that they could prevent and treat some of the cancers they encounter, as they believe to understand their causalities. The issue is that data from the Oncology Directorate at KATH supports that the use of alternative therapies often leads to delays in treatment. This contributed to late-stage presentation, therefore, decreasing survival rates.

Lower survival rates are associated with TM practitioners' inability to detect the early stages of cancer. Such deficiencies could be somewhat mended if conventional training was provided because TM practitioners tend to be receptive to bridging the knowledge gap. Such efforts would not be futile because TM practitioners in Ghana already have a knowledge base when it comes to the etiology of cancer. TM practitioners understood the importance of diet and lifestyle, even though formal training was not provided. However, it should be noted that TM practitioners are a de facto part of the healthcare system as they keep records, follow up and refer patients when their care requires it (O'Brien et al., 2012).

When treating people living with HIV/AIDS (PLHIV) on the African continent (including Ghana), it is common for them to use hypoxis and sutherlandia to manage their symptoms, even though it has been proven that they negatively affect the ART cocktails (Sato, 2012). As previously mentioned, TM's usage should be initiated with caution because there is the possibility of drug-herb interaction that may lead to liver toxicity. Before any culpability is ascribed to patients when it comes to noncompliance, it should be noted that medication shortages contribute to health workers prescribing non-prescription remedies (Laar et al., 2017). The reasons for non-compliance seem relatively straightforward, but in a study by Gyasi et al., approximately 94% of survey participants did not disclose their use of TM for the treatment of their HIV infection to their conventional medicine providers. TM was primarily used for appetite improvement, pain relief, and general well-being (Gyasi et al., 2013).

Evidence shows that CAM is commonly used in Ghanaian patients who are hypertensive (8-40%). In addition to the cost savings associated with TM/CAM, the medicine's natural source adds to the appeal. As previously mentioned, there is an assumption that TM is safe that goes against what is known in Public Health and specifically Epidemiology. That knowledge is captured in the adage that it is the dosage that makes the poison. In a nonregulated field, the formulation of "poisons" may be more common than we would like to believe (Kretchy, Owusu-Daaku, & Danquah, 2014).

The routes of administration for TM are similar to those of conventional medicine. Addo reports the lack of documentation associated with the usage of TM in the genealogical ward at KATH. Said lack of documentation are related to issues of TM concoctions that are administered using the oral, rectal, vaginal routes, or a combination of aforementioned routes. The issue with TM's specialized use is that they have created toxic events in patients that needed surgery and have affected the outcomes of pregnancies (Kretchy, Owusu-Daaku, & Danquah, 2014).

A commonality with all medical conditions explored until now is that the patients, irrespective of demographics, are reluctant to disclose their TM usage to their physicians. This can easily complicate matters as with overlapping toxicity in cancer patients. When it comes to cancer patients, kava causes hepatotoxicity. St. John Wort interacts with drugs and causes surgical complications. Ginseng is known to affect the anticoagulant properties of other drugs and causes hypoglycemia. Finally, garlic and ginko are also known as anticoagulants. TM/CAM are used in Ghana to alleviated side effects associated with cancer therapy to include; gastric distress, nausea, diarrhea and, itching spells (Yarney et al., 2013).

As previously mentioned, this research took place in Kumasi at KATH. Kumasi is the capital of the Ashanti Region. KATH is the primary referral hospital for the following regions; Ahafo, Ashanti, Brong, and Volta (North, Upper East, and Upper West) regions (Kretchy, Owusu-Daaku, & Danquah, 2014). As an institution, KATH receives people of diverse cultural and socioeconomic backgrounds. The patient population travels from all corners of the country and, at

times, from neighboring countries. Common diseases for this hospital are diarrhea, malaria, tuberculosis, HIV/AIDS, hypertension, and diabetes (Gyasi et al., 2013). This patient population provides an environment where various perspectives can be explored when it comes to the various reasons people use TM alone or in conjunction with conventional medicine.

Conceptual Framework - Andersen Behavioral Health Model

When considering the various reasons people use TM, two polarized approaches elucidate the phenomenon. They can be classified as pull and push mechanisms that further help in the characterization of the approaches. The pull aspect of TM utilization has to do with the various factors that entice potential users to use it. High on the list of reasons to use TM are the ability to take control over one's health and its all-encompassing nature that include personal and religious beliefs (Tabi, Powell, & Hodnicki, 2006). The other point to consider when it comes to the contribution to the pull mechanism of TM is patients' dissatisfaction with conventional medicine as a function of its ineffectiveness (Aziato & Antwi, 2016). One should note that complaints of conventional medicine's ineffective nature tend to be mostly associated with what is considered tropical and neglected diseases (Gyasi et al., 2016). Conventional medicine response to these diseases tend to have adverse side effects attributed to their synthetic nature, and their administrations tend to be impersonal and cost-prohibitive (Gyasi et al., 2016).

Conversely, the push mechanism is facilitated by the aversion to conventional medicine that can be seen as foreign to the prevalent culture, which, in our case, is Ghana's. Unlike conventional medicine, TM incorporates remedies to address spiritual and psychological issues in its quest to reestablish physical health. The push mechanism is associated with the African social cohesion that serves as a binder of community members, thereby influencing TM's use (Gyasi et al., 2016). Said cohesion facilitates TM's recommendation by families, friends, and other community members (Gyasi et al., 2016).
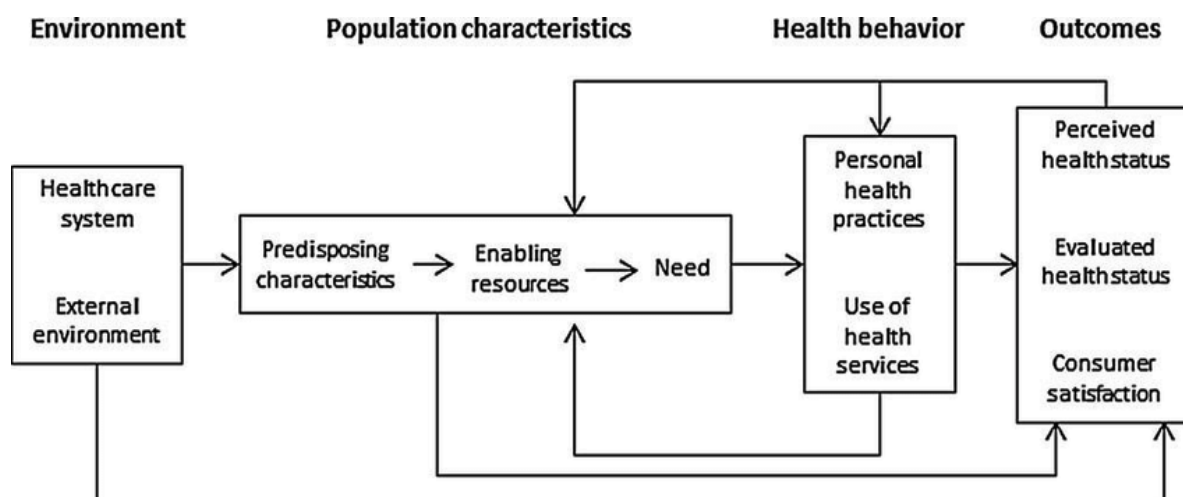
Figure 3. The Andersen Model of Healthcare Utilization

The aforementioned pull and push mechanisms associated with TM usage are further explained by Andersen's Healthcare Utilization Model (AHU). Figure 3 provides a visual representation of the model. For that reason, the AHU will be used as this study's conceptual framework. This is because it classifies the various reasons for the uptake of TM in three different contexts. Said contexts are predisposing, enabling, and need factors. Predisposing factors capture the individual context of the potential patient of various aspects of medicine, TM included. It should be noted that the most researched predisposing factors are age, marital status, gender/sex, ethnicity/nativity, and employment status.

Enabling factors are as the name implies. They are a function of the individual's ability to absorb healthcare costs; however, it also encompasses an organization's ability to offer a reliable source of care that is apropos to the patient's primary complaint. The most investigated enabling factors are income/financial situation, health insurance, consistency of a source of healthcare, and medical services availability.

The third context of the AHU model is the need factor related to the patient's perceived needs. When it comes to this dimension, the AHU model, it is essential not to confuse the patient's perceived needs versus actual needs as evaluated by healthcare providers. The need factors that have recently received the most attention are health status, self-reported/perceived health, diabetes,

depressive symptoms, hypertension, heart disease, cancer, prior medical conditions and, the presence/absence of medical services (Azfredrick, 2016).

The AHU model has primarily been used in research projects in the United States and other developed countries such as the United Kingdom and has been less used within the context of low-income countries, like Ghana (Babitsch, Gohl, & von Lengerke, 2012). The body of knowledge captures research performed in the USA, UK, Canada, Germany, Korea, Argentina, and Nigeria. The topic of such research included primary care, mental health, academic tertiary care centers, among others. Additionally, the majority of the use of the model made use of secondary data. In their literature review, Babitsch et al. identified a great need for internationally conducted primary research that properly operationalizes the AHU model's complexity. It is the absence of such information that this research aims to address. However, the literature review did not yield an instance where the AHU model was used to examine TM. This is where this study aims to contribute to the body of knowledge.
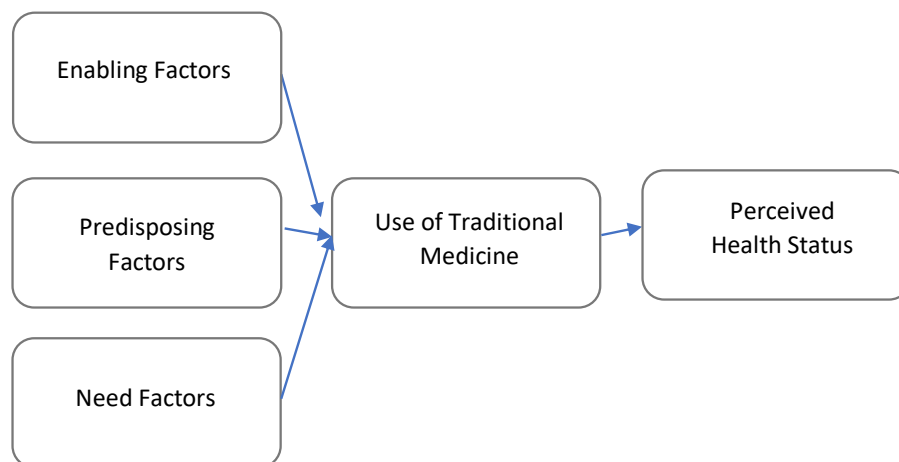
Figure 4. Contextual Application of the AHU model.

Outline of the Remaining Chapters

Chapter 2 examined and discussed the existing literature as it applies to herbal medicine usage around the world, on the African continent and specifically in Ghana. The literature review identified a lack of theoretically-informed empirical studies of the utilization of TM within the African and Ghanaian context – a gap this study fills. Chapter 2 also presented the Conceptual Framework used in this study, Andersen's Healthcare Utilization Model. The subsequent chapters will be organized as follows: Chapter 3 summarizes the methodological approach of the study. Chapter 4 presents the results of the study. Finally, Chapter 5 discusses the findings of the study, examines the outcomes of the research questions, and contributes to the understanding of the global health implications of the research results

CHAPTER 3

METHODOLOGY

Study Population and Sample

The study focused on assessing factors associated with herbal medicine use among patients with chronic conditions in Kumasi, Ghana. The study included a convenient sample obtained from the patient population of KATH in Kumasi, Ghana. KATH is a 1200-bed hospital with approximately 4000 dedicated staff (Komfo Anokye Teaching Hospital, n.d). Over the period of approximately two weeks, patients with one of more chronic conditions, seeking care from the following departments were invited to participate in the study: a) Dermatology, b) Diabetes, c) Dialysis, d) Family Medicine, e) Female Fever Unit, f) Main Theater, g) Male Fever Unit, h) Male Intensive Care (ICU) Unit, i) Oncology, j) Outpatient Department (OPD), k) Preoperative (Preop) Female Unit, and l) the Thyroid Unit.

Interested participants were screened for the presence of at least one chronic condition, before enrolling them in the study. Participants completed a survey, administered in the form of a structured interview. Research assistants of the Georgia Southern University partnered with medical students from the Kwame Nkrumah University of Science and Technology to secure the necessary informed consent for the surveys and to administer the survey. Such partnership was vital for the optimization of the research efforts, because many patients were more comfortable in expressing themselves in their mother tongue, which is predominantly Twi.

Survey Instrument

A survey, developed based on a comprehensive literature review, was used as the data collection instrument. The survey instrument was divided into the following sections: 1) My Health, 2) Care for Chronic Condition, 3) Herbal Medicine, 4) Medical Care, and 5) Demographics (About You).

The "My Health" section obtained information on the health status of the patient, including perceived current health status and evaluated need for health services (i.e. medical conditions). Collectively, the questions in this section provided information on the need factors and perceived health status domains of the AHU model. The "Care for Chronic Condition" section obtained information on the enabling factors. The questions in this section of the survey sought to capture the potential financial constraints associated with the health-seeking behavior. Additionally, the section evaluated other barriers to care including the distance barriers. The "Medical Care" section also provided information on enabling factors associated with healthcare service utilization. Questions in this section sought to evaluate the participants' experiences with the health care delivery system. This is because a patient's view of the medical system facilitates or hinders their utilization of conventional medical services and consequently, may enable or hinder the use of herbal medicine as an alternative source of care. The "Herbal Medicine" section sought to gain information about herbal medication use and specifically, the circumstances surrounding the usage of herbal medicine. This section also obtained information on beliefs regarding herbal medicine use. The AHU model considers beliefs a predisposing factor in the use of health services. The "Culture" section captured attitudes toward the preservation of traditional culture. According to AHU model, such cultural norms, attitudes and belief may predispose an individual to use or not use traditional or herbal medicine. Finally, the demographic or "About You" section captured classical predisposing factors of the AHU model. As previously mentioned, these predisposing factors included gender, age, marital status, educational level, occupation, religion, and the setting and region where the individual lives.

Data Management

Data were collected using a paper-based survey. The data was ultimately uploaded in a Microsoft Excel spreadsheet for data cleaning. The various questions of the survey were coded to allow a concise analysis of the data. The codebook is captured in Appendix B. Data were re-evaluated to ensure completeness. 214 surveys were completed in Kumasi. Five were excluded from subsequent analysis because participants reported no documented chronic illness, resulting in a final analytical sample of 209. Data analyses were subsequently completed using Stata 15.0.

Dependent Variables

This study sought to (a) examine the determinants of the use of traditional medicine and (b) assess the relationship between past or current traditional medicine use and health outcomes, as measured by current perceived health status. Therefore, the two dependent variables of this research were the use of traditional medicine and self-reported (perceived) health status. The use of traditional (also known as herbal) medicine was measured as a categorical variable as follows: never used, past usage, and current usage. Self-reported health status was measured as the average score on the "General Health Perception" subscale of the Medical Outcomes Study Short-Form-36 (Ware, Snow, Kosinski & Gandek, 1993).

Independent Variables

The selection of independent variables was guided by the AHU model. Collectively, the study's independent variables assessed predisposing, enabling and need factors. Predisposing factors included beliefs concerning herbal medicine use, cultural beliefs, gender, age, marital status, educational level, employment status, and religion. Need factors were assessed as evaluated need factors and included the number of diagnosed chronic conditions. Assessed enabling factors included the presence of health insurance, perceived quality of conventional care, satisfaction with

physicians, reported accessibility barriers to healthcare access, and geographic location (rural versus urban). Table 1 operationalizes the study's variables.

Exploratory Factor Analysis

Exploratory factor analysis (EFA) was used to assess construct validity. Specifically, EFA explores the inter-correlation of test questions to validate survey scales and identify those with empirical support for conceptual relevance (Watkins, 2018). Items with a factor loading of at least 0.40 were retained; all others were eliminated. This included one item from the General Health Perception Scale, three items from the herbal medicine belief scale and five items from the satisfaction with physicians' scale (see Appendix for survey). Notably, the herbal medicine scale was originally conceptualized as a unidimensional domain, however, following EFA the items loaded under two factors: general beliefs and beliefs regarding co-use of herbal and conventional medicine. Table 2 presents the final scales with their respective items.

Scale reliability was assessed using the Cronbach alpha co-efficient. The Cronbach alpha co-efficient for all subscales exceeded the 0.70 benchmark for acceptable scale reliability (Nunnally, 1978) (Table 2). Subsequently, resulting validated scales were aggregated into single respective scores by taking the average score across survey items (Trochim, Donnely and Akora, 2016).

Table 1. Organization of the Research Measures.

	Construct	Variable	Measure
Behavioral Construct (Outcome)	Model 1: Use of TM	Have you ever used herbal medicine to treat any condition? How many different herbal medications are you <u>currently</u> taking? Note: The two questions combined into one variable that distinguished between past and current use.	0= Never Used 1= Past Use 2= Current Use
Behavioral Construct (Outcome)	Model 2: Health Status	Health Status (General Health Perception Scale)	Health Status Score
Causal Constructs (Independent Variables)	Enabling Factors	Insurance status	1-Yes 0-No
		Geographic Location	1-Rural 2-Periurban 3-Urban
		Accessibility Barriers to Care	Reported one or more barriers to health access 1-Yes 0-No
		Satisfaction with Physician (Scale)	Satisfaction with Physician Score
Causal Constructs (Independent Variables)	Predisposing Factors	Age	Age in years (Continuous)
		Gender	1-Male 2-Female
		Marital Status	1-Married/Cohabiting 0-Other
		Religion	1-No Religion 2-Christian 3-Islam 4-Traditional

	Construct	Variable	Measure
			5-Other
		Education	1-Never attended school
			2- Primary school
			3-JSS
			4-SSS
			5-College degree
			6- Graduate degree
		Employment	1-Employed
			0-Other
		Herbal Medicine Beliefs	Herbal Medicine Belief Score
		Cultural Belief (Scale)	Cultural Belief Score
Causal Constructs (Independent Variables)	Need Factors	Evaluated Health Need	Total number of chronic conditions (Count)

Table 2. Exploratory Factor Analysis of the scales associated with the survey administered to the patient sample of KATH.

Survey Item		Factor Loading				Cronbach Alpha
		1	2	3	4	
General Health Perception	I am as healthy as anybody I know	0.66				0.72
	My health is excellent	0.76				
	I have been feeling bad lately	0.44				
General Beliefs About Herbal Medicine	There is nothing wrong with using herbal medicine		0.79			0.86
	It is okay to use herbal medicine when you do not have access to the drugs needed to treat your condition		0.66			
	There are herbal cures for many diseases		0.64			
	Herbal medicine is safe		0.84			
	Herbal medicine is effective		0.86			
	In many cases, herbal medicine works better than medicine prescribed by doctors		0.51			
Beliefs About Co-use of Herbal and Conventional Medicine	Herbal medicine can sometimes make medications prescribed by doctors or pharmacists less effective			0.46		0.72
	In some cases, it is harmful to use certain types of			0.49		

	herbal medicine together with certain drugs prescribed by a doctor or pharmacist may be harmful		
Satisfaction with Physicians	Most doctors care about their patients	0.75	
	Most doctors treat patients with respect and dignity	0.75	0.80
	Most doctors explain things to patients in a way that is easy to understand	0.68	
Cultural Beliefs	It is important to practice our traditional culture	0.65	
	There are a lot of things we can learn from our culture	0.79	0.85
	It is important for us to teach our children our traditional culture	0.81	

Univariate and Bivariate Analyses

Descriptive statistics including means, standard deviation, minimum, maximum and frequencies were used to describe the study variables. Descriptive statistical tests such as t-test and chi-square were used to assess relationships among variable pairs as appropriate. Spearman correlation coefficients were used to examine correlations among variable pairs and to determine the presence of multi-collinearity.

Multivariable Analysis

Multinomial Logistic Regression – Determinants of Traditional Medicine Use

Logistic regression allows for the modeling of dependent variables that are binary, or dichotomous. It assumes that taking the logarithm of the odds of membership in one population is a linear function of multiple predictors or independent variables of a model (Shi, 2008). Multinomial logistic regression is an extension of logistic regression that makes allowance for categorical dependent variables with more than two levels of measurement. Similar to logistic regression, multinomial logistic regression incorporates the maximum likelihood estimation to assess the probability of categorical inclusion. Unlike linear regression, multinomial logistic regression does not assume normality, linearity or homoscedasticity (Starkweather and Moske, 2011).

In this study, multinomial logistic regression was appropriate since the dependent variable, TM use was measured at 3 levels: never used, past usage and current usage. The multinomial regression model included need, predisposing and enabling factors as independent variables.

Tobit Regression with Endogenous Covariates (Instrumental Variable) – Relationship TM Use and Current Health Status

To assess the relationship between TM use and health status, an instrumental variable approach was used. An instrumental variable approach is appropriate for instances when there is endogeneity. In the case of this study, it was possible that while TM use could influence an individual's health, an individual's perceived health status could also influence use of TM. There was therefore a potential bi-directional association, leading to a simultaneity problem. An instrumental variable allows researchers to address this problem of endogeneity.

An instrument has to meet two criteria: relevance and exogeneity. This means the instrument has to be a variable that is related to the endogenous independent variable (in this case traditional medicine use is the endogenous variable) (i.e. relevance criteria) but not related to the outcome variable (in this case health status), except through endogenous variable (i.e. exogeneity criteria) (Gitto, Noh, & Andrés, 2015). To reduce issues related to under-identification, multiple instruments can be selected per endogenous variable (Dunn, 2009). For this study, the use of traditional medicine by family and friends, beliefs about herbal medicine, cultural beliefs were identified as the instruments, since neither family nor friends' usage nor herbal medicine or cultural beliefs are expected to directly influence an individual's health, except through increasing the individual's likelihood to use traditional medicine. The F-test and the J-test were used to assess whether the instrument met the relevance and the endogeneity assumptions, respectively (Ullah, Zaefarian, & Ullah, 2020). In addition, the Wald test for exogeneity was used to assess whether herbal medicine use variable was truly endogenous, as conceptualized (Gitto, Noh, & Andrés, 2015).

Stata's Tobit Regression with Endogenous Covariates function (ivtobit) was used for conducting the instrumental variable regression. The Tobit model allows for the analysis of dependent variables that are truncated or censored. It is also known as the censored regression

model and can be used for continuous dependent variables and truncated/censored dependent variables (Orme J. and Buehler, 2001). In the case of this study, the health status score was constrained between the values of 1 and 5, because each of the scale items were measured on a 5-point Likert scale. The Tobit instrumental variable regression model also included need, predisposing and enabling factors as independent variables.

Reporting

The reporting of the data was aggregated to ensure the de-identification of participating patients of the Komfo Anokye Teaching Hospital. Statistical significance was assessed using a p-value of less than 0.05. The Stata statistical software version 15 was used to analyze the data.

Ethical Consideration

The Georgia Southern University's Office of Research Integrity (Institutional Review Board) approved this research (Protocol Number H15458). Additionally, the Committee on Human Research, Publications, and Ethics from the Kwame Nkrumah University of Science and Technology approved this research. Said approvals allowed for the execution of the pre-approved data collection instruments in Kumasi, Ghana at the Komfo Anokye Teaching Hospital. The data is not identifiable and was collected in strict adherence to the protocol. Furthermore, informed consent was collected for each of the respondents. Voluntary participation was emphasized and participants were informed of their right to be able to stop participating in the study at any time during the data collection process.

Outline of the Remaining Chapters

Chapter 3 summarized the methodological approach of the study. Chapter 4 presents the results of the study. Finally, Chapter 5 discusses the findings of the study, examines the outcomes of the research questions and discusses the global health implications of the research results.

CHAPTER 4

RESULTS

Descriptive Statistics

Table 3 describes the demographic characteristics of the research participants. About two-thirds (66.8%) of the sample was female and married or cohabitating (63.1%). About a quarter reported no formal education (22.3%). The majority of the sample was unemployed (53.6%)., and most identified as Christian (86.1%) when came to religious affiliation. The age of the patient sample ranged from 20-106 with an average age of 56. In terms of parity, the range was from 0-16 children, with an average of 4 children per patient.

With respect to enabling factors for health services utilization, 89% of the sample had health insurance. The majority of participants lived in the urban or peri-urban areas (52.7%) primarily in the Ashanti region (82.7%). A minority of the patient sample reported experiencing barriers (39%) when it came to access to healthcare.

With respect to need factors, the most commonly reported chronic conditions were diabetes (32.7%), hypertension (54.1%), and cancer (31.6%). Forty percent of the participants had 1 chronic condition; 41% had 2 chronic conditions, 18% suffered from 3 chronic conditions, and 1% suffered from 4 or more chronic conditions (Table 4).

Table 3. Descriptive Characteristics of Study Sample.

		n (%)	N	
Predisposing Factors				
Gender	Male	68 (33.2)	205	
	Female	137 (66.8)		
Civil Status	Not Married/Cohabit	76 (36.9)		
	Married/Cohabit	130 (63.1)		
Education	None	46 (22.3)		
	Primary	26 (12.6)	206	
	JSS	46 (22.3)		
	SSS	57 (27.7)		
	College	18 (8.7)		
	Graduate	13 (6.3)		
Employment	Employed	96 (46.4)	207	
	Not employed	111 (53.6)		
Religion	Not Christian	29 (13.4)	208	
	Christian	179 (86.1)		
	Range	**Average**	**N**	**SD**
Age	20-106	56	204	31
Children	0-16	4.4	206	6.7
Enabling Factors				
		n (%)	N	
Health Ins.	Yes	187 (89.0)	209	
	No	22 (11.0)		
Urban/Rural	Urban	20 (9.8)		
	Peri-urban	88 (42.9)	205	
	Rural	97 (47.3)		
Regions	Ashanti	172 (82.7)		
	Brong Ahafo	10 (4.8)		
	Central	2 (1.0)		
	Eastern	5 (24)		
	Greater Accra	2 (1.0)		
	Northern	4 (1.9)	208	
	Upper East	1 (0.5)		
	Upper West	1 (0.5)		
	Volta	1 (0.5)		
	Western	8 (3.9)		
Barriers	Yes	81 (39.0)		
	No	128 (61.0)		

Family/Friends Use	Yes	112 (54)	207
	No	95 (46)	

Need Factors			
Chronic Disease		**n (%)**	**N**
Diabetes		68 (32.7)	208
Hypertension		113 (54.1)	
Asthma		5 (2.4)	
Heart Failure		7 (3.4)	
Smoke		8 (3.8)	
Arthritis		35 (16.8)	
Sickle Cell		6 (2.9)	
HIV/AIDS		3 (1.4)	209
Cancer		66 (31.6)	
Kidney		19 (9.1)	
Other		42 (20.1)	
TCC	1 condition	83 (40)	
TCC	2 conditions	85 (41)	
TCC	3 conditions	37 (18)	
TCC	4 conditions	2 (1)	

Table 4 stratifies the demographic characteristics of participants by herbal medicine use. With respect to gender, females made up 72% of those who had never used herbal medicine (i.e. never users), 68% of those who had used it in the past and 60% of those who were current users. Seventy-two percent of current users were married or cohabiting, compared to 50% of never users. With respect to education, 29% had never used herbal medicine, compared to 21% and 20% among past and current users, respectively. 54% of those who had never used herbal medicine were employed, compared to 53% and 55% in the past use and current use categories, respectively. A similar proportion of never users (84%), past users (87%) and current users (85%) were Christians. The average age of the survey respondents across use categories were similar. The mean ages were 57 (never users), 54 (past users) and 53 (current users), respectively. On average, respondents had 4 children across all herbal use categories.

The majority of participants were insured, regardless of herbal medicine use: never used (86%), used in the past (92%), and currently use (87%) (Table 4). Among past and current use categories, the majority of participants reported residence in a rural or peri-urban area (56% and 55% respectively). Across all categories, the majority of participant were from the Ashanti region (88% among never users, 80% among past users and 83% among current users) and reported an absence of accessibility barriers to healthcare (66% among never users, 58% among past users and 68% among current users). A higher proportion of past users reported accessibility barriers.

With respect to need factors, diabetics made up 52% of those who reported having never used herbal medicine, 55% of past users, and 51% of current users. Fifty-four percent of never users, 65% of past users and 53% of current users reported two or more chronic conditions, respectively (Table 4).

Table 4. Participant Demographic Characteristics by Herbal Medicine Use

	n (%)	N	
Predisposing Factors			
Gender			
Male	68 (33.2)	205	
Female	137 (66.8)		
Civil Status			
Not Married/Cohabit	76 (36.9)		
Married/Cohabit	130 (63.1)		
Education			
None	46 (22.3)	206	
Primary	26 (12.6)		
JSS	46 (22.3)		
SSS	57 (27.7)		
College	18 (8.7)		
Graduate	13 (6.3)		
Employment			
Employed	96 (46.4)	207	
Not employed	111 (53.6)		
Religion			
Not Christian	29 (13.4)	208	
Christian	179 (86.1)		

	Range	Average	N	SD
Age	20-106	56	204	31
Children	0-16	4.4	206	6.7

Enabling Factors		
	n (%)	N
Health Ins.		209
Yes	187 (89)	
No	22 (11)	
Urban/Rural		205
Urban	20 (9.8)	
Peri-urban	88 (42.9)	
Rural	97 (47.3)	
Regions		
Ashanti	172 (82.7)	
Brong Ahafo	10 (4.8)	
Central	2 (1.0)	
Eastern	5 (24)	
Greater Accra	2 (1.0)	
Northern	4 (1.9)	208
Upper East	1 (0.5)	
Upper West	1 (0.5)	
Volta	1 (0.5)	
Western	8 (3.9)	
Barriers		
Yes	81 (39)	
No	128 (61)	
Family/Friends Use		
Yes	112 (54)	207
No	95 (46)	

Need Factors		
	n (%)	**N**
Chronic Disease		
Diabetes	68 (32.7)	208
Hypertension	113 (54.1)	
Asthma	5 (2.4)	
Heart Failure	7 (3.4)	
Smoke	8 (3.8)	
Arthritis	35 (16.8)	
Sickle Cell	6 (2.9)	
HIV/AIDS	3 (1.4)	
Cancer	66 (31.6)	
Kidney	19 (9.1)	
Other	42 (20.1)	
Total Number of Chronic Conditions		
1 condition	83 (40)	
2 conditions	85 (41)	
3 conditions	37 (18)	
4 conditions	2 (1)	

Mean Scores for Validated Scales

All psychometrically validated scales were measured on a 5-point Likert scale. Participants on average reported low to moderate perceived health status, moderately favorable believes concerning herbal medicine and its co-use with conventional medicine, high levels of satisfaction with their physicians and strong support for their culture (Table 5).

Table 5. Summary of Scales

	N	Mean	Standard Deviation	Minimum	Maximum
General Health Perceptions	203	2.87	1.09	1	5
General Beliefs About Herbal Medicine	209	3.32	0.81	1	5
Beliefs About Co-use of Herbal and Conventional Medicine	208	3.57	0.91	1	5
Satisfaction with Physicians	207	3.99	0.70	1	5
Cultural Beliefs	205	4.11	0.65	2	5

Spearman Correlation Analysis

The Spearman Correlation Analysis (Table 6) tested for multicollinearity. The standard cut-off of 0.65 was used to assess the presence of multicollinearity. Multicollinearity refers to strong linear relationships between two or more independent variables in a multiple regression model. Its presence causes issues with model fit and interpretation. An examination of the correlation coefficients (Table 6) indicated the absence of multicollinearity in the data.

Table 6. Spearman correlation analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Female (1)	1														
Age (2)	0.13														
Cohabit. (3)	-0.28	-0.13	1												
Christian (4)	-0.08	0	0.09	1											
Educ. (5)	-0.35	-0.31	0.13	0.17	1										
Employ. (6)	-0.20	-0.45	0.27	0.13	0.23	1									
HM Beliefs (7)	-0.02	-0.06	0.15	-0.02	0.08	0.01	1								
Cultural Beliefs(8)	0.04	0.03	0.03	-0.05	0.10	0.13	0.22	1							
Co-Use Beliefs (9)	0.02	-0.03	-0.13	-0.11	0.09	0.06	-0.11	0.23	1						
Fam_FriendUse (10)	-0.10	-0.22	0.07	0.13	0.12	0.10	0.34	0.08	-0.02	1					
Health Ins. (11)	0.02	0.15	0.09	-0.09	0.30	-0.01	0.05	0.23	-0.01	0.05	1				
Rural (12)	-0.05	0.16	-0.08	-0	0.20	-0.08	-0.07	-0.08	-0.02	-0.17	0.01	1			
Barriers (13)	-0.04	-0.01	0.07	-0.01	-0.07	0.08	-0.02	0.19	0.10	0.09	-0.05	0.22	1		
Dr. Satisfaction (14)	0.12	0.06	-0.10	-0.05	-0.03	0.15	-0.09	0.32	0.29	-0.03	0.12	-0.05	0.22	1	
Total CC (15)	0.17	0.35	-0.13	0	-0.11	-0.34	0	0.01	-0.05	-0.16	0.11	0.07	0.01	-0.09	1

Multinomial Logistic Regression - Factors Associated with Herbal Medicine Use

The summary of the multivariate logistic regression is presented in Table 7. Predisposing, enabling and need factors were sequentially added in the model building process. Model 1 (Predisposing Factors) is the simplest of the models. Model 2 adds on enabling factors to Model 1. Model 3 (Predisposing, Enabling, and Need Factors) represents the full model.

Predisposing Factors. The relative probability of using herbal medicine in the past rather than never is about three times higher for those married or cohabiting than other civil status (Relative Risk Ration (RRR) = 2.83; 95% Confidence Interval (CI) = 1.11-7.23), and about nine times for those knowing family or friends who use herbal medicine than those who did not (RRR=9.23; 95% CI = 3.038-27.7) On the other hand, the relative probability of past usage of herbal medicine rather than never is about 99% lower for those reporting a college education than no education (RRR = 0.01; 95% Confidence Interval (CI) = 0.00-0.14).

The relative probability of currently using herbal medicine rather than never is about four times higher for those reporting more favorable general herbal medicine beliefs (RRR = 3.63; 95% CI = 1.75-7.54), and about eleven times for those knowing family or friends who use herbal medicine than those who did not (RRR=10.7; 95% CI = 3.03-387.0). On the other hand, the relative probability of current usage of herbal medicine rather than never is about 91% lower for those reporting a college education than no education (RRR = 0.09; 95% Confidence Interval (CI) = 0.01-0.81)

Enabling Factors. None of the enabling factors were found to be associated with herbal medicine use.

Need Factors. The total number of chronic conditions was found to be associated with herbal medicine utilization. The relative probability of past usage of herbal medicine rather than never was three times higher for those with greater chronic conditions (RRR=3.0; 95% CI = 1.49 – 6.02). Similarly, the relative probability of current usage of herbal medicine rather than never was

about two times higher for those with greater chronic conditions (RRR=2.22; 95% CI = 1.02 –

4.82).

In summary, patients who knew of family of friends who used herbal medicine and those

with chronic conditions were more likely to be current or past users of herbal medicine. Individuals

who were married/cohabiting were more likely to report being past users, rather than never users;

while those with more favorable general beliefs about herbal medicine were more likely to be

current users, compared to never users. College-educated individuals were more likely to belong in

the never use category. Predisposing factors explained the most variation in the data (21.3%),

followed by need factors (2.8%) and enabling factors (2.5%) (Table 7).

An evaluation of the change in R2 following the sequential model building indicated that

predisposing factors had more explanatory potential, compared to need and enabling factors.

Predisposing factors explained 21% of the variation in the herbal medicine use compared to 2.5%

and 2.8% for enabling and need factors, respectively (Table 8).

Table 7. Multinomial logistic regression analysis - Factors associated with TM use.

	Model 1 – Predisposing Factors		Model 2 – Predisposing and Enabling Factors		Model 3 – Predisposing, Enabling and Need Factors	
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Past Use (Ref: Never Used)						
Predisposing Factors						
Age	0.97	0.94-1.00	0.97	0.94-1.01	0.96*	0.93-1.00
Female (Ref: Male)	1.62	0.56-4.71	1.60	0.54-4.76	1.43	0.47-4.34
Married-Cohabit (Ref: Other)	2.83*	1.11-7.23	3.22*	1.20-8.64	3.89*	1.36-11.1
Christian (Ref: Other)	1.17	0.32-4.18	1.24	0.31-4.97	0.99	0.23-4.33
Education (Ref: None)						
Primary	0.41	0.08-2.01	0.39	0.07-2.16	0.41	0.07-2.63
JHS	1.10	0.29-4.23	1.15	0.27-4.87	1.19	0.26-5.39
SHS	1.56	0.41-5.88	1.90	0.46-7.85	2.11	0.48-9.36
College	0.02***	0-0.13	0.02**	0-0.18	0.01***	0-0.14
Graduate Education	0.73	0.09-5.69	0.78	0.09-6.81	0.84	0.09-7.71
Employed (Ref: Unemployed)	0.38	0.13-1.09	0.33*	0.11-0.99	0.39	0.12-1.25
Gen. Herbal Med. Beliefs	1.42	0.81-2.48	1.48	0.83-2.63	1.45	0.79-2.67

	Model 1 – Predisposing Factors		Model 2 – Predisposing and Enabling Factors		Model 3 – Predisposing, Enabling and Need Factors	
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Friends/Family Use Herbal Med (Ref: No)	9.23***	3.08-27.7	9.53***	2.99-30.4	13.6***	3.86-47.7
Cultural Beliefs	0.99	0.51-1.94	0.88	0.40-1.94	0.74	0.32-1.71
Co-Use Beliefs	1.06	0.64-1.77	0.97	0.58-1.65	0.96	0.54-1.69
Enabling Factors						
Health Insurance			1.44	0.36-5.78	1.27	0.30-5.35
Residence (Ref: Urban)						
Peri-Urban			0.11	0.01-1.19	0.08	0.01-1.01
Rural			0.15	0.01-1.76	0.10	0.01-1.28
Accessibility Barrier (Ref: None)			1.15	0.43-3.08	1.07	0.39-2.97
Physician Satisfaction			1.17	0.55-2.49	1.38	0.60-3.17
Need Factor						

	RRR	95% CI	RRR	95% CI	RRR	95% CI
Total Chronic Conditions					3.00**	1.49-6.02

Current Use (Ref: Never Used)						
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Predisposing Factors						
Age	0.98	0.94-1.01	0.98	0.95-1.02	0.97	0.94-1.01
Female (Ref: Male)	0.87	0.94-1.02	0.88	0.26-3.01	0.80	0.23-2.80
Married-Cohabit (Ref: Other)	2.69	0.86-8.43	3.01	0.94-1.02	3.48*	1.01-12.0
Christian (Ref: Other)	1.56	0.32-7.52	1.75	0.33-9.42	1.44	0.25-8.16
Education (Ref: None)						
Primary	0.50	0.08-3.16	0.38	0.05-2.67	0.42	0.05-3.25
JHS	0.85	0.17-4.30	0.65	0.12-3.62	0.67	0.11-3.93
SHS	0.67	0.13-3.56	0.57	0.10-3.34	0.64	0.10-3.88
College	0.11*	0.02-0.84	0.11*	0.01-0.93	0.09*	0.01-0.81
Graduate Education	0.35	0.03-4.66	0.32	0.02-5.00	0.32	0.02-5.40
Employed (Ref: Unemployed)	0.47	0.14-1.58	0.47	0.13-1.68	0.53	0.14-1.96
Gen. Herbal Med. Beliefs	3.63**	1.75-7.54	3.63**	1.71-7.71	3.64**	1.68-7.90
Friends/Family Use Herbal Med (Ref: No)	10.7***	3.03-38.0	11.8***	3.16-44.1	14.5***	3.61-58.3
Cultural Beliefs	0.81	0.35-1.84	0.85	0.34-2.15	0.71	0.27-1.86
Co-Use Beliefs	0.72	0.39-1.30	0.72	0.39-1.33	0.70	0.37-1.33
	Model 1 – Predisposing Factors		Model 2 – Predisposing and Enabling Factors		Model 3 – Predisposing, Enabling and Need Factors	
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Enabling Factors						
Health Insurance			1.22	0.27-5.55	1.19	0.25-5.57
Residence (Ref: Urban)						
Peri-Urban			0.20	0.14-3.00	0.15	0.01-2.54
Rural			0.23	0.01-3.68	0.15	0.01-2.65
Accessibility			0.62	0.19-1.99	0.59	0.18-1.97
Barrier (Ref: None)						
Physician Satisfaction			0.71	0.31-1.62	0.78	0.33-1.89
Need Factor						
Total Chronic Conditions					2.22*	1.02-4.82

*p<0.05 **p<0.01; ***p<0.001

Table 8. Change in R-squares for Multinomial Models

	R^2	Change in R^2
Model 1 (Predisposing)	0.2134	-
Model 2 (Predisposing and Enabling)	0.2379	2.45
Model 3 (Predisposing, Enabling and Need)	0.2662	2.83

Instrumental Variable Regression - Relationship between Herbal Medicine Use and Perceived Health Status

Table 9 and 10 provide the results of the Tobit regression analysis without and with instruments to test for endogeneity. The instruments assessed were beliefs about herbal medicine and knowledge of family and friends who used herbal medicine. Both herbal medicine belief variables (general herbal medicine beliefs and beliefs regarding co-use with of herbal medicine with conventional medicine) as well as cultural beliefs were tested as potential instruments. Co-use beliefs and cultural beliefs were subsequently dropped because they did not meet the relevance assumption, as both were not found to be associated with herbal medicine use. General herbal medicine beliefs and family and friends use of herbal medicine collectively met the relevance assumption (F-test statistic = 19.7 p< 0.001; F-test is greater than the benchmark of 10) and the exogeneity assumption (J-test ; λ = 0.70; p=0.4015). A non-significant J-test indicates that the instruments are exogenous.

Table 9 summarizes the findings from the Tobit model without instruments. In this model, herbal medicine use was not found to be associated with perceived general health status. The only other variable found to be associated with perceived general health status was education. Table 10 summarizes results from the instrumental variable model. The results were found to be similar to the model without instruments. Again, herbal medicine use was not found to be associated with perceived health status. Education was the only variable associated with perceived health status. Post-hoc analysis comparing the two models (Table 9 and Table 10) and evaluating the need for an

instrumental variable approach identified the lack of a need for instruments, as indicated by a lack

of statistically significant Wald test for exogeneity (Wald test for exogeneity; $\lambda = 0.70$ p=0.4015).

The null hypothesis for the Wald test for exogeneity is that potentially endogenous variable (i.e.

herbal medicine use) is exogenous. Thus, a failure to reject the null identifies the lack of a

simultaneity problem with the herbal medicine variable, in contrast to what was conceptualized.

Under this scenario, the Tobit model without the use of instruments (Table 9) is identified to be

more efficient and is preferred.

Table 9. Tobit Model without Instruments

Independent Variables	Coef.	Std. Err.	t	p-value	95% CI
Herbal Medicine Use					
1 – Past Use	-0.20	0.22	-0.89	0.38	-0.63-0.24
2 – Current Use	-0.05	0.25	-0.20	0.85	-0.55-0.45
Age	0.01	0.01	1.31	0.19	0-0.02
Female (Ref: Male)	-0.19	0.20	-0.94	0.35	-0.59-0.21
Married-Cohabit (Ref: Other)	0.22	0.19	1.13	0.26	-0.60-0.16
Christian (Ref: Other)	-0.01	0.28	-0.04	0.97	-0.56-0.54
Education					
Primary	0.20	0.32	0.64	0.52	-0.42-0.83
JHS	0.22	0.27	0.83	0.41	-0.31-0.76
SHS	0.18	0.28	0.66	0.51	-0.36-0.73
College	0.87	0.39	2.30	0.02	0.13-1.65
Graduate Education	1.14	0.45	2.53	0.01	0.25-2.03
Employed (Ref: Unemployed)	0.28	0.21	1.36	0.18	-0.13-0.69
Health Insurance	0.17	0.28	0.60	0.55	-0.38-0.71
Residence (Ref: Urban)					
Peri-Urban	-0.32	0.31	-1.05	0.29	-0.93-0.28
Rural	-0.25	0.32	-0.78	0.44	-0.87-0.38
Accessibility Barrier (Ref: None)	-0.18	0.19	-0.96	0.34	-0.54-0.19
Physician Satisfaction	0.07	0.13	0.50	0.62	-0.20-0.33
Total CC	-0.13	0.12	-1.11	0.27	-0.36-0.10

Table 10. Tobit Model with Instrumental Variable.

Independent Variables	Coef.	Std. Err.	z	p-value	95% CI
Herbal Medicine Use	-0.25	0.30	-0.84	0.40	-0.85-0.34
Age	0.01	0.01	1.28	0.20	0-0.02
Female (Ref: Male)	-0.23	0.21	-1.12	0.26	-0.64-0.17
Married-Cohabit (Ref: Other)	-0.20	0.20	-0.97	0.33	-0.59-0.20
Christian (Ref: Other)	0.04	0.29	0.12	0.90	0.52-0.60
Education					
Primary	0.21	0.32	0.67	0.51	-0.41-0.84
JHS	0.23	0.27	0.83	0.41	-0.31-0.76
SHS	0.13	0.28	0.45	0.65	-0.42-0.68
College	0.88	0.39	2.23	0.03	0.11-1.65
Graduate Education	1.11	0.46	2.42	0.02	0.21-2.01
Employed (Ref: Unemployed)	0.30	0.21	1.43	0.15	-0.11-0.70
Health Insurance	0.16	0.28	0.59	0.56	-0.39-0.71
Residence (Ref: Urban)					
Peri-Urban	-0.31	0.31	-1.00	0.32	-0.91-0.29
Rural	-0.24	0.32	-0.77	0.44	-0.88-0.38
Accessibility Barrier (Ref: None)	-0.21	0.19	-1.10	0.27	-0.58-0.16
Physician Satisfaction	0.03	0.14	0.24	0.81	-0.24-0.30
Total CC	-0.12	0.12	-1.03	0.31	-0.36-0.11

Outline of the Remaining Chapters

Chapter 4 summarized the results of the study. The subsequent and final chapter (5) discusses the findings of the study, examines the outcomes of the research questions, and discusses the global health implications of the research results.

CHAPTER 5

DISCUSSION

Introduction

The purpose of this theory-grounded study was to identify the factors of the AHU model that were associated with the usage of TM in the context of Komfo Anokye Teaching Hospital (KATH) in Kumasi, Ghana. This chapter includes a summary and interpretation of the research findings, general implication of the findings, interpretation within broader context, implications for public health programs and policies, considerations for future research, strengths and limitations, and conclusions. Furthermore, this chapter provides a discussion and potential research opportunities to further probe this study's hypotheses and associated research questions. Two hypotheses and related research questions were generated to give focus to this endeavor. The hypotheses were; 1) The enabling, need, and predisposing factors are associated with TM's use. However, the need factors have the strongest correlation when considering TM/health service use, and 2) The use of TM is associated with perceived health status. The associated research questions were; a) What are the need, predisposing, and enabling factors associated with the use of traditional medicine? b) What was the relationship between traditional medicine use and perceived health status?

The goal of this research was to understand how factors of Andersen's Healthcare Utilization (AHU) model (i.e., predisposing, enabling, and need) affected the use of TM. Such understanding is critical because of the scarcity of resources to sustain conventional medicine and the often-experienced lack of supplies that support its use (i.e., drugs and consumables associated with medical devices). In our adaptation of the AHU model, we opted not to include the *environment construct*, thereby focusing on the other constructs (population characteristics, health behavior and, outcomes). The decision was driven by the lack of information on adapting the AHU model in LMICs, where the data on the environment and infrastructure at lower geographic levels

is not always robust. In the Ghanaian context, the TM system is mostly unregulated and thus, the environment within which it functions is largely uncharacterized from a research standpoint (Aziato & Antwi, 2016).

TM's use is a global phenomenon that has been a function of humanity's progression to what it is today. However, for various reasons, our understanding of TM has not progressed at a rate that allows it to be defendable (scientifically speaking). Such deficiency does not prevent the majority of the world's population from making use of it. There are various reasons why TM persists, and it behooves Public Health to understand the associated reasons and mechanisms that can be used to allow its safe co-existence with conventional medicine. Should such inclusion not be sought, the complications that geminate from TM's utilization will continue to go unaddressed. At times, such lack of surveillance erroneously contributes to the understanding that TM is without side effects and is the best alternative in treating/curing diseases.

The study aimed to understand the factors that facilitate TM's use for the treatment of chronic diseases in Kumasi, Ghana. The Komfo Anokye Teaching Hospital (KATH) in Kumasi provided an attractive setting for such research because it is a tertiary hospital that houses various specialties. Kumasi sees patients from urban, peri-urban, and rural settings, in addition to patients from neighboring Western African countries. The research benefitted from medical students from the Kwame Nkrumah University of Science and Technology (KNUST) who were sensitized to the indigenous use of TM and bridged the language barrier for the researchers of Georgia Southern University.

Summary and Interpretation of Research Findings

In general, predisposing and need factors were associated with herbal medicine use among the sample, with predisposing factors explaining the most variation in the data. Specifically, the influence of family and friends was the most significant predisposing factor. This is supported by previous research that suggest that a patient's social circle can potentially inform her of healthcare

alternatives (O'Brien et al., 2012). Other factors associated with herbal medicine use included education, marital status, and herbal medicine beliefs. Individuals who were married/cohabiting were more likely to report being past users rather than never users, while those with more favorable general beliefs about herbal medicine were more likely to be current users compared to never users. Notably, college-educated individuals were more likely to belong in the never use category. Such finding is supported by a previous study where education was found to be associated with TM's use to treat chronic diseases (i.e., HIV/AIDS) in the Kumasi context (Gyasi, Tagoe-Darko & Mensah, 2013). Specifically, in that study, people with lower education appear more likely to use TM.

Additionally, the presence of comorbidities was found to be associated with herbal medicine use. These findings support previous work in the Ashanti region of Ghana, where the odds of using TM were four times higher for people suffering from chronic conditions and spiritual issues (Gyasi, Mensah & Siaw, 2014). Other studies have found support for the relationship between evaluated need and health services use. For African Americans who use herbal medicine through CAM, multiple morbidities/prescriptions have been identified as an important predictor of CAM use (Barner, Bohman, Brown, and Richards, 2010). Perceived need (made apparent by a cervical cancer diagnosis) has also been associated with CAM use in another previous study (Park, 2014).

This study's results lent partial support to the AHU model, as applied to the use of herbal medicine in the Ghanaian context. However, notably, enabling factors were not found to be associated with herbal medicine use. This contrasts with other applications of the model that have confirmed the influence of enabling factors on health care utilization. For example, a study conducted in Ecuador identified health insurance as an enabling factor for the use of healthcare services (Lopez-Cevallos & Chi, 2009). One explanation for these discrepancies could be that the AHU model is more applicable to conventional healthcare services, of which herbal medicine is not. It may also suggest that the application of the model may be geographical/cultural context-

specific. Finally, the use of herbal medicine was not found to be associated with perceived health status. Based on these findings, both study's hypotheses were not supported.

General Implications

This research sought to understand how a specific conceptual framework can help our understanding of traditional medicine adoption to treat chronic diseases in Kumasi, Ghana. Such an understanding could inspire similar research in similar or even different settings. This is because there is a paucity of research when it comes to traditional medicine research that makes use of theoretical frameworks. By employing scientifically sound research, much-needed credibility could be achieved to promote the use of TM. Conversely, such research could also disprove certain practices. This residual credibility would principally serve the patient and, to a certain extent, the medical/scientific community.

The application of scientific approaches to TM will face opposition since many of its practices are grounded in people's history and culture (Jakhar, 2020). Such adversities are not new to science, and cultural sensitivity must be an a priori consideration for the sake of efficiency when it comes to educating target populations on the potential and real dangers of such practices. The dangers associated with TM must be balanced with its benefits. It can be argued that some TM practices can be seen as archaic when compared to CM. The terrain is somewhat muddied because many TM practices have benefits, which suggest some efficacy. As with most therapeutic agents that include conventional medicines, TM practitioners must be willing to accept the limitations of their individual/collective practices and the products that support such practices.

Interpretation within Larger Context

Many countries must rely on TM for the maintenance of their populations' health. Therefore, we must increase our collective understanding of such practice(s). There is a universal fundamental truth that supports the fact that an individual and the group to which she belongs has a

right to do what she must to promote survival (inasmuch as it does not burden another). TM seems to be such an instrument that supports individual/collective survival. It may be possible that wherever TM does work, its effects could be no better than that of a placebo. However, when faced with despair, it could be argued that the absence of hope may be worse than ineffective medicine. Such a philosophical stance must be further explored because the lack of empirical data allows people on both sides of the dilemma to proceed without all the facts.

When collecting the data in Kumasi, an opportunity presented itself where a patient of the KATH, expired within twenty-four hours of being admitted to the hospital. Per Ghanaian laws, such occurrence required an autopsy. Various researchers were invited to witness the autopsy and our "silent teacher" allowed those present to learn about an unpopular aspect of TM. In brief, the patient took an herbal concoction to deal with the complication of cirrhosis of the liver. The herbal concoction prompted disseminated intravascular coagulation, which forced his early demise.

Unfortunately, such stories are often missing from the global discourse that surrounds the use of traditional medicine. There is an undeniable responsibility for conventional medicine to report adverse events associated with its practices. The reporting responsibility is not shared by traditional medicine, and an overdue philosophical debate must be initiated/continued. A debate that must be considered is the complexity of such practice and the economic/political undercurrents that encourage its use. One example of such complexities is captured in the soft power play China displays when it comes to strengthen its economic/political global presence (Jakhar, 2020).

When the world was frantically searching for answers to the Covid-19 pandemic, China advertised the use of traditional medicine as the best source of action. As Western countries admitted "defeat," China sent herbal medication and traditional medicine practitioners to Africa, Central Asia, and Europe. One should note that traditional medicine supplies were sent in addition to conventional drugs and equipment (Jakhar, 2020).

To various extents, TM can contribute to the strengthening of five aspects of healthcare (i.e., service delivery, health workforce, access to essential medicines, financing, and governance).

Perhaps the most important contribution of TM is its potential to decrease the overall cost of healthcare. This is based on the assumption that the products used by its practitioners are safe and efficacious. The consideration of TM's inclusion is salient to world economics when considering that medicines can absorb up to sixty percent of healthcare expenditures in certain countries. Additionally, in LMIC, spending associated with healthcare consumes 13 – 32 % of household expenses. When dissecting the healthcare spending, it is observed that 41 – 56 % of these same LMIC households spend all their healthcare budgets on medicines. Due to the resource's limitation and the increase in healthcare costs, alternatives should be considered. Per the WHO, the imperatives of an optimized healthcare system are one that is equitable, of proven quality, safety, and efficacy. These goals are possible, but consideration must be given to various settings' challenges towards such attainment. The reliance of healthcare on medicines is predicated by assuming that such products' quality is supported by scientific understanding while considering affordability. This cannot be stressed enough when presented with the fact that medicines account for the second-largest line item (after salaries) of most healthcare budgets. Added to this complexity is the fact that medicines are the largest private health spending in LMIC (Mazzaglia & Mol, 2016).

The financial considerations associated with conventional medicines are exasperated because pharmaceutical approaches of specific conditions will be faced with infectivity due to resistance, inappropriate route of administration, formulation dysfunction for specific groups, lack of empirical data, and lack of market support. Compounding the healthcare issues of LMIC is the under-reported drug shortages experienced at times. Unfortunately, this is seen around the world. However, production problems seem to be a common theme. These shortages can have a downstream effect on prices, and an investigation of medicine prices in sixteen LMIC exposed variations that contribute to public health issues. Consideration for the uptake of herbal medicines is not constrained to LMIC. After all, the costs associated with CAM are appreciable and in an

upward trend. Approximately 29 percent of US adults used at least one CAM therapy, and about ten percent of that number captures the use of herbal medicine (Mazzaglia & Mol, 2016)

Implications for Global Health Programs and Policies

Public Health has the responsibility to leverage the different capacities of various countries. There are various levels of inequalities experienced in various countries, and the famous Aristotelian adage holds; "Equals tend to be treated equally and unequals, unequally." Therefore, the onus is on Public Health to optimize healthcare by combining resources and institutions. By doing so, preventive and curative programs could be established to support specific healthcare contexts (Mazzaglia & Mol, 2016).

The WHO and the Africa Centers for Disease Control and Prevention (Africa CDC) are encouraging more research in TM implementation in the management of the COVID-19 pandemic. In July 2020, the WHO and Africa CDC assembled 25 members to serve as an expert advisory panel. The panel's mandate is to provide scientific advice and support to member countries of Central, Eastern, Southern and, West Africa. The panel's goal is to ultimately ensure the safety, efficacy, and quality of TM herbal medicine used to fight the COVID-19 pandemic.

The panel will operationalize their mandate by coordinating support of African countries to execute clinical trials focusing on TM. Two plants have been identified as having anti-viral properties; *Aloe ferox* and *Moringa oleifera.* Such systematic incorporation of TM in the toolkit of Global Health provided a mechanism towards attaining universal health coverage. It has been suggested that if properly implemented, TM could reduce health spending by at least 80% in the African context. However, there remains a hesitancy on the part of TM practitioners when it comes to collaborating with experts that typically have exploited their art to advance their profession at TM's expense. A solution to this problem would be to secure governmental collaboration that would fund innovative herbal remedies research. It has suggested that the only way to incorporate TM into mainstream healthcare systems is to create parallel structures in ministries of health. This

would allow an implementation to occur at the lowest health units and upper management. This is predicated by the associated staff is trained and have expertise in TM (Opiyo, 2020).

A substantial amount of energy was spent on the African continent to explore all options to manage the novel COVID-19 pandemic. This crisis facilitated the use of traditional medicine (TM) as a candidate. In Ghana, some TM practitioners presented themselves as the bearer of good news, stating that the cure was revealed to them in dreams. As previously mentioned, such claims are not foreign to the TM domain. However, Ghana is better equipped than most countries to deal with such claims since she is equipped with the Center for Plant Medicine Research (CPMR), which was established in the 1960s. Therefore, as a country, Ghana benefits from the infrastructure to probe claims of cure or treatment of herbal origins. As a guardian of Ghana's Public Health, the CPMR is tasked with the methodological assessment of phytonutrients or phytoconstituents to provide scientifically-sound solutions. These solutions potentially become candidates to address diseases, and the approach to COVID-19 infections is no different (Ghanaians, 2020).

Ghana's approach to TM is not reciprocated in all contexts where it is used. An excellent example of such difference can be seen in the unbridled consumption of Madagascar's COVID-Organics herbal tonic, which is advertised as a cure for infections by the novel virus. The trust that supports the tonic consumption is based on the Malagasy President's claim that the tonic passed scientific scrutiny and cured two patients. One of the issues at hand is that the Malagasy Institute of Applied Research (IMRA) has not reported any data on its efficacy or side effects. Meanwhile, fellow African countries that include Tanzania and Congo are procuring the product to manage their needs. In addition to the lack of scientific evidence as being problematic to the adoption of COVID-Organics, it is the fact that one of its active ingredients is one is artemisinin. Artemisinin is used to combat malaria, and its use in the treatment of COVID-19 infections could contribute to the malaria resistance issues of the African continent and potentially create another global health burden (Nordling, 2020).

Also, on the African continent, Nigeria and Guinea Bissau have shown interest in the Malagasy tonic. Similar to Ghana, neighboring Nigeria reported that its institutions would assess the tonic (Apanews, 2020). However, Ghana's pre-existing guidelines make it clear how COVID-organics will be processed through its institutions. It is the same process that conventional drugs follow that include testing by Ghana's FDA. Additionally, because the tonic is an herbal preparation, it will be assessed by the (CMPR) (Khumalo, 2020).

A recent case of TM's institutionalization in Public Health programs and policies took place recently in Haiti. When Covid-19 presented itself as an issue in Hispaniola, the Haitian President reached out to his Madagascar's counterpart for help. The help was readily given in the formula of an herbal preparation that was said to effectively combat the virus that is contributing to the global morbidity and mortality rates (Juno7, 2020 Madagascar). When considering that Haiti is in the Americas, Madagascar's solution could be an asset or liability to surrounding countries (i.e. malaria resistance). Also, in Haiti is a group of medical doctors alleges to have a treatment plan for people affected by the pandemic. They state that the traditional remedies hold the treatments and seek collaboration to legitimize their herbal medication approach (juno7, 2020 Groupe).

Again, in Haiti, a considerable aspect of its population is reluctant to use CM and depend on herbal/traditional medicine. One of the registered fears is that hospitals are injecting patients with deadly drugs. These deadly injections are to increase the mortality rates, thereby attracting international aid. Another fear is that vaccines are being tested on the population without their consent (The Haitian Times, 2020). Such mistrust of conventional medicine is also seen on the African continent. However, no person articulates the current state of Western medical sciences regarding TM as Catherine Kyobutungi, Executive Director of the African Population and Health Research Center in Nairobi, Kenya. She states that it is disingenuous to cry foul and demand the most stringent forms of accountability for one type of science and then bend the rules for another". Perhaps the issues may be best understood by continuing to look at the behavioral predisposing

factors that allow such dualities to exist. Such inquisition would be optimized by using theoretical models such as the AHU model of this research (Opiyo, 2020).

Considerations for Future Research

TM's present state suggests that there has been a minimal improvement to our understanding of its efficacy and the associated detrimental effects associated with its use. The body of knowledge surrounding TM suffered from upstream limitations that include colonial mandates, racism, and lack of funding for what has been considered, at best, an exotic healthcare system. However, it could be argued that post-colonial intelligentsia of once-colonized countries must value a healthcare system (TM) that has served their respective countries and, to various extents, capturing its culture, calling for increased research focus in the use of and outcomes related to TM. Specifically, within the context of Ghana, population-based studies can help characterize the extent of use of TM as well as the outcomes associated with such usage.

One could be tempted to ignore the potential and characterized dangers of TM. Such an approach is ill-advised because many people use it without considering its interaction with CM. Such an issue is complicated by the increased use of pharmaceutical products that can give rise to drug-herb interactions. It is important that future research focus on characterizing drug-herb interactions (Bjerrum, Andersen, Petersen & Kragstrup, 2003).

Future research would be served by understanding indigenous people's current views concerning countries that once colonized them. Such understanding could then inform the subsequent adoption of traditional or conventional medicine. The post-colonial views on the adoption of traditional/conventional medicine could explain the TM phenomenon in Low- and Middle- Income Countries (LMIC). As mentioned in chapter 2, there has been increased recognition of TM's use and its effects on all countries at different levels. Therefore, its utilization becomes more than an "exotic" issue. Understanding TM to the fullest benefits humanity and all that sit at her table.

Strengths and Limitations

A notable strength of this research is that it filled knowledge gaps in applying theoretical frameworks in the study of Traditional Medicine. However, there were some significant limitations. First, because this study was performed solely in Kumasi, using a convenient sample, the findings may not be generalizable. Additional limitations include the cross-sectional nature of the study, which does not allow the establishment of causality. Also, the relatively small sample may limit the ability to detect small effects. Further, there is a potential for social desirability bias due to the types and mode of questioning. Despite these limitations, by focusing on Ghana, the study added to the sparse empirical literature on TM's adoption in LMICs.

Lessons-learned

This research's primary objective was to add to the Public Health body of knowledge, and the objective, as mentioned earlier, was successfully met. While the discussion section captures the relevant facts, there are a few lessons that were unexpected gifts. This study was initially impacted by operational issues that created stressful environments in the field. I am grateful for my committee's advice in addressing these issues. I am equally grateful for the adversity that allowed me to practice my negotiation skills. Moreover, together with our team members in Kumasi, we were able to weather the storm. There was never a moment where I felt alone in my venture, and this is something that will remain part of me. In terms of lessons learned:

1- When faced with professional complications, it is advisable to speak of the issue sooner than later. My dissertation chair and I spoke almost daily when I operationalized the research in the field. At times, she reminded me to remain calm, which contributed to the research's success.

2- When facing adversities remaining calm is the only option. Adding fuel to the proverbial fire is merely counterproductive.

3- In the calmness of a storm, it will never cease to impress me how bonds are created. Specifically, the bonds created with our team members from the Kwame Nkrumah University of Science and Technology who were addressing their clinical requirements at the Komfo Anokye Teaching Hospital were vital to this research's success. I will never forget the early mornings and late nights that were necessary. All this was done with the grace of what I trust will become great physicians.

4- Nothing replaces spending time with locals if possible. This global research benefitted from being near a cultural center. It was not evident to me before my journey to Kumasi how instrumental this was to decompress. This fact and the various trips throughout Ghana allowed me to understand a country and its people better. Therefore, travel is an excellent tool in the study of humanity, thereby becoming more human.

Reflexivity

This research may have been inadvertently affected by my experiences. One, if not the most important contributors to my views on life, is the fact that I was born in a Low- and Middle-Income Country (LMIC). I was born in Quisqueya, the name that our indigenous people gave the land now known as Haïti, which is the adaptation of another indigenous name for the island (Ayiti). After our fight for independence, our country was fast in finding ways to incorporate all island inhabitants (black and white). It was these early lessons of acceptance and incorporation that have forged into the person that I have become. On that same patch of land, I was introduced to one of our famous writers, Alexandre Dumas, whose father was Haitian and was the Three Musketeers author. Due to Dumas' relationship with Victor Hugo (author of Les Misérables), he also became part of my early readings. These readings forced me to partner the application of compassion in all human undertakings. A consideration that was vital in my introduction to the concept of post-colonialism. This section of my literary voyage began with the Nigerian Nobel Prize Laureate Chinua Achebe's "Things Fall Apart" and, then progressed to the literary works of

Frantz Fanon, Aimé Césaire, Chiekh Anta Diop and, Ngũgĩ wa Thiong'o. A fulfilling aspect of my appreciation of post-colonialism took place in Aotearoa (aka New Zealand), where I saw the incorporation of indigenous representation (Maori) in government events.

As my mind was engaged in its journey, my body was experiencing its expedition. One of my early memories involves living in Lubumbashi's rural parts, Zaïre (now the Democratic Republic of Congo). I experienced a painful scratch (for a child), and I remember how a nearby adult addressed my wound. That memory is etched in my memory because my dear adult used lemon to disinfect my wound. I remember the compounding effect this decision had on my pain, but I survived. As that event played through my mind for years after the experience, it became clear that there are different realities in this world. Realities that we do not discuss as we should, for many reasons but remain part of the human condition. Realities that I witnessed in the clinical setting of various countries. Realities that allowed for the following words to be uttered, "…there is nothing that medicine can do for you." For some reason, my mind tended to focus on the "you" aspect of these words. Through my Public Health readings, I came to understand that our experiences in the clinical setting are determined by our sociological grouping, the "you." A grouping that is best explained by Educational Sociology, Medical Sociology, and Sociobiology.

My quest to better understand the human condition was somewhat complicated by my readings in the scientific fields. This is because it is common for these fields to purport to have answers that are not always complete, sustainable in all settings, and, at times, not what they claim to be. Pertaining to this work is the incomplete aspect of the solutions that science has. Incomplete due to the lack of inclusion of ALL groups, again the "you." Groups that were historically marginalized groups that are in Public Health's scope. My progression as mentioned above, allowed me to make sense of instances where people have done "extraordinary" things in the hope of regaining their health status. These behaviors were, at times, incompatible with life but were the best course due to a lack of alternatives. Therefore, one is served to know how to make the best use of available resources. This is where this study on Traditional Medicine presents itself as a

functional part of humanity's puzzle. A puzzle that must benefit from Thabo Mbeki's views, captured in his poem "I am African." Specifically, human existence demands freedom, which is a necessary condition for human existence. A corollary is that the presence of bad options degrades the concept of freedom. Bad options that are created by humans for various reasons. A freedom that must be supported by Voltairean views; that our freedom must end where others' freedom begins. It is my views on the at-times shameful human history, the current state of world affairs, human rights, and the rights of collectives that have instructed this research.

Conclusions

The study applied the AHU model to examine the factors associated with herbal medicine use and its impact on health status. Evaluated need (total chronic conditions (TCC) and predisposing factors that support the use of the TM (including civil status, use by family/friends, and beliefs in herbal medicine) were found to be associated with herbal medicine use. There was no indication that the use of herbal medicine influenced perceived health status. This research contributes to the body of knowledge by being the first study to apply the AHU model to study herbal medicine uptake in low- middle- income counties (LMIC), and specifically in Ghana.

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APPENDIX A

SURVEY

My Health

Please mark the circle that <u>best</u> describes whether <u>each</u> of the following statements is true or false for you.

	Definitely false	Mostly false	Not sure	Mostly true	Definitely true
1a) I am somewhat ill	☐	☐	☐	☐	☐
1b) I am as healthy as anybody I know	☐	☐	☐	☐	☐
1c) My health is excellent	☐	☐	☐	☐	☐
1d) I have been feeling bad lately	☐	☐	☐	☐	☐

Have you ever been told by a doctor that you have:

	Yes	No
2a) Diabetes		
2b) Hypertension (BP)		
2c) Asthma		
2d) Chronic Heart Failure		
2e) Stroke		
2f) Arthritis		
2g) Sickle Cell		
2h) HIV/AIDS		
2i) Cancer		
2j) Kidney Disease		
2k) Other		

If you indicated Other, please specify below

Care for Chronic Condition

3) **Do you have health insurance?**

☐Yes ☐No

4) **Has a doctor prescribed medications for you to treat your chronic condition?**

☐Yes ☐No

5) **How many pills has your doctor told you to take per day?**

6) **In the past week, have you missed any doses?**

☐Yes ☐No ☐I
don't remember

7) **What are some of the things that make it difficult to get the medical care that you need for your chronic condition (select all that apply)?**

☐ 7a) I do not have difficulty getting the medical care I need for my chronic condition

☐ 7b) Distance to healthcare facilities

☐ 7c) Lack of transportation

☐ 7d) Cost

☐7e) Lack of insurance

7f) Lack of respect for healthcare providers

☐7g) Other, please specify

8) **How much do you agree or disagree with the following statements concerning the care you receive and the medications you take for your condition?**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
8a) I have been getting good health care for my condition	☐	☐	☐	☐	☐
8b) I have adequate access to the drugs needed to manage my condition	☐	☐	☐	☐	☐
8c) The medication I am given by the doctor to treat my	☐	☐	☐	☐	☐

condition work					
8d) I have bad side effects when I take the medications my doctor gives me.	☐	☐	☐	☐	☐
8e) Doctors usually explain the side-effects of the medications they give me in a way that I can understand	☐	☐	☐	☐	☐

Herbal Medicine

9. **Have you ever used herbal medicine to treat any condition?**
   ☐Yes   ☐No
10. **Do you know of any family member(s) and/or friends who use herbal medicine?**
   ☐Yes   ☐No
11. **Do you know of any friend(s) who use herbal medicine?**
   ☐Yes   ☐No
12. **How many different herbal medications are you currently taking?**

13. **What conditions are you treating with the herbal medicine(s) you are currently taking?**

	Yes	No

    13a) Diabetes
    13b) Hypertension (BP)
    13c) Asthma
    13d) Chronic Heart Failure
    13e) Stroke
    13f) Arthritis
    13g) Sickle Cell
    13h) HIV/AIDS
    13i) Cancer
    13j) Kidney Disease
    13k) Other
    13k.1) If you indicated Other, please specify below

14. **If you are currently using herbal medicine, do you use them together with the medication you doctor gave you?**

☐Yes ☐No

15. Do you have any side effects with the herbal medicine(s) you are currently taking?

☐Yes ☐No ☐I am not currently using herbal medicine

16. If you indicated yes in the question above, how would you describe the discomfort caused by the side effects from the herbal medicine(s) you currently take?

☐Better than the side effects I get when I take the medications my doctor prescribe

☐Similar to the side effects I get when I take the medications my doctor prescribe

☐Worse than the side effects I get when I take the medications my doctor prescribe

☐ ☐ I am not currently using herbal medicine

17. Where do you typically get the herbal medicine you use/have used (select all that apply)?

☐ 17a) ☐ I have never used herbal medicine

☐ 17b)☐ Homemade preparation

☐ 17c) ☐ Traditional healer/herbalist

☐ 17d)☐ Family member/Friend

☐ 17e)☐ Church

☐ 17f)☐ Mosque

☐17g) ☐ Herbal medicine shop/seller

17h) ☐ Doctor or Nurse

☐ 17i) ☐ Pharmacist/Chemical Seller

17j) ☐ Other Healthcare provider

17k) ☐ Internet

☐ 17l)☐ Other, please specify

18. Where do you usually get information concerning the herbal medicine (e.g. the proper dosage and the conditions for which it is appropriate) (select all that apply)?

18a) ☐ I have never used herbal medicine

☐ 18b)☐ No one

☐18c) ☐ Traditional healer/herbalist

18d)☐ ☐ Family member/Friend

18e) ☐ Church

18f) ☐ Mosque

18g)☐ ☐ Herbal medicine shop/seller

18h)☐ ☐ Doctor or Nurse

18i)☐ ☐ Pharmacist/Chemical Seller

18j☐ ☐ Other Healthcare provider

18k) ☐Television/Radio/Newspaper

18l) ☐ Internet

☐18m) ☐ Other, please specify

19. **If you are <u>currently</u> using herbal medicine, have you told your health care provider about the herbal medications you are using?**

    ☐Yes
    ☐No
    ☐I am not currently using herbal medicine

20. **Why <u>have you or have you not</u> told your health care provider about the herbal medicines you are using.**

21. **How much do you agree or disagree with the following statements concerning herbal medicine?**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
21a) There is nothing wrong with using herbal medicine	☐	☐	☐	☐	☐
21b) It is okay to use herbal medicine when you do not have access to the drugs needed to treat your condition	☐	☐	☐	☐	☐
21c) There are herbal cures for many diseases	☐	☐	☐	☐	☐
21d) Herbal medicine can be used at the same time as medicine prescribed by a doctor or pharmacist	☐	☐	☐	☐	☐

21e) People who use herbal medicine are looked down upon in my community	☐	☐	☐	☐	☐
21f) Herbal medicine is safe	☐	☐	☐	☐	☐
21g) Herbal medicine is effective	☐	☐	☐	☐	☐
21h) In many cases, herbal medicine works better than medicine prescribed by doctors	☐	☐	☐	☐	☐
21i) It is important to tell your health care provider when you use herbal medicine	☐	☐	☐	☐	☐
21j) Herbal medicine can sometimes make medications prescribed by doctors or pharmacists less effective	☐	☐	☐	☐	☐
21k) In some cases, it is harmful to use certain types of herbal medicine together with certain drugs prescribed by a doctor or pharmacist may be harmful	☐	☐	☐	☐	☐

Medical Care

22. Below are a few statements about medical care in Ghana. Please tell us how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
22a) Today's doctors are better trained than ever before	☐	☐	☐	☐	☐
22b) Doctors rely on drugs and pills too much	☐	☐	☐	☐	☐
22c) Many doctors do not know what they are doing	☐	☐	☐	☐	☐
22d) Most doctors care about their patients	☐	☐	☐	☐	☐
22e) Most doctors treat patients with respect and dignity	☐	☐	☐	☐	☐
22f) Most doctors explain things to patients in a way that is easy to understand	☐	☐	☐	☐	☐
22g) You have to wait for a very long time before seeing a doctor	☐	☐	☐	☐	☐
22h) It is easier to go to the drugstore for medicine than to bother with a doctor	☐	☐	☐	☐	☐
22i) The more money you	☐	☐	☐	☐	☐

have, the easier it is to see a doctor					

23. Below are a few statements about pharmacists in Ghana. Please tell us how much you agree or disagree with each statement.

	👎👎 Strongly Disagree	👎 Disagree	Neither Agree nor Disagree	👍 Agree	👍👍 Strongly Agree
23a) Today's pharmacists are better trained than ever before	☐	☐	☐	☐	☐
23b) Most pharmacists care about their patients	☐	☐	☐	☐	☐
23c) Many pharmacists do not know what they are doing	☐	☐	☐	☐	☐
23d) Most pharmacists explain things to patients in a way that is easy to understand	☐	☐	☐	☐	☐

24. Overall, how satisfied are you with the health care system in Ghana?
☐Very Dissatisfied
☐Dissatisfied
☐Neither Satisfied nor Dissatisfied
☐Satisfied
☐Very Satisfied

Culture

25. How much do you agree or disagree with the following statements concerning Ghanaian culture?

	👎👎 Strongly Disagree	👎 Disagree	Neither Agree	👍 Agree	👍👍 Strongly Agree

			nor Disagree		
25a) It is important to practice our traditional culture	☐	☐	☐	☐	☐
25b) There are a lot of things we can learn from our culture	☐	☐	☐	☐	☐
25c) It is important for us to teach our children our traditional culture	☐	☐	☐	☐	☐
25d) We seem to be following Western culture more than our own culture	☐	☐	☐	☐	☐

About You

26. **Gender**
    ☐ Male
    ☐ Female

27. **How old are you?**

28. **Are you…**
    Single
    Married
    Living together with your partner
    Separated
    Divorced
    Widowed

29. What is your highest educational level?
☐Never attended school
☐Primary school
☐ JSS
☐ SSS
☐ College degree
☐Graduate degree

30. Are you employed?
Yes, I am working
No, I am not working
I am retired

31. If you are working, what type of work do you do?

32. What is you religion?
No religion
Christian
Islam
Traditional
Other, please specify

33. How many children do you have?

34. In which setting do you live?
☐ Rural (Village far away from a city)
☐ Peri-urban (Smaller town very near a city)
☐ Urban (City)

35. In which region do you live?
☐Ashanti Region
☐Brong Ahafo Region
☐Central Region
☐Eastern Region
☐Greater Accra Region
☐Northern Region
☐Upper East Region
☐Upper West Region
☐Volta Region
☐Western Region

APPENDIX B

SURVEY CODEBOOK

1. My Health - Likert scale (-1 to 5)
2. Doctor Assessment of list of diseases (Yes =1, No =2)
3. Health Insurance (Yes =1, No =2)
4. Prescribed medications (Yes =1, No=2)
5. How many pills prescribed by doctor (numeric value)?
6. Missed doses (Yes =1, No=2, No recall =3)
7. Contributing factors to difficulty in securing medical care (No difficulty =1, Distance =2, Lack of transportation =3, Cost =4, Lack of insurance =5, Lack of respect for healthcare providers =6)
8. Likert scale (-1 to 5)
9. Using herbal medication to treat any conditions (Yes =1, No= 2)
10. Family members using herbal medication (Yes =1, No= 2)
11. Friends using herbal medication (Yes =1, No= 2)
12. Quantity of herbal medication being used (1-5 =1, 6-10 =2, 11-15 =3, 16-20 =4)
13. Conditions being treated with herbal medicine (Yes =1, No= 2)
14. Using with medication given by doctor (Yes =1, No= 2)
15. Side effects (Yes =1, No= 2))
16. Side effects comparison ((Better =1, Similar =2, Worse =3, Not using =4)
17. Origin of herbal medicine (Never used =1, Homemade =2, Traditional =3, Family/Friend =4, Church =5, Mosque =6, Shop/Seller =7, Doctor/Nurse =8, Pharmacist/Chemical Seller =9, Other Healthcare provider =10, Internet =11, Other =12)
18. Information source for herbal medicine (Never used =1, No one =2, Traditional =3, Family/Friend =4, Church =5, Mosque =6, Shop/Seller =7, Doctor/Nurse =8, Pharmacist/Chemical Seller =9, Other Healthcare provider =10, Television/Radio/Newspaper =11, Internet =12, Other =13)
19. Communication of herbal medicine use to healthcare provider (Yes =1, No= 2, Not using =3)
20. Disclosure to health care provider - Alpha response
21. Responses to statements on herbal medicine - Likert scale
22. Responses to statements on medical care - Likert scale
23. Responses to statements on pharmacists - Likert scale
24. Satisfaction with health care system in Ghana (Very dissatisfied =1, Dissatisfied =2, Neither =3, Satisfied =4, Very satisfied =5)
25. Responses to statements on Culture - Likert scale
26. Gender (Male =1, Female =2)
27. Age (18-39 =1, 39-58 =2, 59-78 =3, 79-98 =4)
28. Marital Status (Single =1, Married =2, Living with partner =3, Separated =4, Divorced =5, Widowed =6)
29. Education (Never attended =1, Primary school =2, JHS =3, SHS =4, College degree =5, Graduate degree =6)
30. Employment
31. Type of Work
32. Religion
33. Number of children

34. Dwelling setting (Rural =1, Peri-urban =2, Urban =3)
35. Dwelling region (Ashanti =1, Brong Ahafo =2, Central =3, Eastern =4, Greater Accra =5, Northern =6, Upper East =7, Upper West =8, Volta =9, Western =10)

APPENDIX C

ORGANIZATION OF THE RESEARCH MEASURES

Table 1. Organization of the Research Measures.

	Construct	Variable	Measure
Behavioral Construct (Outcome)	Model 1: Use of TM	Have you ever used herbal medicine to treat any condition? How many different herbal medications are you <u>currently</u> taking? Note: The two questions combined into one variable that distinguished between past and current use.	0= Never Used 1= Past Use 2= Current Use
Behavioral Construct (Outcome)	Model 2: Health Status	Health Status (General Health Perception Scale)	Health Status Score
Causal Constructs (Independent Variables)	Enabling Factors	Insurance status	1-Yes 0-No
		Geographic Location	1-Rural 2-Periurban 3-Urban
		Accessibility Barriers to Care	Reported one or more barriers to health access 1-Yes 0-No
		Satisfaction with Physician (Scale)	Satisfaction with Physician Score
Causal Constructs (Independent Variables)	Predisposing Factors	Age	Age in years (Continuous)
		Gender	1-Male 2-Female
		Marital Status	1-Married/Cohabiting 0-Other

	Construct	Variable	Measure
		Religion	1-No Religion 2-Christian 3-Islam 4-Traditional 5-Other
		Education	1-Never attended school 2- Primary school 3-JSS 4-SSS 5-College degree 6- Graduate degree
		Employment	1-Employed 0-Other
		Herbal Medicine Beliefs	Herbal Medicine Belief Score
		Cultural Belief (Scale)	Cultural Belief Score
Causal Constructs (Independent Variables)	Need Factors	Evaluated Health Need	Total number of chronic conditions (Count)

APPENDIX D

EXPLORATORY FACTOR ANALYSIS OF THE SCALES ASSOCIATED WITH THE SURVEYADMINISTERED TO THE PATIENT

SAMPLE OF KATH.

Table 2. Exploratory Factor Analysis of the scales associated with the survey administered to the patient sample of KATH.

Survey Item		Factor Loading				Cronbach Alpha
		1	2	3	4	
General Health Perception	I am as healthy as anybody I know	0.66				0.72
	My health is excellent	0.76				
	I have been feeling bad lately	0.44				
General Beliefs About Herbal Medicine	There is nothing wrong with using herbal medicine		0.79			0.86
	It is okay to use herbal medicine when you do not have access to the drugs needed to treat your condition		0.66			
	There are herbal cures for many diseases		0.64			
	Herbal medicine is safe		0.84			
	Herbal medicine is effective		0.86			
	In many cases, herbal medicine works better than medicine prescribed by doctors		0.51			
Beliefs About Co-use of	Herbal medicine can sometimes make			0.46		0.72

Herbal and Conventional Medicine	medications prescribed by doctors or pharmacists less effective		
	In some cases, it is harmful to use certain types of herbal medicine together with certain drugs prescribed by a doctor or pharmacist may be harmful	0.49	
Satisfaction with Physicians	Most doctors care about their patients	0.75	
	Most doctors treat patients with respect and dignity	0.75	0.80
	Most doctors explain things to patients in a way that is easy to understand	0.68	
Cultural Beliefs	It is important to practice our traditional culture	0.65	
	There are a lot of things we can learn from our culture	0.79	0.85
	It is important for us to teach our children our traditional culture	0.81	

APPENDIX E

DESCRIPTIVE CHARACTERISTICS OF STUDY SAMPLE

Table 3. Descriptive Characteristics of Study Sample.

		n (%)	**N**	
Predisposing Factors				
Gender	Male	68 (33.2)	205	
	Female	137 (66.8)		
Civil Status	Not Married/Cohabit	76 (36.9)		
	Married/Cohabit	130 (63.1)		
Education	None	46 (22.3)	206	
	Primary	26 (12.6)		
	JSS	46 (22.3)		
	SSS	57 (27.7)		
	College	18 (8.7)		
	Graduate	13 (6.3)		
Employment	Employed	96 (46.4)	207	
	Not employed	111 (53.6)		
Religion	Not Christian	29 (13.4)	208	
	Christian	179 (86.1)		
	Range	**Average**	**N**	**SD**
Age	20-106	56	204	31
Children	0-16	4.4	206	6.7
Enabling Factors				
		n (%)	**N**	
Health Ins.	Yes	187 (89)	209	
	No	22 (11)		
Urban/Rural	Urban	20 (9.8)	205	
	Peri-urban	88 (42.9)		
	Rural	97 (47.3)		
Regions	Ashanti	172 (82.7)		
	Brong Ahafo	10 (4.8)		
	Central	2 (1.0)		
	Eastern	5 (24)		
	Greater Accra	2 (1.0)	208	
	Northern	4 (1.9)		
	Upper East	1 (0.5)		
	Upper West	1 (0.5)		
	Volta	1 (0.5)		

		n (%)	N
	Western	8 (3.9)	
Barriers	Yes	81 (39)	
	No	128 (61)	
Family/Friends Use	Yes	112 (54)	207
	No	95 (46)	

Need Factors			
Chronic Disease		**n (%)**	**N**
Diabetes		68 (32.7)	208
Hypertension		113 (54.1)	
Asthma		5 (2.4)	
Heart Failure		7 (3.4)	
Smoke		8 (3.8)	
Arthritis		35 (16.8)	
Sickle Cell		6 (2.9)	
HIV/AIDS		3 (1.4)	209
Cancer		66 (31.6)	
Kidney		19 (9.1)	
Other		42 (20.1)	
TCC	1 condition	83 (40)	
TCC	2 conditions	85 (41)	
TCC	3 conditions	37 (18)	
TCC	4 conditions	2 (1)	

APPENDIX F

PARTICIPANT DEMOGRAPHIC CHARACTERISTICS BY HERBAL MEDICINE USE

Table 4. Participant Demographic Characteristics by Herbal Medicine Use

		n (%)	N	
Predisposing Factors				
Gender				
Male		68 (33.2)	205	
Female		137 (66.8)		
Civil Status				
Not Married/Cohabit		76 (36.9)		
Married/Cohabit		130 (63.1)		
Education				
None		46 (22.3)	206	
Primary		26 (12.6)		
JSS		46 (22.3)		
SSS		57 (27.7)		
College		18 (8.7)		
Graduate		13 (6.3)		
Employment				
Employed		96 (46.4)	207	
Not employed		111 (53.6)		
Religion				
Not Christian		29 (13.4)	208	
Christian		179 (86.1)		
	Range	**Average**	**N**	**SD**
Age	20-106	56	204	31

		n (%)	N	
Children	0-16	4.4	206	6.7

Enabling Factors

		n (%)	N
Health Ins.			209
Yes		187 (89)	
No		22 (11)	
Urban/Rural			
Urban		20 (9.8)	205
Peri-urban		88 (42.9)	
Rural		97 (47.3)	
Regions			
Ashanti		172 (82.7)	
Brong Ahafo		10 (4.8)	
Central		2 (1.0)	
Eastern		5 (24)	
Greater Accra		2 (1.0)	
Northern		4 (1.9)	208
Upper East		1 (0.5)	
Upper West		1 (0.5)	
Volta		1 (0.5)	
Western		8 (3.9)	
Barriers			
Yes		81 (39)	
No		128 (61)	
Family/Friends Use	Yes	112 (54)	207
	No	95 (46)	

Need Factors

		n (%)	N
Chronic Disease			

Diabetes		68 (32.7)	208
Hypertension		113 (54.1)	
Asthma		5 (2.4)	
Heart Failure		7 (3.4)	
Smoke		8 (3.8)	
Arthritis		35 (16.8)	
Sickle Cell		6 (2.9)	
HIV/AIDS		3 (1.4)	209
Cancer		66 (31.6)	
Kidney		19 (9.1)	
Other		42 (20.1)	
TCC	1 condition	83 (40)	
TCC	2 conditions	85 (41)	
TCC	3 conditions	37 (18)	
TCC	4 conditions	2 (1)	

APPENDIX G

SUMMARY OF SCALES

Table 5. Summary of Scales

	N	Mean	Standard Deviation	Minimum	Maximum
General Health Perceptions	203	2.87	1.09	1	5
General Beliefs About Herbal Medicine	209	3.32	0.81	1	5
Beliefs About Co-use of Herbal and Conventional Medicine	208	3.57	0.91	1	5
Satisfaction with Physicians	207	3.99	0.70	1	5
Cultural Beliefs	205	4.11	0.65	2	5

APPENDIX H

SPEARMAN CORRELATION ANALYSIS

Table 6. Spearman correlation analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Female (1)	1														
Age (2)	0.13														
Cohabit. (3)	-0.28	-0.13	1												
Christian (4)	-0.08	0	0.09	1											
Educ. (5)	-0.35	-0.31	0.13	0.17	1										
Employ. (6)	-0.20	-0.45	0.27	0.13	0.23	1									
HM Beliefs (7)	-0.02	-0.06	0.15	-0.02	0.08	0.01	1								
Cultural Beliefs(8)	0.04	0.03	0.03	-0.05	0.10	0.13	0.22	1							
Co-Use Beliefs (9)	0.02	-0.03	-0.13	-0.11	0.09	0.06	-0.11	0.23	1						
Fam_FriendUse (10)	-0.10	-0.22	0.07	0.13	0.12	0.10	0.34	0.08	-0.02	1					
Health Ins. (11)	0.02	0.15	0.09	-0.09	0.30	-0.01	0.05	0.23	-0.01	0.05	1				
Rural (12)	-0.05	0.16	-0.08	-0	0.20	-0.08	-0.07	-0.08	-0.02	-0.17	0.01	1			
Barriers (13)	-0.04	-0.01	0.07	-0.01	-0.07	0.08	-0.02	0.19	0.10	0.09	-0.05	0.22	1		
Dr. Satisfaction (14)	0.12	0.06	-0.10	-0.05	-0.03	0.15	-0.09	0.32	0.29	-0.03	0.12	-0.05	0.22	1	
Total CC (15)	0.17	0.35	-0.13	0	-0.11	-0.34	0	0.01	-0.05	-0.16	0.11	0.07	0.01	-0.09	1

APPENDIX I

MULTINOMIAL LOGISTIC REGRESSION ANALYSIS – FACTORS ASSOCIATED WITH

TM USE

Table 7. Multinomial logistic regression analysis - Factors associated with TM use.

Independent Variables	Model 1 – Predisposing Factors		Model 2 – Predisposing and Enabling Factors		Model 3 – Predisposing, Enabling and Need Factors	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
Past Use (Ref: Never Used)						
Predisposing Factors						
Age	0.97	0.94-1.00	0.97	0.94-1.01	0.96*	0.93-1.00
Female (Ref: Male)	1.62	0.56-4.71	1.60	0.54-4.76	1.43	0.47-4.34
Married-Cohabit (Ref: Other)	2.83*	1.11-7.23	3.22*	1.20-8.64	3.89*	1.36-11.1
Christian (Ref: Other)	1.17	0.32-4.18	1.24	0.31-4.97	0.99	0.23-4.33
Education (Ref: None)						
Primary	0.41	0.08-2.01	0.39	0.07-2.16	0.41	0.07-2.63
JHS	1.10	0.29-4.23	1.15	0.27-4.87	1.19	0.26-5.39
SHS	1.56	0.41-5.88	1.90	0.46-7.85	2.11	0.48-9.36
College	0.02***	0-0.13	0.02**	0-0.18	0.01***	0-0.14
Graduate Education	0.73	0.09-5.69	0.78	0.09-6.81	0.84	0.09-7.71
Employed (Ref: Unemployed)	0.38	0.13-1.09	0.33*	0.11-0.99	0.39	0.12-1.25
Gen. Herbal Med. Beliefs	1.42	0.81-2.48	1.48	0.83-2.63	1.45	0.79-2.67
Friends/Family Use Herbal Med (Ref: No)	9.23***	3.08-27.7	9.53***	2.99-30.4	13.6***	3.86-47.7
Cultural Beliefs	0.99	0.51-1.94	0.88	0.40-1.94	0.74	0.32-1.71
Co-Use Beliefs	1.06	0.64-1.77	0.97	0.58-1.65	0.96	0.54-1.69
Enabling Factors						
Health Insurance			1.44	0.36-5.78	1.27	0.30-5.35
Residence (Ref: Urban)						
Peri-Urban			0.11	0.01-1.19	0.08	0.01-1.01
Rural			0.15	0.01-1.76	0.10	0.01-1.28
Accessibility Barrier (Ref: None)			1.15	0.43-3.08	1.07	0.39-2.97
Physician Satisfaction			1.17	0.55-2.49	1.38	0.60-3.17

Need Factor						
Total Chronic Conditions					3.00**	1.49-6.02

Current Use (Ref: Never Used)						
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Predisposing Factors						
Age	0.98	0.94-1.01	0.98	0.95-1.02	0.97	0.94-1.01
Female (Ref: Male)	0.87	0.94-1.02	0.88	0.26-3.01	0.80	0.23-2.80
Married-Cohabit (Ref: Other)	2.69	0.86-8.43	3.01	0.94-1.02	3.48*	1.01-12.0
Christian (Ref: Other)	1.56	0.32-7.52	1.75	0.33-9.42	1.44	0.25-8.16
Education (Ref: None)						
Primary	0.50	0.08-3.16	0.38	0.05-2.67	0.42	0.05-3.25
JHS	0.85	0.17-4.30	0.65	0.12-3.62	0.67	0.11-3.93
SHS	0.67	0.13-3.56	0.57	0.10-3.34	0.64	0.10-3.88
College	0.11*	0.02-0.84	0.11*	0.01-0.93	0.09*	0.01-0.81
Graduate Education	0.35	0.03-4.66	0.32	0.02-5.00	0.32	0.02-5.40
Employed (Ref: Unemployed)	0.47	0.14-1.58	0.47	0.13-1.68	0.53	0.14-1.96
Gen. Herbal Med. Beliefs	3.63**	1.75-7.54	3.63**	1.71-7.71	3.64**	1.68-7.90
Friends/Family Use Herbal Med (Ref: No)	10.7***	3.03-38.0	11.8***	3.16-44.1	14.5***	3.61-58.3
Cultural Beliefs	0.81	0.35-1.84	0.85	0.34-2.15	0.71	0.27-1.86
Co-Use Beliefs	0.72	0.39-1.30	0.72	0.39-1.33	0.70	0.37-1.33
Enabling Factors						
Health Insurance			1.22	0.27-5.55	1.19	0.25-5.57
Residence (Ref: Urban)						
Peri-Urban			0.20	0.14-3.00	0.15	0.01-2.54
Rural			0.23	0.01-3.68	0.15	0.01-2.65
Accessibility Barrier (Ref: None)			0.62	0.19-1.99	0.59	0.18-1.97
Physician Satisfaction			0.71	0.31-1.62	0.78	0.33-1.89
Need Factor						
Total Chronic Conditions					2.22*	1.02-4.82

	Model 1 – Predisposing Factors		Model 2 – Predisposing and Enabling Factors		Model 3 – Predisposing, Enabling and Need Factors	
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI

Past Use (Ref: Never Used)

Predisposing Factors						
Age	0.97	0.94-1.00	0.97	0.94-1.01	0.96*	0.93-1.00
Female (Ref: Male)	1.62	0.56-4.71	1.60	0.54-4.76	1.43	0.47-4.34
Married-Cohabit (Ref: Other)	2.83*	1.11-7.23	3.22*	1.20-8.64	3.89*	1.36-11.1
Christian (Ref: Other)	1.17	0.32-4.18	1.24	0.31-4.97	0.99	0.23-4.33
Education (Ref: None)						
Primary	0.41	0.08-2.01	0.39	0.07-2.16	0.41	0.07-2.63
JHS	1.10	0.29-4.23	1.15	0.27-4.87	1.19	0.26-5.39
SHS	1.56	0.41-5.88	1.90	0.46-7.85	2.11	0.48-9.36
College	0.02***	0-0.13	0.02**	0-0.18	0.01***	0-0.14
Graduate Education	0.73	0.09-5.69	0.78	0.09-6.81	0.84	0.09-7.71
Employed (Ref: Unemployed)	0.38	0.13-1.09	0.33*	0.11-0.99	0.39	0.12-1.25
Gen. Herbal Med. Beliefs	1.42	0.81-2.48	1.48	0.83-2.63	1.45	0.79-2.67
Friends/Family Use Herbal Med (Ref: No)	9.23***	3.08-27.7	9.53***	2.99-30.4	13.6***	3.86-47.7
Cultural Beliefs	0.99	0.51-1.94	0.88	0.40-1.94	0.74	0.32-1.71
Co-Use Beliefs	1.06	0.64-1.77	0.97	0.58-1.65	0.96	0.54-1.69
Enabling Factors						
Health Insurance			1.44	0.36-5.78	1.27	0.30-5.35
Residence (Ref: Urban)						
Peri-Urban			0.11	0.01-1.19	0.08	0.01-1.01
Rural			0.15	0.01-1.76	0.10	0.01-1.28
Accessibility Barrier (Ref: None)			1.15	0.43-3.08	1.07	0.39-2.97
Physician Satisfaction			1.17	0.55-2.49	1.38	0.60-3.17
Need Factor						
Total Chronic Conditions					3.00**	1.49-6.02
Current Use (Ref: Never Used)						
Independent Variables	RRR	95% CI	RRR	95% CI	RRR	95% CI
Predisposing Factors						
Age	0.98	0.94-1.01	0.98	0.95-1.02	0.97	0.94-1.01
Female (Ref: Male)	0.87	0.94-1.02	0.88	0.26-3.01	0.80	0.23-2.80
Married-Cohabit (Ref: Other)	2.69	0.86-8.43	3.01	0.94-1.02	3.48*	1.01-12.0
Christian (Ref: Other)	1.56	0.32-7.52	1.75	0.33-9.42	1.44	0.25-8.16
Education (Ref: None)						
Primary	0.50	0.08-3.16	0.38	0.05-2.67	0.42	0.05-3.25
JHS	0.85	0.17-4.30	0.65	0.12-3.62	0.67	0.11-3.93
SHS	0.67	0.13-3.56	0.57	0.10-3.34	0.64	0.10-3.88
College	0.11*	0.02-0.84	0.11*	0.01-0.93	0.09*	0.01-0.81
Graduate Education	0.35	0.03-4.66	0.32	0.02-5.00	0.32	0.02-5.40

Employed (Ref: Unemployed)	0.47	0.14-1.58	0.47	0.13-1.68	0.53	0.14-1.96
Gen. Herbal Med. Beliefs	3.63**	1.75-7.54	3.63**	1.71-7.71	3.64**	1.68-7.90
Friends/Family Use Herbal Med (Ref: No)	10.7***	3.03-38.0	11.8***	3.16-44.1	14.5***	3.61-58.3
Cultural Beliefs	0.81	0.35-1.84	0.85	0.34-2.15	0.71	0.27-1.86
Co-Use Beliefs	0.72	0.39-1.30	0.72	0.39-1.33	0.70	0.37-1.33
Enabling Factors						
Health Insurance			1.22	0.27-5.55	1.19	0.25-5.57
Residence (Ref: Urban)						
Peri-Urban			0.20	0.14-3.00	0.15	0.01-2.54
Rural			0.23	0.01-3.68	0.15	0.01-2.65
Accessibility Barrier (Ref: None)			0.62	0.19-1.99	0.59	0.18-1.97
Physician Satisfaction			0.71	0.31-1.62	0.78	0.33-1.89
Need Factor						
Total Chronic Conditions					2.22*	1.02-4.82

*p<0.05 **p<0.01; ***p<0.001

APPENDIX J

CHANGE IN R-SQUARE FOR MULTINOMIAL MODELS

Table 8. Change in R-squares for Multinomial Models

	R^2	Change in R^2
Model 1 (Predisposing)	0.2134	-
Model 2 (Predisposing and Enabling)	0.2379	2.45
Model 3 (Predisposing, Enabling and Need)	0.2662	2.83

APPENDIX L

TOBIT MODEL WITH INSTRUMENT VARIABLE

Table 10. Tobit Model with Instrumental Variable.

Independent Variables	Coef.	Std. Err.	z	p-value	95% CI
Herbal Medicine Use	-0.25	0.30	-0.84	0.40	-0.85-0.34
Age	0.01	0.01	1.28	0.20	0-0.02
Female (Ref: Male)	-0.23	0.21	-1.12	0.26	-0.64-0.17
Married-Cohabit (Ref: Other)	-0.20	0.20	-0.97	0.33	-0.59-0.20
Christian (Ref: Other)	0.04	0.29	0.12	0.90	0.52-0.60
Education					
Primary	0.21	0.32	0.67	0.51	-0.41-0.84
JHS	0.23	0.27	0.83	0.41	-0.31-0.76
SHS	0.13	0.28	0.45	0.65	-0.42-0.68
College	0.88	0.39	2.23	0.03	0.11-1.65
Graduate Education	1.11	0.46	2.42	0.02	0.21-2.01
Employed (Ref: Unemployed)	0.30	0.21	1.43	0.15	-0.11-0.70
Health Insurance	0.16	0.28	0.59	0.56	-0.39-0.71
Residence (Ref: Urban)					
Peri-Urban	-0.31	0.31	-1.00	0.32	-0.91-0.29
Rural	-0.24	0.32	-0.77	0.44	-0.88-0.38
Accessibility Barrier (Ref: None)	-0.21	0.19	-1.10	0.27	-0.58-0.16
Physician Satisfaction	0.03	0.14	0.24	0.81	-0.24-0.30
Total CC	-0.12	0.12	-1.03	0.31	-0.36-0.11