

Explanatory Model for the Use of Traditional Medicines in Kilimanjaro, Tanzania

by

John W. Stanifer

Duke Global Health Institute
Duke University

Date: _____

Approved:

Nathan Thielman, Supervisor

David Boyd

Uptal Patel

Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the Duke Global Health Institute in
the Graduate School of Duke University

2014

ABSTRACT

Explanatory Model for the Use of Traditional Medicines in Kilimanjaro, Tanzania

by

John W. Stanifer

Duke Global Health Institute
Duke University

Date: _____

Approved:

Nathan Thielman, Supervisor

David Boyd

Uptal Patel

Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the Duke Global Health Institute in
the Graduate School of Duke University

2014

Copyright by
John W Stanifer
2014

Abstract

Introduction: The practice of traditional medicines is one of the most important means of achieving total health care coverage globally, and their importance in Tanzania extends beyond the impoverished rural areas. Their use remains high even in urban settings among the educated middle and upper classes. They are a critical component healthcare in Tanzania, but they also can have harmful side effects. Therefore we sought to understand the decision-making and reasoning processes by building an explanatory model for the use of traditional medicines in Tanzania.

Methods: We conducted a mixed-methods study between December 2013 and June 2014 in the Kilimanjaro Region of Tanzania. Using purposive sampling methods, we conducted focus group discussions (FGDs) and in-depth interviews of key informants, and the qualitative data were analyzed using an inductive Framework Method. A structured survey was created, piloted, and then administered it to a random sample of adults. We reported upon the reliability and validity of the structured survey, and we used triangulation from multiple sources to synthesize the qualitative and quantitative data.

Results: A total of five FGDs composed of 59 participants and 27 in-depth interviews were conducted. 16 of the in-depth interviews were with self-described traditional practitioners or herbal vendors. We identified five major thematic categories that relate to the decision to use traditional medicines in Kilimanjaro: healthcare delivery, disease understanding, credibility of the traditional practices, health status, and strong cultural beliefs.

A total of 473 participants (24.1% male) completed the structured survey. The most common reasons for taking traditional medicines were that they are more affordable (14%, 12.0-16.0),

failure of hospital medicines (13%, 11.1-15.0), they work better (12%, 10.7-14.4), they are easier to obtain (11%, 9.48-13.1), they are found naturally or free (8%, 6.56-9.68), hospital medicines have too many chemicals (8%, 6.33-9.40), and they have fewer side effects (8%, 6.25-9.30). The most common uses of traditional medicines were for symptomatic conditions (42%), chronic diseases (14%), reproductive problems (11%), and malaria and febrile illnesses (10%). Participants currently taking hospital medicines for chronic conditions were nearly twice as likely to report traditional medicines usage in the past year (RR 1.97, p=0.05).

Conclusions: We built a broad explanatory model for the use of traditional medicines in Kilimanjaro. The use of traditional medicines is not limited to rural or low socioeconomic populations and concurrent use of traditional medicines and biomedicine is high with frequent ethnomedical doctor shopping. Our model provides a working framework for understanding the complex interactions between biomedicine and traditional medicine. Future disease management and treatment programs will benefit from this understanding, and it can lead to synergistic policies with more effective implementation.

Contents

Abstract.....	iv
List of Tables.....	xii
List of Figures.....	ix
Acknowledgements.....	x
1. Introduction.....	1
1.1 Study Site.....	1
1.2 Background.....	3
1.3 Defining the Terms.....	5
1.4 Conceptual Model for the Use of Traditional Medicines.....	6
1.5 Objectives.....	7
2. Methods.....	9
2.1 Study Design.....	9
2.2 Study Population.....	9
2.3 Ethics.....	9
2.4 Sampling Strategies.....	10
2.4.1 Qualitative Sampling.....	10
2.4.2 Quantitative Sampling.....	10
2.5 Data Collection	12
2.5.1 Qualitative Data Collection.....	12
2.5.2 Quantitative Data Collection.....	14
2.5.3 Development of the Survey Tool.....	15
2.6 Data Management.....	20

2.7 Data Analysis.....	21
2.7.1 Qualitative Data Analysis.....	21
2.7.2 Building a Framework.....	22
2.7.3 Quantitative Data Analysis.....	22
3. Results.....	24
3.1 Qualitative Study Population.....	24
3.2 Quantitative Study Population.....	27
3.3 Converging Thematic Categories.....	29
3.4 Survey Results.....	42
4. Discussion.....	49
Appendix A.....	53
Appendix B.....	58
References.....	72

List of Tables

Table 1: Inclusion Criteria for Survey Items.....	19
Table 2: Baseline characteristics of the focus group discussions (FGDs) and in-depth interviews.....	26
Table 3: Baseline characteristics of the traditional practitioners who participated in in-depth interviews.....	37
Table 4: Baseline characteristics of the quantitative study population.....	29

List of Figures

Figure 1: District map of the Kilimanjaro Region, Tanzania.....	1
Figure 2: Pyramidal representation of the Tanzanian HealthCare Referral Structure.....	3
Figure 3: Action Cycle Detailing the Numerous Steps and Dynamic Nature of Cross-Cultural Survey Design.....	15
Figure 4: Diagrams illustrating the five major themes and their relationship to each other.....	31
Figure 5: Diagram showing the relationship between poor disease understanding by patients and the use of traditional medicines.....	34
Figure 6: Flow Chart Highlighting the Impact of Health Status on the Use of Traditional Medicines.....	41
Figure 7: Diagram showing the relationship between strong cultural beliefs and the credibility of traditional practices.....	42
Figure 8: Frequency of Traditional Medicine Use among the general population according to whether the survey respondent knew someone using them.....	45
Figure 9: Pie chart showing the relative frequencies of the reasons for the use of traditional medicines.....	46
Figure 10: Pie chart showing the most frequent uses of traditional medicines.....	48
Figure 11: Pie chart showing the most frequent formulations or modes of administration of traditional medicines.....	49

Acknowledgements

I would first like to express my gratitude to all of my mentors at Duke University who have supported me through Internal Medicine training and my Global Health Masters studies.

Professor G Ralph Corey has been instrumental in my development as a physician, scientist, and person and without him none of this would have been possible. Professor Mary Klotman who chairs the Department of Medicine has been gracious and generous in her support which has allowed me to pursue these studies and for that I am grateful. Drs. Patel and Boyd have provided incredible mentorship at Duke and this work is an expression of that guidance, and Professor Thielman in his mentorship and support of the Global Health Residency has been intimately responsible for my successes. Additionally, the support of the Duke-KCMC Collaboration in Moshi and its leader, Prof. John Bartlett, have provided an exceptional training and learning environment for young investigators and this work is also a reflection of that.

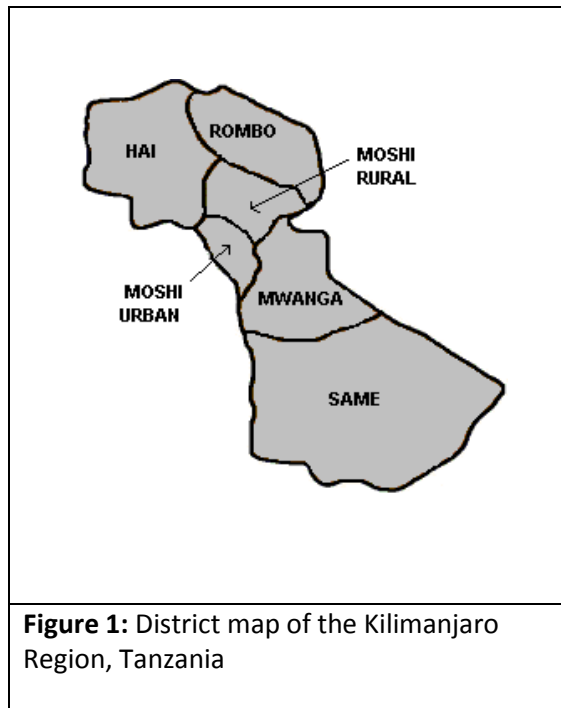
I am also grateful to the attentive support from Cecelia Pezdek and Tara Pemble who have guided me through the numerous steps and hurdles of a global health education. Without them this certainly would not have been possible.

Finally, I would like to thank my loving wife Molly and my family who have supported me through this endeavor. Few persons would provide enough support and love to move across the world, and without them I certainly would have failed long ago.

1. Introduction

1.1. Study Site

The Kilimanjaro Region, situated in Northern Tanzania is divided into seven districts with Moshi Urban as the most populous (**Figure 1**).



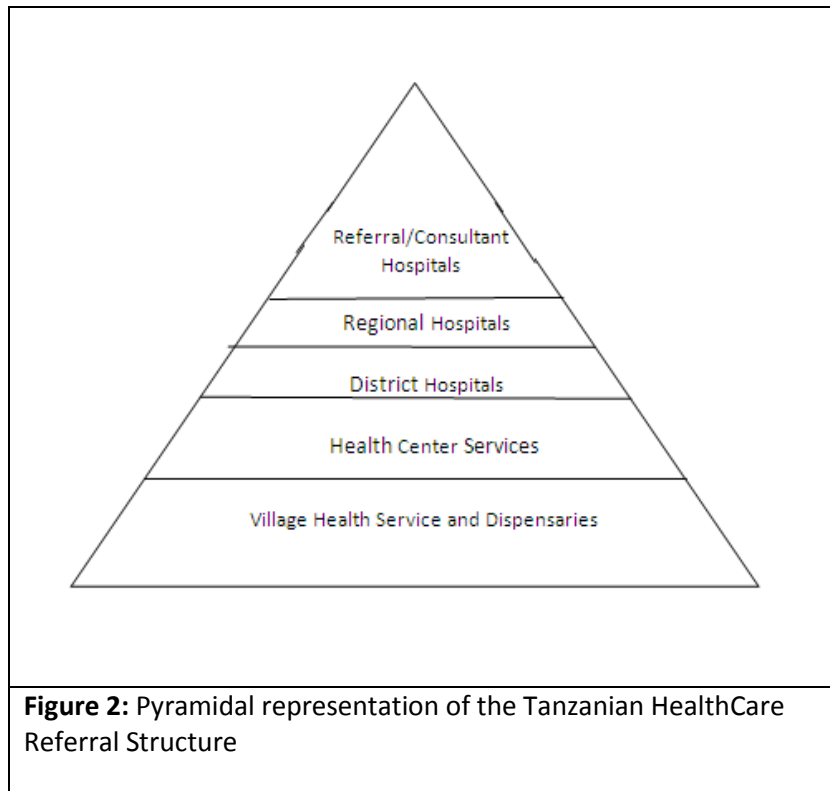
Within each district, the administrative units are further defined as wards which then contain neighborhoods or streets. The neighborhoods represent the most basic government administrative unit within Tanzania.

From the 2012 national census, Kilimanjaro's regional adult population is over 1.6 million people; over 75% of the population lives in rural areas and it is nearly evenly

divided between men and women.¹ Currently greater than 95% of school-age children are enrolled in primary school, and literacy rates are greater than 80% for both men and women which place the region above the national average. The largest ethnic group is the Chagga tribe followed by the Pare, but the Maasai, Samba, and Kahe tribes also have a presence. In total, over 120 ethnic groups reside in Tanzania and Swahili is the major language of the region and the entire country.²

This entire population is served by Kilimanjaro Christian Medical College (KCMC) hospital in Moshi town which has a total catchment area of nearly ten million people when the neighboring regions are included. KCMC is a constituent college of Tumaini University, and it is one of six medical schools and referral centers in Tanzania. It is the sole tertiary referral hospital for Tanzania's Northern Zone.

In the healthcare structure of Tanzania, KCMC represents the pinnacle of referral (**Figure 2**). Below the tertiary referral hospitals such as KCMC are the regional and district hospitals which are staffed by a combination of Medical Doctors and Assistant Medical Officers (mid-level providers). The most basic and decentralized points of care for most people are the village health centers and dispensaries; staffing and supplies are extremely variable among health centers and dispensaries.



1.2. Background

The use of traditional medicine is a critical aspect of healthcare in sub-Saharan Africa: a fact confirmed by the World Health Organization (WHO) position statement that traditional medicines are one of the most important means of achieving total health care coverage globally.³ Up to 80% of the population in sub-Saharan countries uses traditional remedies, and their importance in some cultures, such as the Maasai healers of Tanzania and the traditional bone setters of northern Nigeria, is well-documented.⁴⁻⁶ Previous work in Tanzania has shown that traditional medicines can be an effective and important component of healthcare for patients especially those from poor, rural regions.⁷ Indeed in

many rural areas traditional medicine is the only healthcare access due to the strained financial and medical resources of medical clinics.³ This eventually led to the legalization of the practice with the passage of the Tanzanian Traditional and Alternative Medicine Act of 2002, and may partly explain why 70% of Tanzanians access healthcare through traditional healers.⁸

However, the importance of traditional medicine in the role of healthcare in Tanzania extends beyond just the impoverished rural areas, and use of traditional medicines is likely high even in urban settings. While cost and access are certainly important factors in the utilization of traditional medicines, they alone do not fully account for their ubiquitous use. Even in rural areas of Tanzania that have easily accessible and low-cost health centers, the use of traditional medicine remains high.⁹ Furthermore, the concurrent use of traditional medicines and hospital medicines in an augmentative process is common enough to warrant further exploration.

In addition to the real and perceived benefits of traditional medicines, the risks associated with them cannot be overlooked. For example, traditional medicines have been implicated in 35% of all the cases of acute kidney injury with some of the most common toxic ones including *Securidaca longepedunculata* (African Violet Tree), *Cape Aloes*, and *Euphorbia matabalensis*.^{10,11} They have also been implicated in hepatic failure, neuropathies, dehydration, seizures and are many are known to interact with hospital medicines,^{12,13} and despite coordinated attempts by the Tanzanian government to formalize and better coordinate traditional healers in the form of professional associations and direct regulations from the Ministry of Health, most all of them remain unregistered and unsupervised in their

practices.¹⁴ Given these risks, understanding the decision-making process and framework for their use is critical in a region where they constitute an important (yet unregulated) form of healthcare.

1.3. Defining the Terms

Before proceeding it is worth clearly defining the terms ‘hospital medicine’ and ‘traditional medicine’ and our rationale for choosing these terms. Hospital medicines are meant to refer to those drugs which have been scientifically studied and are prescribed by licensed Medical Doctors (or their surrogates). The literature often synonymously refers to them as ‘conventional medicines’ or ‘Western medicines’ or ‘biomedicines’; however, we have chosen to avoid those terms in this manuscript. Our research participants themselves repeatedly (and almost exclusively) used the term ‘hospital medicine’ when referring to this category of treatment options. As will also be seen, the term ‘Western’ was used by the participants in a negative context at times, and finally, there is nothing conventional about the use of these medicines among most people of Tanzania. Indeed, in their context, the term ‘conventional’ would more likely refer to traditional medicines. The term ‘traditional medicine’ (*mitishamba* in Swahili) should be taken to mean any herbs, drugs, vitamins, teas, foods, creams, lotions, potions, and soups that are used to treat health and wellness problems. This term may also be translated as herbal or natural medicine, but we believe the context is better captured by using the term ‘traditional’ which stresses the family and cultural heritages that became evident through this research.

Finally, although many patients refer to all healthcare providers as Doctors, most providers at the dispensary level are Assistant Medical Officers which are mid-level providers with

minimal post-graduate training and no residency training. Because the patients themselves do not often know this distinction, it was impossible to tell with certainty which providers they are referring to during our sessions, and it is likely that they are referring to both depending upon the setting.

1.4. Conceptual Models for the Use of Traditional Medicines

Traditional remedies and hospital medicines are very different in their approach to the cause of illness as well as their approach to healing.¹⁵ Because people often hold multiple different (and sometimes conflicting) viewpoints regarding illness and disease, they may accept the scientific and physiological reasons for disease (even without fully understanding them) but maintain within their traditional belief systems a theurgical understanding of disease whereby supernatural or external forces are at least partly responsible. In this model, health is both biological and cultural, hospital medicines do not provide holistic solutions pertaining to problems associated with personal or spiritual imbalances.¹⁶ Importantly, healers themselves often hold this dual naturalistic-theurgical concept of disease, and this has important ramifications in prescription of treatments for disease.¹⁵ Treatments may target symptomatic relief of disease (physiological or biological homeostasis) while at the same time be directed toward restoring these imbalances (spiritual homeostasis).

Previous work in sub-Saharan Africa has suggested that it is the inability of hospital medicine to attend to these perceived spiritual (or supernatural) imbalances that leads to treatment failure, non-compliance, or its abandonment, yet this worldview is not so different than the Western tradition.^{17,18} It echoes the theology-biology of Hippocrates, Galen, and Avicenna

which all plagued the canon of Western medicine for over two millennia with different variants of Humeral Theory and which all derive their roots from the Aristotelian teleological world-view. Even today, it is hard to overstate the role that complementary or supplementary methods of treatment, including prayer, yoga, meditation, relaxation therapy, behavioral cognitive therapy, home remedies, and retail “natural” remedies play in the Western culture of healthcare.

Through highlighting these similarities, an important question arises: if it is the inability of hospital medicines to holistically attend to these imbalances that leads to treatment failure, then why does this not occur in Western countries with similar traditions? *Prima facie* cost and access are the logical answers, but these alone are inadequate as well. They do little to explain the use of traditional medicines in educated, urban areas or the concurrent use of traditional medicines and hospital medicines. Understanding these complex interactions and issues requires a broad explanatory model that encompasses all of these critical aspects in a dynamic way.

1.5. Objectives

It is the intent of this work to provide a different and more complete framework for the use of traditional medicines in Kilimanjaro. We will show that the inability of hospital medicine to attend to spiritual explanations of disease only has a small part in the explanation of the perceived failure of hospital medicine in managing diseases. This finding is consistent with other work in the field, but we also show that a lack of disease understanding, healthcare delivery, health status, and the credibility of the traditional practices themselves all play important and interacting roles in the use of traditional medicines.¹⁹⁻²¹

Some have put forth that traditional healer shopping is the primary response of chronically ill people in sub-Saharan Africa, but we will show that this is only a narrow understanding.^{20,21} We posit that the term 'ethnomedical doctor shopping', which highlights the important relationship between Medical Doctors and Traditional Doctors, is a more inclusive and accurate term than simply 'healer shopping' or 'doctor shopping'. Our research will show that patients often freely flow between these two realms (and among many providers within each realm) depending upon the current physiological (symptomatic), social, environmental, spiritual, and financial status of the disease state, and this paper will explore the interplay among these factors that lead up to decisions about traditional medicines.

Finally, we will show that concurrent use of hospital medicine and traditional medicine is high. We have built a model that is broad enough and dynamic enough to capture these complex issues, and we will explore the reasons behind this phenomenon.

2. Methods

2.1. Study Design

The research study consisted of two methods: a qualitative portion of in-depth interviews, focus groups, and targeted interviewing and a quantitative cluster designed, cross-sectional portion.

This mixed method technique has the advantage of understanding deeper meanings, reasoning, and cultural contexts as well as providing generalizable conclusions through quantitative structured surveys. The study was conducted between December 2013 and May 2014.

2.2. Study Participants

All adults (male and female) over the age of 18 who were capable and willing to consent were eligible for inclusion. Non-residents or non-citizens of Tanzania were excluded from the study.

2.3. Ethics

Approval from the Duke Institutional Review Board (IRB) (Duke IRB # Pro00040784), Kilimanjaro Christian Medical College (KCMC) Ethics Committee (EC#502) and the National Institute of Medical Research (NIMR) in Tanzania was obtained before any contact with participants.

Additionally, we sought approval from each district commissioner and each individual village leader in advance of any recruitment from their respective jurisdiction.

Informed consent forms were administered both in oral and text form by local (native) research assistants who speak Swahili as their first language. For participants who were unable to sign their name, a thumbprint was obtained as proof of consent.

2.4. Sampling Strategies

2.4.1. Qualitative sampling

We used a purposive sampling strategy to invite adults to participate in in-depth interviews and focus group discussions (FGD). We sampled from five different groups of people: patients receiving care from the Internal Medicine clinic at KCMC hospital and Majengo Health Clinic, patients receiving care from traditional healers, well-adults from the general population of Moshi Urban and Rural, herbal vendors, traditional healers from different tribal groups (including Saamba and Maasai), and Medical Doctors from the Department of Medicine at KCMC Hospital. This purposive sampling had the principle advantage of providing perspectives from many of the key informants in health care in the region.

2.4.2. Quantitative sampling

All adults (male and female) over the age of 18 were eligible for inclusion. Pregnant women, non-residents, and non-citizens of Tanzania were excluded from the study.

The sampling method was based on Area or Cluster Probability Sampling such that the geographic area of sampling was determined by the administrative boundaries within Moshi Urban and Moshi Rural. Within Moshi Urban and Rural, 30 neighborhoods were randomly chosen based on population proportional to size after being weighted by the inverse of their square area to account for population densities. This served as the primary sampling unit (*psu*). Within each chosen neighborhood, a cluster site was chosen using latitude and longitude points randomly generated using Environmental Systems Research Institute (ESRI) Arc Global Information Systems (ArcGIS®) software.

The cluster sites were located using a global positioning satellite (GPS). The dwelling physically closest to the GPS cluster site represented the first contact. If that dwelling fulfilled the criteria for a household, then the residents were invited to participate. The next household within the cluster was chosen by a coin flip indicating left or right and the roll of a die indicating which house was to be chosen (**Appendix A**). This process was repeated until a minimum of 12 persons from each cluster were enrolled. Within each household, each adult participant who met the inclusion criteria was invited to participate.

A minimum of two additional visits on subsequent days and weekends were attempted for those who did not respond initially. When possible, we tracked and approached residents at their place of work for recruitment.

To ensure that the sampling protocol was strictly adhered to, the principle investigator regularly accompanied the surveyors into the field (but remained absent during survey administration). Additionally, anonymous shadowing of the surveyors was performed regularly.

2.5. Data Collection

2.5.1. Qualitative data collection

Prior to qualitative data collection, the research assistants (RAs) and moderator were trained on the aims of the formative research and the appropriate techniques for leading in-depth interviews, FGDs, and note-taking.

In-depth interviews and FGDs used targeted methods in order to focus on particular and different components of the utilization of traditional remedies. Additionally, although the sessions were semi-structured in order to cover specific content areas, the process was iterative

and dynamic with each prior interview or FGD forming the questions and probes for the proceeding sessions. In this way, the sessions were guaranteed to cover certain topics with refined questions, but the process allowed for the exploration of new topics as the sessions progressed. Questions that we agreed were saturated were dropped from the next focus group discussion to allow for these new lines of discussion.

FGDs were all conducted at the Majengo Health Clinic which is centrally located in town and well-known to most locals. Each session was conducted in Swahili and led by a local moderator who was assisted by two note-takers. Each session was audio recorded to ensure that a complete transcript was available, and each session lasted between 3-5 hours. Demographics data were collected before beginning the session. Each one consisted of 8-16 people with men and women separately. We avoided recruiting participants' friends, neighbors, or relatives in an effort to keep the conversation as candid as possible. Participants were provided refreshments and reimbursement for their travel. Participants received a handout describing the focus groups along with the date and time of the focus group, and a reminder phone call was made the day before.

In-depth interviews were performed at the Majengo Health Clinic or on-site at the participant's home or work. Demographics data were collected before beginning the session. Each session was conducted in Swahili or Maa (Maasai language) and led by a local research assistant. Each session was audio recorded to ensure that a complete transcript was available, and each session lasted between 1-2 hours. Participants were provided refreshments and reimbursement for their travel.

A debriefing session was held at the end of each focus group to discuss our first impressions, any emerging themes, and ideas for improvement. This feedback was used to help guide the next focus group discussion as well as shape the analysis.

At the completion of each session, the audio recording was transcribed and then translated into English by two RAs who speak Swahili as their first language. The in-depth interviews that were conducted in Maa were translated by a native RA who speaks Maa, Swahili, and English. The notes taken during the session were used to help guide the transcription and translation. The moderator reviewed the original and translated manuscripts to ensure accuracy.

2.5.2. Quantitative data collection

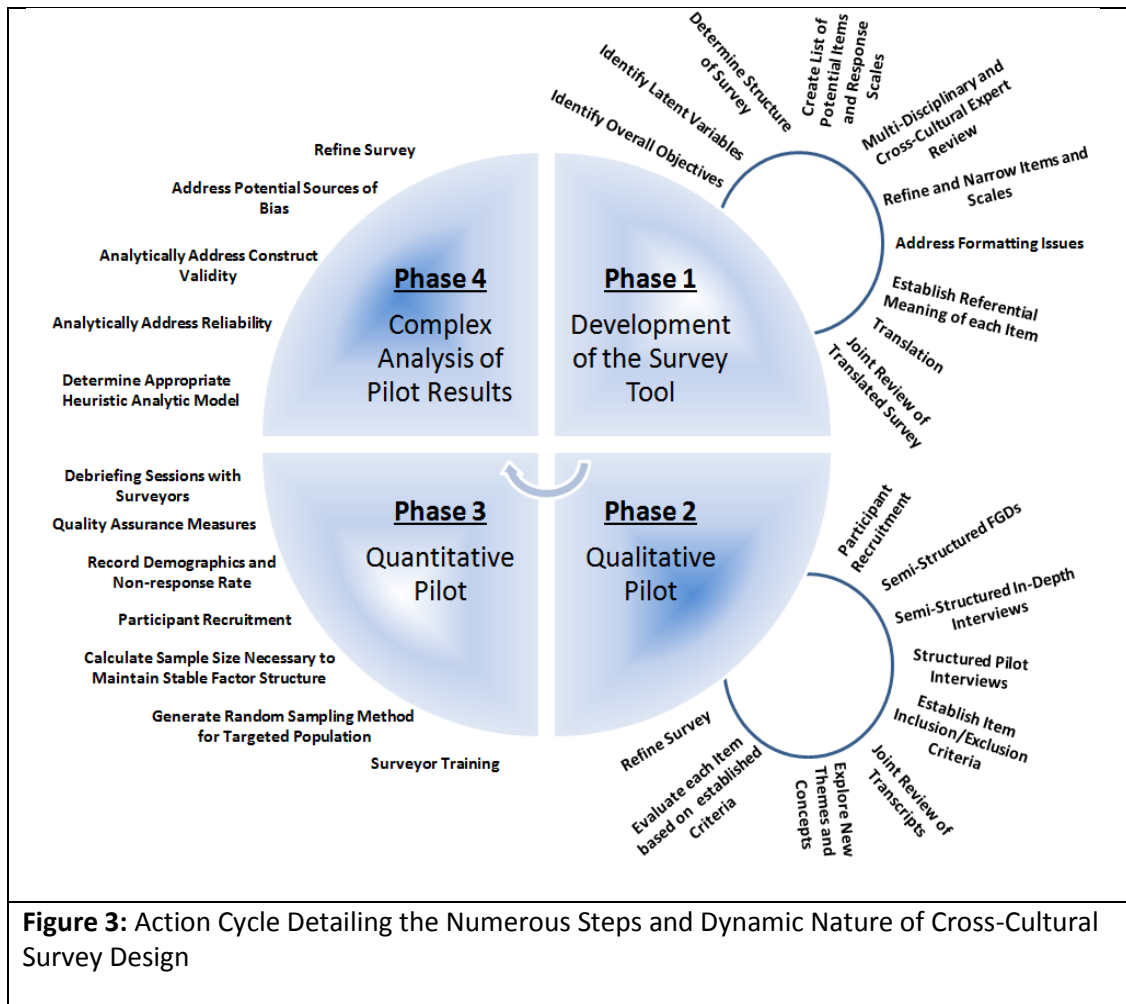
After informed consent, demographic data were collected before administration of the survey. Additionally, the non-response rate was obtained, and reasons for non-response and basic demographic data for non-responders were obtained when available.

The General Questions Related to Traditional Medications and Health Survey (Appendix B) was then administered orally (in Swahili) to each participant. Each RA was trained in the administration of the Survey before implementation, and they were instructed to read the survey *verbatim* to the participants. Each participant spoke Swahili as his/her native language; therefore, the survey was only administered orally in Swahili in order to reduce recall bias and provide more culturally-consistent answers (i.e. reduce cultural frame switching).²² The RAs were allowed to answer questions related to clarifying instructions and words, but they were not allowed to answer questions related to the meaning of each question. The survey was administered in private to each participant in order to reduce the response effect that the

presence of other persons may have had. Surveyors were instructed to record any abnormalities that occurred during the survey such interruptions or excessive answer-changing.

2.5.3. Development of the Survey Tool

We developed a survey with the intent to test different aspects of traditional medication usage in the Kilimanjaro Region. Creation of a cross-cultural survey is a complex process with numerous iterative steps and checks. There are two critical aspects of validity that were first addressed when generating this cross-cultural survey: content validity and construct (or latent) validity. We developed a process which reflected the dynamic nature of cross-cultural survey design and that ensured issues with content and construct validity were appropriately addressed (**Figure 3**).



Phase 1: Creating the Survey Tool

We developed a survey with the intent to test issues pertaining to traditional medication usage in the Kilimanjaro Region of Tanzania. Our objectives were to understand different aspects related to their use in order to better formulate future treatment and prevention programs. With these objectives in mind, we built a structured survey designed to test latent variables grouped into three major categories: frequency of use, reasons for use, and accessibility.

Content validity refers to whether the scale items represent the proposed domains or concepts in question.²³ We addressed content validity by having experts from multiple disciplines involved in the generation of items and the corresponding response scales. Consensus was obtained for each item before its inclusion in the survey.

We reviewed the survey for formatting issues relating to clarity, ease of reading, vague quantifiers such as “often” and “sometimes”, and design flaws. Each item was reviewed to ensure that there were no double negative questions and to ensure that there were no double-barreled questions. The survey was written in Microsoft sans Serif 12 point font. In order to reduce potential response bias of participants agreeing with statements they believe to be true, we included a mixture of both true and falsely worded items.²⁴ At this step, we also ensured that all reference periods were clearly defined.

In the final step before translation, the referential meaning of each survey item was established. This not only clarified our intended meaning of each item (and latent variables being tested), but it served as a reference for the surveyors during administration. It also served as an additional means of addressing the codability of words and concepts as they were translated from English to Swahili. In cross-cultural surveys where local behaviors, patterns, and worldviews can be very different, this step was especially important.²⁵

After the survey was constructed in English and had been reviewed by the entire team, it was independently translated into Swahili by two native speakers one of whom is a trained medical professional. Following translation, we conducted a joint review of the survey which included the translators as well as the researchers responsible for creating the English version. Issues in codability were explored and questions and answers were either re-written or removed that

contained words or concepts with difficult translation. This step also allowed for additional testing of the content validity of each question by involving local, non-medical experts in the process.

Phase 2: Qualitative Pilot

Construct or latent validity refers to how well the items and answers actually represent the underlying concepts being tested.²³ Issues that may affect construct validity in cross-cultural surveys include translation difficulties with individual words or entire concepts (codability), different intended or referential meaning between the researchers and participants, structural issues in the format and order of the survey itself, and sensitivity of the questions (e.g. stigma or fear of answering certain questions out of embarrassment). To address all of these issues, we conducted an extensive qualitative piloting sessions. When changes were made to the survey, it was often necessary to return to the steps in Phase 1 before conducting more piloting sessions.

Using purposive sampling, participants were recruited from the Kilimanjaro Region. We targeted participants from the general population, participants from the internal medicine clinics at the local hospital, and participants from the clinics of traditional healers. We targeted both men and women of all ages with varying education levels and varying ethnicities.

We then conducted focus group discussions (FGDs) (men and women separate) and in-depth interviews. All of these sessions were audio-recorded and then translated and transcribed by two native research assistants (RAs). Each of these sessions followed a semi-structured protocol that included the referential meaning as well as targeted probe questions. The survey was administered orally by a trained surveyor. An additional note taker was present during the sessions who recorded both verbal and non-verbal cues from the participants while they

answered the survey. At the completion of each session, a debriefing was held which included translators, surveyors, note takers, and researchers.

After completion, the surveyor was instructed to review each item in detail. First, the surveyor was instructed to ask the participant(s) what he/she thought we meant by each question. Next, the surveyor read the referential meaning (developed in Phase 1) to the participant(s) and proceeded to ask a series of probe questions. The probe questions were designed to assess four key areas of the response process: comprehension, retrieval, judgment, and response (**Figure 2**).

In addition to these semi-structured sessions, in-depth interviews were conducted which simulated the actual field-administration of the survey. The surveyor read the informed consent, collected demographic data, read the instructions, and then administered the entire survey as if it were being done for field data collection. The only difference was the presence of a note-taker and the audio-recording of the session.

At the end of all the sessions, each participant(s) was asked to complete a series of structured questions pertaining to formatting, ability to follow instructions and see clearly, the order of the survey questions, and the appropriateness of the answer choices.

During this phase, we adopted a set of criteria by which to judge each item after the sessions.²⁵

To be included each item had to meet all of the established criteria (**Table 1**).

Table 1: Inclusion Criteria for Survey Items

Criteria

1. Level of language (Kiswahili) was not too high
2. The question was simple and grammatically correct
3. Singular and plural 'you' was clear
4. Reflected local issues
5. Meaning and interpretation was clear
6. The question made sense to everyone
7. A 'yes' was clear and unambiguous in meaning
8. A 'no' was clear and unambiguous in meaning
9. Time period was clear
10. The question was not viewed as too sensitive by all participants
11. Resulted in meaningful answers
12. Appropriate degree of discrimination (i.e. items with > 80% endorsement of a single answer were removed)(Priest J McColl BA, Thomas L, Bond S. Developing and Refining a New Measurement Tool. *Nurse Researcher* 1995; 2, 69-81.)

The resulting transcripts and field notes were reviewed by the research team. These reviews included active discussions between the researchers, surveyors, and note takers. Based on the established, decisions were then made for each question as to whether to accept the question unchanged, accept the question with a slight change to the translation, reject the question, or reject the question and write a new one. Additionally, these sessions also served as a rich source of generating new items, concepts, and themes for testing that were not apparent at the beginning of the process, and this served as another process for testing content validity as it further ensured that the items would be of local significance.

Phase 3: Quantitative Pilot

Each surveyor was trained in the administration of the survey before implementation, and they were instructed to read the survey *verbatim* to the participants. Each participant spoke Kiswahili

as his/her native language; therefore, the survey was only administered orally in Swahili in order to reduce recall bias and provide more culturally-consistent answers (i.e. reduce cultural frame switching).²² The surveyors were allowed to answer questions related to clarifying instructions and words, but they were not allowed to answer questions related to the meaning of each question. The survey was administered in private to each participant in order to reduce the response effect that the presence of other persons may have had. Surveyors were instructed to record any abnormalities that occurred during the survey such interruptions or excessive answer-changing.

The sampling methods are described earlier in [section 2.4.2](#). Suggested sample sizes vary from a participant-to-item ratio (N/p) of 2:1 up to 10:1; therefore, to ensure a stable factor structure, we targeted a minimum number of participants as 260 which ensured us an N/p ratio of at least 10:1.²⁶

Through the data collection process, regular debriefing sessions were held between the surveyors and the lead researchers. We discussed issues related to the administration of the survey including any abnormalities noted, participant difficulty with following the instructions or comprehension of items, and other suggestions for improvement.

Phase 4: Complex Analysis of Pilot Results

See Section 2.7.3 below.

2.6. Data Management

Data were electronically stored behind the Duke firewall using Research Electronic Data Capture (REDCap[®]). Hard copies of all information were scanned into an encrypted thumb-drive for

back-up and all originals were stored in a locked filing cabinet in our research offices. Our research offices were accessible only by members of the study team. All entered data were independently reviewed to ensure accuracy.

2.7. Data Analysis

2.7.1. Qualitative Data Analysis

Data collection and data analysis occurred simultaneously in most cases. We used the analytic memos and emerging themes from each focus group to help shape the discussion and direction of the next focus group. These were discussed among the researchers and agreed upon before the next focus group. Questions that we agreed were saturated were dropped from the next focus group discussion to allow for these new lines of discussion. Additionally, our probing questions were continually refined after each session.

We used an Inductive Framework Analysis grounded in the data to explore emerging concepts and then develop themes. In an iterative process, we first reduced the data (data reduction). During this process, analytic (inductive) memos were written out as possible emerging themes. After data reduction, the transcripts were coded (open, descriptive [conceptual] coding) which again was an iterative process resulting in more analytical memos. Descriptive, open coding was chosen based on the emerging conceptual framework. Coding was done independently by two researchers who then, through an iterative process, reviewed all codes together for additional concepts. In a novel approach, we used a 'cultural insider' (emic) and a 'cultural outsider' (etic) to independently code the data, *i.e.* one researcher was a native to the region and one researcher (JS) was a foreigner (outsider) to the region. This allowed for exploration of concepts that otherwise might have been missed by each one individually.

An index was then compiled using the final forms of the codes and entered into a matrix. These codes and indices were stored and analyzed using QRS International NVIVO[®] (version 10.0) software. Indexed codes and analytic memos were then grouped together into clearly defined categories which were then grouped together into broader categories. Connections were then mapped among these categories to further explore relationships, and together this all formed the working analytical framework from which major themes were derived. To ensure that the themes and emerging explanations were cross-checked with other data within and between transcripts we continued to refine our analyses in an iterative process.

2.7.2. Building a Framework

Based on similar constructs as the Anderson Behavioral Model, we developed a proposed conceptual framework *a priori* for the use of traditional medicines. We used QRS Internatinal NVIVO[®] 10.0 software to create a visual representation of this model.

Although we anticipated that the framework would necessarily change as the research progressed, we used this as the working model from which to construct the key concepts and ideas to test. This software easily allows for the creation of static versions from these dyanmic models. This served as the basis for the creation of our final framework.

2.7.3. Quantitative Data Analysis

All data were exported from the REDCap[®] database into STATA[®] (STATA Corp., Version 13.0) for analysis. All continuous variables are reported as mean (standard error). Descriptive statistics are reported as estimate (95% confidence interval) or estimate (p value). All p values are two-sided and evaluated for statistical significance at the 0.05 significance level. We accounted for

the design effect due to cluster sampling by using the STATA svyset command and the Taylor series linearization method for estimation of variance.

To address the reliability of the survey, a Cronbach alpha was calculated for items designed to test the same latent variables. We considered an alpha ≥ 0.70 and to be good reliability and > 0.80 to be excellent.

To compare differences in reported frequency of traditional medicine usage among groups, we used a Wilcoxon-Mann-Whitney Rank Sum Test for dichotomous independent variables and a Kruskal-Wallis Rank test for polymatous independent variables. These non-parametric tests do not assume normal distribution of the data. We used a Chi squared test to compare differences between groups for reported uses of traditional medicines, reasons for use, point-of-access, and mode of medication use. For instances in which there were fewer than five responses in a single cell, a Fisher's exact test was used in place of a Chi squared test.

Odds ratios (OR) were calculated by cross-tabulation or by ordered (proportional) logistic regression in the cases of polymatous, ordinal outcomes. Risk ratios (RR) were calculated by cross-tabulation or by multi-nomial logistic regression in the cases of polymatous categorical outcomes.

The quantitative results from the survey were then synthesized with the findings from the qualitative sessions. This triangulation process also allowed us to explore conflicting or diverging results. In cases of divergent results, we used a team-based approach to explore the causes. In most cases, we were able to find deeper understanding of the complex issues within our study setting as well as explore limitations of each method.

3. Results

3.1. Qualitative Study Population

Between December 2013 and June 2014, a total of 5 FGDs composed of 59 participants in total took place. During the same dates, 27 in-depth interviews were conducted 16 of which were with self-described traditional practitioners. Table 2 shows the participants' characteristics by FGD and in-depth interview (**Table 2**).

Table 2: Baseline characteristics of the focus group discussions (FGDs) and in-depth interviews.

	FGD1	FGD2	FGD3	FGD4	FGD5	In-Depth Interviews
Study Population	Clinic Patients	General	Clinic Patients	General	Practicing MDs	Patients and General
Participants (N)	15	12	16	12	4	11
Gender						
Male	0%	0%	100%	100%	50%	45%
Female	100%	100%	0%	0%	50%	55%
Age range (years)	25-61	26-65	18-70	18-74	30-36	19-60
Number of Persons in Household	5.6	4.5	6.1	5.7	3.5	6.4
Ethnicity						
Chagga	11 (73%)	9 (75%)	11 (69%)	4 (33%)	2 (50%)	2 (18%)
Pare	2 (13%)	2 (17%)	2 (13%)	5 (42%)	0	0
Maasai	0	0	0	0	0	4 (36%)
Sambaa	1 (7%)	1 (8%)	1 (6%)	0	0	3 (27%)
Other*	1 (7%)	0	2 (13%)	3 (25%)	2 (50%)	2 (18%)
Education						
None	0	0	0	0	0	2 (18%)
Primary	11 (73%)	10 (83%)	10 (63%)	3 (25%)	0	4 (36%)
Middle	2 (13%)	2 (17%)	4 (25%)	6 (50%)	0	1 (9%)
High School	1 (7%)	0	1 (6%)	0	0	0
University	1 (7%)	0	1 (6%)	3 (25%)	4 (100%)	4 (36%)
Occupation						
Unemployed [#]	2 (13%)	4 (33%)	0	1 (8%)	0	3 (27%)
Student	0	0	4 (25%)	5 (42%)	0	0
Farmer	1 (7%)	1 (8%)	7 (44%)	1(8%)	0	2 (18%)
Wage Earner	3 (20%)	2 (17%)	1 (6%)	2 (17%)	0	3 (27%)
Small Business	3 (20%)	2 (17%)	3 (19%)	2 (17%)	0	1 (9%)
Professional [†]	4 (27%)	3 (25%)	1 (6%)	1 (8%)	4(100%)	2 (18%)
Unspecified	2 (13%)	0	0	0	0	0
Religion						
Roman Catholic	5 (33%)	5 (42%)	8 (50%)	1 (8%)	3 (75%)	7 (64%)
Lutheran	6 (40%)	4 (33%)	4 (25%)	2 (17%)	0	1 (9%)
Christian Evangelical	1 (7%)	1 (8%)	2 (13%)	5 (42%)	1 (25%)	1 (9%)
Christian (Other)	2 (13%)	0	0	0	0	0
Islam	1 (7%)	2 (17%)	2 (13%)	4 (33%)	0	2 (18%)

*Other Tribal Ethnicities represented in our groups include Luguru, Kilindi, Kurya, Mziguwa, Mnyisanzu, Rangji, Jita, Nyambo, and Kaguru
[#] Includes housewives
[†] Professional includes any salaried position (e.g. nurse, teacher, government employee, etc.) and retired persons
Note: Percentages may not add up to exactly 100% due to rounding

In total, the FGDs were evenly divided between men (51%) and women (49%) with an age range from 18 to 74 years old. Between the FGDs and in-depth interviews, the study population

consists of clinical patients (from hospitals and traditional healers), general participants, practicing medical doctors (MDs), traditional healers, herbal doctors, and herb vendors. Religious affiliation was majority Roman Catholic (n=31; 36%), Islam (n=20; 23%), and Lutheran (n=19; 22%), but Christian Evangelicals (n=11; 13%) and Maasai traditional practices (n=3; 3%) are represented as well. Thirteen tribal ethnicities were represented with the majority being Chagga (n=39; 45%), Samba (n=15; 17%), Pare (n= 11; 13%), or Maasai (n=10; 12%) (**Tables 2 and 3**). Education levels varied from none (n=9; 10%) to university degrees (n=13; 15%), but the vast majority had completed only a primary education. (n=51; 59%). Among the traditional practitioners only nine (56%) had any formal education at all and among those none achieved any education beyond primary school (**Table 3**).

Table 3: Baseline characteristics of the traditional practitioners who participated in in-depth interviews.

In-Depth Interview (#)	Gender	Age	Ethnicity	Religion	Occupation	Persons in Household (N)	Education
1	M	48	Sambaa	Islam	Herbal Doctor	1	Primary
2	M	50	Sambaa	Islam	Herbal Doctor	1	None
3	M	57	Sambaa	Islam	Herbal Doctor	7	Primary
4	M	65	Sambaa	Islam	Herbal Doctor	6	Primary
5	M	45	Sambaa	Islam	Herbal Doctor	7	Primary
6	M	50	Maasai	Lutheran	Herb Vendor	1	Primary
7	M	48	Sambaa	Islam	Herb Vendor	6	Primary
8	M	40	Sambaa	Islam	Herbal Doctor	15	Primary
9	M	21	Sambaa	Islam	Herbal Doctor	10	Primary
10	M	63	Sambaa	Islam	Herb Vendor	1	Primary
11	F	56	Meru	Maasai Traditional	Traditional Healer	7	None
12	F	60	Maasai	Roman Catholic	Traditional Healer	8	None
13	M	48	Maasai	Maasai Traditional	Traditional Healer	7	None
14	M	60	Maasai	Maasai Traditional	Traditional Healer	16	None
15	M	56	Maasai	Roman Catholic	Traditional Healer	8	None
16	M	50	Maasai	Lutheran	Herb Vendor	10	None

3.2. Quantitative Study Population

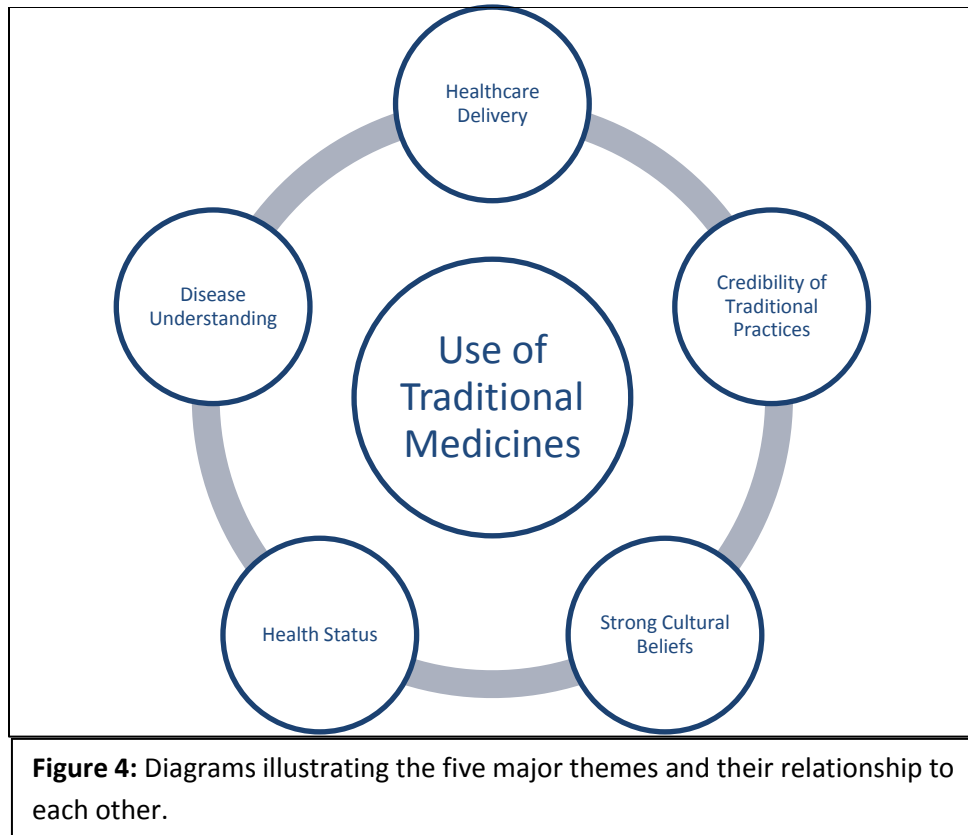
Between January and May of 2014, 473 participants were recruited from 30 cluster sites within Moshi Urban and Rural. The non-response rate was 17%. The total sample consisted of 114 men (24.1%) and 359 women (75.9%) with a mean age of 45.3 (0.67). The mean adult household size was 2.44 (0.10). The composition of the demographic and social characteristics was similar to the qualitative sample with the majority being Chagga (n=273; 58.1%), Roman Catholic (n=184; 39.1%), and educated only to the level of primary school (n=339; 72.0%)(**Table 4**).

Category	Variable	Number (%)	Frequency (%) of Traditional Meds (times per past year)					p-value
			0	1-5	6-10	11-20	>20	
Demographics	Gender							0.21
	Male	114 (24.1)	39	41	10	5	5	
	Female	359 (75.9)	46	39	8	3	4	
	Age (years)							0.28
	18-39	185 (41.9)	47	39	10	1	3	
	40-59	170 (38.5)	45	42	5	4	5	
	60+	87 (20)	39	40	13	2	6	
	Marital Status							0.30
	Never	42 (8.9)	43	20	5	0	3	
	Common Law	101 (21.4)	32	61	4	2	0	
	Married	219 (46.4)	52	28	11	3	5	
	Divorced/ Separated	57 (12.1)	45	37	9	4	8	
	Widowed	53 (11.2)	40	38	10	6	6	
Ethnicity							0.63	
Chagga	273 (58.1)	47	37	9	4	4		
Pare	58 (12.3)	43	50	4	0	4		
Maasai	4 (0.9)	25	50	25	0	0		
Sambaa	37 (7.9)	38	46	11	3	3		
Other	98 (20.9)	41	38	11	4	6		
Socials Characteristics	Education							0.54
	None	30 (6.4)	43	33	13	3	7	
	Primary	339 (72.0)	42	42	9	3	4	
	Secondary	77 (16.4)	55	33	7	3	3	
	High School	2 (0.4)	50	0	0	50	0	
	Trade School	10 (2.1)	40	40	0	10	10	
	University	13 (2.8)	46	38	0	0	15	
	Occupation							0.41
	Unemployed	76 (16.1)	42	42	12	3	1	
	Student	6 (1.3)	80	20	0	0	0	
	Farmer	124 (26.2)	42	45	7	3	3	
	Wage Earner	53 (11.2)	45	40	9	2	4	
	Small Business	165 (34.9)	47	37	9	4	4	
	Professional	49 (10.4)	39	35	9	4	13	
Medical History	Diabetes	53 (11.2)	34	46	12	4	4	0.13
	Hypertension	127 (27.0)	40	43	10	6	2	0.28
	Stroke	6 (1.3)	80	0	20	0	0	0.21
	Heart Disease*	16 (3.4)	29	14	14	29	14	0.01
	Tuberculosis	12 (2.6)	33	22	33	11	0	0.19
	Hepatitis	15 (3.2)	27	33	7	35	0	0.03
	Malaria	425 (90)	43	40	9	3	4	0.04
	Cancer	6 (1.3)	33	0	50	17	0	0.12
	COPD	9 (1.9)	37	25	25	13	0	0.39
	HIV/AIDS	25 (5.3)	48	48	0	4	0	0.39
	Kidney Disease	15 (3.2)	46	31	15	8	0	0.91
* Coronary, Structural, or Heart Failure								

Few participants reported having a known medical history of COPD (n=9; 1.9%), HIV/AIDS (n=25; 5.3 %), stroke (n=6; 1.3%), heart disease (n=16; 3.4%), cancer (n= 6; 1.3%), or kidney disease (n=15; 3.2%). However, nearly everyone reported a history of malaria (n=425; %90) and many reported a history of hypertension (n=127; 27%) and diabetes (n=53; 11.2%).

3.3. Converging Thematic Categories

We identified five major thematic categories that relate to the decision to use traditional medicines in Kilimanjaro (**Figure 4**). Rather than being independent and separate of each other, these five themes are all inter-connected with each assuming different relative weight depending upon the individual. For example, in individuals with a history of having received poor healthcare delivery the theme of 'Healthcare Delivery' assumed much greater importance; on the other hand, in healthy individuals with limited healthcare contact, the themes of 'Health Status' and 'Strong Cultural Beliefs' assumed much greater importance.



Healthcare Delivery

Our results showed that quality of the delivery of healthcare in the Kilimanjaro Region can be divided into two categories: structural issues and communication issues at the point-of-care. These two categories taken together or separately result in non-compliance with medical therapy, lack of disease understanding by patients, and poor healthcare delivery.

Structural issues that were highlighted in our study include medication cost, long wait times, lack of experience and training by some providers, and perverse financial incentives whereby only private wealthy patients receive sufficient attention by the providers. A 21 year old male expressed, *“Some doctors are money-oriented. If you do not have money then you will never get*

any service, or the service you do get will be very poor. But some hospitals do provide good services like the private ones.” Another participant, a 74 year old male, stressed the financial incentives as an important distinction between physicians and traditional healers, *“The medical doctor will only treat you well if you have sufficient money while most times money does not matter to the traditional healers.”*

All point-of-care issues leading to poor healthcare delivery were effectively due to poor communication between providers and patients. This breakdown in communication led to different expectations on behalf of the patient and provider. Participants expressed that they were concerned over inappropriate or ineffective therapy given by medical providers, and likewise, the MDs expressed frustration that poor understanding by the patients lead them to unreasonable expectations (**Box 1**).

53yo M – People complain that if you go to the hospital, the first thing they will do is to admit you and start injecting you with a water drip [IV saline] without even testing to know what the problem is...plus some of the Doctors respond harshly to the patients which makes it hard to believe in them.

26yo F - I attended the hospital and treatment was begun but with no success for a long time; instead other parts in my body began to swell and the wound remained wet. At that time I decided to discharge myself from the hospital, and my grandmother gave me local herbals which cured me.

22yo M – I was admitted to the hospital for three months, but I didn't get any relief. The Doctors told me that the problem is so serious that is cannot be cured. Afterwards, my grandmother sent me to the traditional healer, and my condition improved in a very short period of time.

Medical Doctor – People keep on seeking a cure for something that is a chronic disease. For example, there was a man who had residual paralysis from a stroke. He kept searching for a medicine to cure the paralysis. When everything failed, he blamed us for not doing enough to cure his paralysis.

Box 1: Participant descriptions

Participants also expressed that they rarely confide to the physician that they have been or currently are taking traditional medicines. The reasons for hiding their traditional medicine usage generally surrounded issues of avoiding criticism; a 22 year old male expressed, *“Sometimes hospital doctors are very angry when you tell them that you have been taking traditional medicines. To avoid quarreling with them, we stay silent.”* Additionally, a few participants expressed frustration that physicians do not take a thorough history when it comes to traditional medicine usage; a 27 year old man stated, *“The hospital doctors prescribe medicines without asking for a history of other medicine use, and many patients end up with many side effects because of this.”* Poor communication on this topic was reinforced during the MD FGD during which all physicians responded that they do not ask about traditional medicine usage in their routine practice.

Poor Disease Understanding

Our results show that the conceptual understanding of disease, including its causes, symptoms, consequences, and treatment, plays a fundamental role in the decision to use traditional medicines. Poor disease understanding leads to unrealistic expectations of cure, perceived treatment failure, and non-compliance with medical therapy, and together these conceptions form a major thematic category leading to the use of traditional medicines (**Figure 5**).

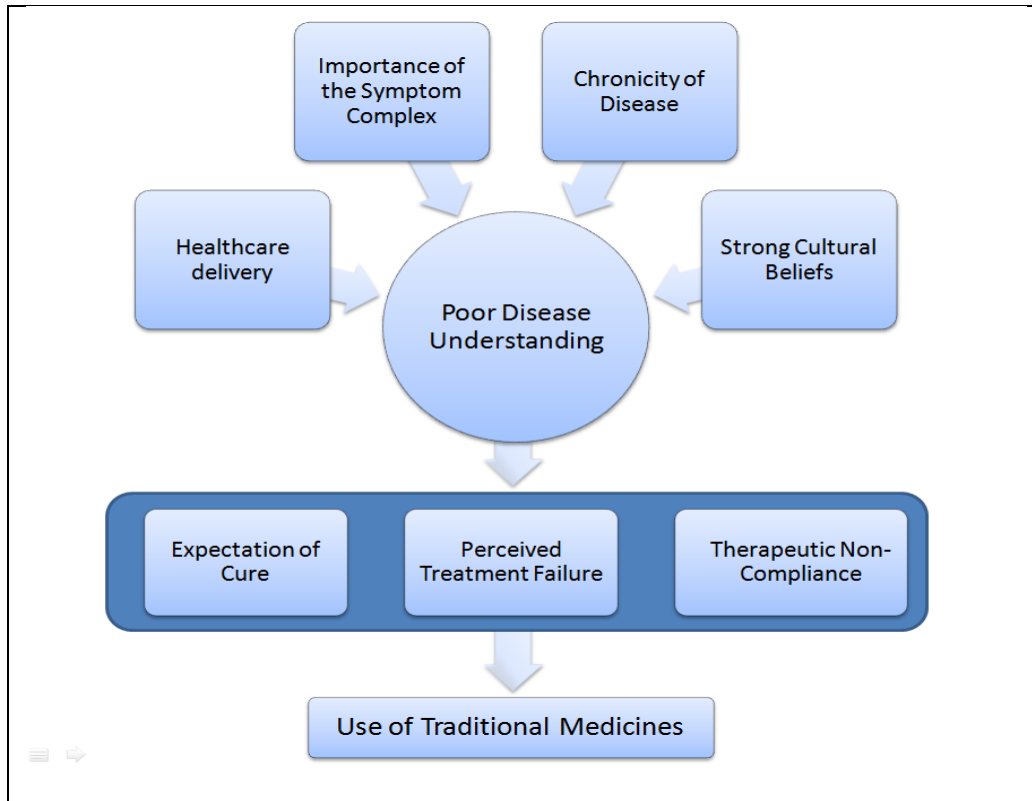


Figure 5: Diagram showing the relationship between poor disease understanding by patients and the use of traditional medicines.

The quality of the delivery of healthcare not only directly contributes to the use of traditional medicines as a major thematic category in itself, but it also directly affects how patients understand their diseases. Structural issues such as cost and access contribute to disease understanding, and communication at the point-of-care between provider and patient also plays a very important role in patient’s disease understanding. One of the Medical Doctors expressed, *“Sometimes patients need long-term counseling on the fact that they need medications for life. Some of them react immediately to this by trying alternatives or losing hope. It can take much time to get them to understand their diseases and the need for medication.”*

Strong cultural beliefs similarly contribute both directly to the use of traditional medicines as well as the overall conception of disease among locals. The pervasive association between epilepsy (*degedege*) and mental health problems and “evil spirits” leads to a nearly ubiquitous use of traditional practices for these conditions. This is also the case for many other conditions irrespective of prior successes or failures with hospital medicines. A 30 year old female said, “*I do not take hospital medicines for any disease until I prove that the traditional medicines have failed completely.*” Other diseases commonly mentioned as best treated by traditional medicines included “inside” and “outside” cancers), diabetes, malaria, and kidney disease among many other symptoms such as stomach problems, headache, infertility, and poor libido. Most participants expressed a very poor understanding of the chronic diseases such as diabetes, cardiovascular disease, chronic kidney disease, and hypertension which likely explains why most participants agreed that “traditional medicines work best for chronic diseases”. HIV was the only exception for which participants portrayed much knowledge about its causes, chronicity, treatment, and consequences.

The poor conception of chronic disease was closely related to the importance of the symptom complex in disease understanding, and together they had significant effects on the overall conception of disease especially as it relates to the expectation of cure, perceived treatment failure by hospital medicines, and non-compliance with hospital medicines (**Box 2**).

22yo M - *Any disease that lasts a long time in the human body without being cured.*

53yo M - *Anything that stays in the human body for a long time, like amoebae and bilharzias [schistosomiasis].*

25yo M - *For instance, with malaria the patient may be given a medicine, but the medicine reacts badly causing the patient to stop using it. By stopping the medicine, the disease then becomes chronic.*

Medical Doctor – *For many patients with diabetes or hypertension, when their blood pressure or blood sugars are controlled, they then believe they are cured. They come to follow-up in 2 to 3 months and see that their blood pressure and glucose are normal; therefore, they assume they are cured and stop their medications. The chronicity of these diseases they do not understand well.*

Medical Doctor - *Maybe it's not treatment failure but the fact that some of the diseases are chronic, and patients keep on seeking a 'cure' for something that is a chronic disease.*

Maasai Traditional Healer - *To me any disease that I can't cure is chronic, and I don't try. I just tell my patients to go to hospitals.*

Herbal Vendor – *Traditional medicines work best for chronic disease. I can assure you if it is a chronic disease that within three months you can go for hospital checkup and will find that you are healed.*

Medical Doctor - *It is widespread belief in our city that a sick person is someone who is having symptoms. It then becomes very difficult for them to take long term medications because they may have no symptoms; they will stop the medications then. So when I tell them they have diabetes or hypertension and you have to take medications for life, I say it is not curable like malaria, because they know malaria. But even so, compliance is very difficult.*

21yo M - *You know you have a disease because the body always has symptoms.*

27yo M - *You know you are healed as you do not have to attend the hospital anymore because your symptoms have disappeared.*

Box 2: Participant descriptions

Strong Cultural Beliefs

The use of traditional medicines is deeply woven into the cultures of Kilimanjaro with different ethnic groups exhibiting different practices. Even among urban communities and educated

persons ethnic identity remains strong, and the traditions that form their ethnic identity persist. All of the Medical Doctors from our session admitted to frequent use of traditional medicines, and a 27 year old university student illustrated the importance of family tradition when he stated, *“My grandmother brought me traditional medicines from Dodoma, and I used them. I was coughing up dirty phlegm, but after a few days I was cured and remain cured until today.”*

Both the type of disease and the role of the family unit emerged as an important components of these strong cultural beliefs. Certain disease such as epilepsy (*degedege*) and mental health diseases have strong stigmas associated with them that are extensions of strong cultural beliefs. A 50 year old mother stated, *“There is a true belief that when a child suffers from degedege that you can cure him by putting him under the bed, removing the mattress, covering is with a winnowing basket and then having the mother urinate on top of the basket. When the urine penetrates through the basket onto the child, he will be healed.”* The Medical Doctors agreed stating, *“Mental illness and seizures (degedege) are mostly all regarded as being best treated by traditional healers because there is a perception that the person has been bewitched.”*

Elder tribal and family members (*wazee*) are considered especially important sources of healthcare knowledge. Many participants explained that they have adopted their traditions from their elders. A 44 year old female stated, *“Me and my family prefer not to go to hospitals. My grandparents taught us a lot (especially about plant roots) for healing and curing... my father still will not use any hospital medicines.”* Another female when speaking about her own child said, *“My daughter suffers from heart problems. I took her to an mzee [elder] in the rural Rombo district. Within two days my child was healed and remains cured to this day.”*

Apart from their ethnic and family identities, the people of Kilimanjaro also exhibit a strong national identity as Tanzanian. As such, many participants expressed a distinct ‘foreignness’ associated with hospital medicines; they were viewed as something apart from Tanzanian. The Medical Doctors agreed with this sentiment with one stating, *“The concept of taking pills on a daily basis is seen as a distinctly Western [American and European] thing.”* A 53 year old man went as far as to say, *“Most of us believe that the Western people came here to undermine us and deter our local medicines. I think that they want to colonize us again.”* However, in most cases, the expression of the ‘foreignness’ of hospital medicines was much more subtle, and emerged as concerns over the side effects of hospital medicines and their ingredients (**Box 3**).

36yo F – *People do not take the new malaria medication because of all the side effects. It is known that from this new medication men will develop breasts and women will grow beards.*

23yo M - *I know someone who was using birth control pills, and she was infected with reproductive cancer as its side effects.*

25yo F – *People take traditional medicine to avoid hospital medicines which are full of chemicals that can affect their health.*

36yo F – *My friend will not use hospital medicines for anything because he does not know how those medicines are made.*

25yo M - *Our elders have taught us that hospital medicines have a lot of chemicals, and in my home area I know people who have used hospital medicines and had many side effects.*

Herbal Vendor - *I remember that during our ancestor’s era there was no hospital. People were just using traditional medicines and women were having birth at home, but now you must go to hospital. Because of this, many diseases have erupted.*

Box 3: Participant descriptions

It emerged that the healers themselves play important roles in reinforcing these beliefs. Participants including the Medical Doctors all discussed the numerous newspaper, radio, television, and billboard advertisements extolling the benefits of traditional medicines over hospital medicines, and some lamented over the lack of government regulation on these topics. The traditional healers and herbal vendors also make extensive use of witness testimonials in addition to these personal advertisements in the promotion of their services. A 27 year old male stated, *"It is a competitive market and the traditional healers advertise with a lot testimonials... we believe them because of these testimonial messages are from patients who used hospital medicines and experienced side effects."* Another man followed up by saying, *"There is an area where traditional healers strongly discourage people to participate in family planning [meaning birth control] because they make people sterile."*

Health Status

The overall health status of an individual emerged as an important theme in the decision to use traditional medicines. Among those who are relatively healthy (or perceive themselves to be healthy), the use of traditional medicines is mostly limited to alleviating ongoing symptoms experienced by the individual although a few discussed taking traditional medicines on a regular basis for prevention of disease; this was mentioned as being especially prominent among the Maasai culture many of whom take traditional medicines on a daily basis.

People's personal experiences of their diseases have a strong influence of the decision to use traditional medicines apart from their understanding of the underlying disease process. When

illness does occur, the acuity of the disease, the chronicity or duration of the disease, and the severity of the disease all influence the decision to use of traditional medicines (**Box 4**).

52yo F – For smaller health problems people prefer traditional healers, and for the larger ones people prefer hospital services.

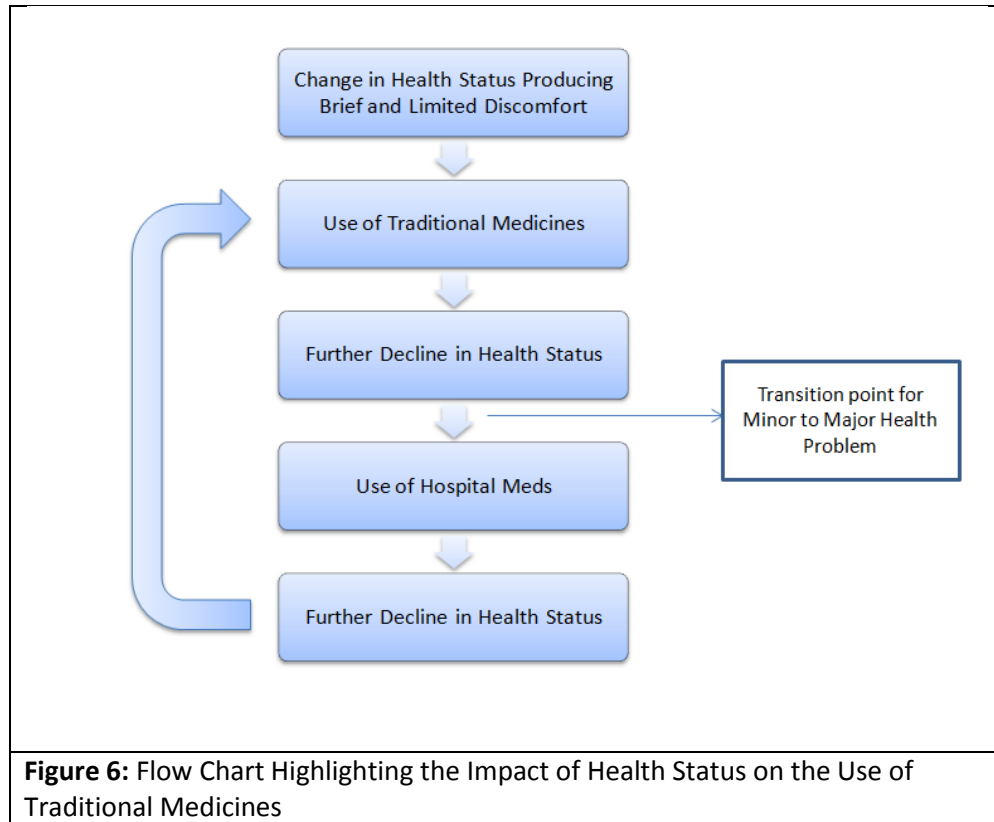
44yo F - The use of the traditional medicines depends on the extent of the problem. For example, when I have stomach problems I take traditional medicines. When I am healed I stop taking them immediately until I feel the abnormality again.

36yo F - The frequency of traditional medicine usage depends on the magnitude of the problem. For chronic problems people tend to use traditional medicines more frequently. This is opposed to “normal problems” for which people only take them when they feel sick, and they then stop afterwards when they no longer feel sick.

Traditional Healer – I best treat diarrhea, foot swelling, waist tightening, poor masculine power, and cancer. Medical doctors, who are able to use various advanced testing kits, are able to treat more complicated problems than us who use only our naked eyes to diagnose patients.

Box 4: Participant descriptions

Persons with diseases producing little or brief discomfort and limited displacement of daily routines are more likely to use traditional medicines. This emerged as a dichotomy between ‘minor’ diseases and ‘major’ diseases whereby diseases which produce significant and ongoing discomfort and incapacity are considered ‘major’, and these generally were considered best treated by hospital medicines (**Figure 6**).

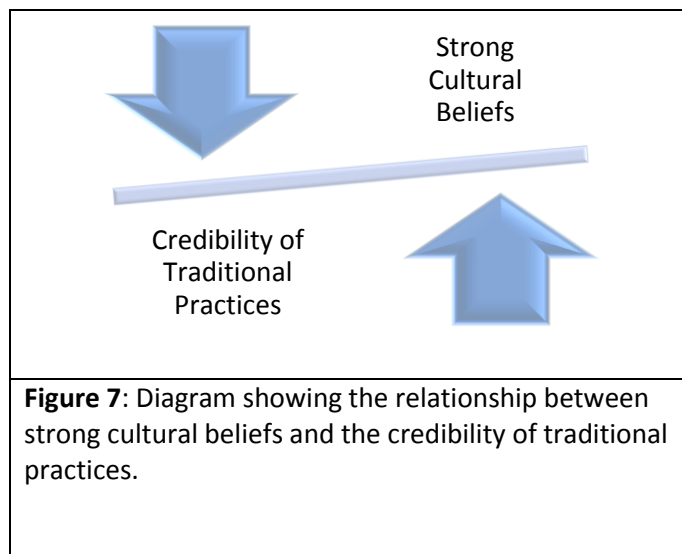


However, the distinction between minor and major diseases is not always clearly defined, and many participants did not consider the disease ‘major’ until they experienced the failure of traditional medicines. This may then lead to the decision to attend a medical clinic or hospital, but depending upon other factors such as the quality of the healthcare delivery, disease understanding, and their ongoing health status, the person may then return to traditional medicines. This was particularly prominent among people with advanced or chronic diseases, and this emerged mostly in the form of seeking a miracle cure after multiple other avenues of treatment had failed or perceived to have failed. To this end, a 58 year old male said, *“Stay with your God, but let us look for other alternative cures including traditional medicines or even*

witchcraft. This attitude is particularly prominent for people who have spent a lot of time in the hospital.”

Credibility of Traditional Practices

Although the credibility of traditional practices is closely related with a strong cultural belief in traditional medicines, it emerged as a separate and important factor in the decision to use traditional medicines. When people with strong cultural beliefs perceive traditional healers or practices as having high credibility, the scales are in strong favor for the use of traditional medicines, or *vice versa* among people with weak cultural beliefs who perceive traditional healers or practices as having low credibility (**Figure 7**).



However, the credibility of traditional practices is influenced by many factors apart from strong cultural beliefs. Thus, the participants expressed concern over the lack of scientific validity, lack of appropriate dosing, lack of education, and lack of regulation among traditional healers and practices, yet many still held strong beliefs in traditional medicines and personally accessed traditional medicines (**Box 5**).

53yo F – Herb Vendors or Traditional Healers may advise you to take one cup everyday but not specify the size of the cup in accordance with the age of the patient.

74yo M - They diagnose you just by listening to your explanations, and they give you medicines without any testing... but this does still cure some people.

35yo M - There is no scientific investigation that has been done to measure their efficiency, yet many people still find cures from them.

50yo F - Most traditional medicines can treat or cure kidney disease although this disease requires testing in the hospital to diagnose. For example, lemongrass and cucumbers are used for 'kidney cleansing'; however, I do wonder how our ancestors managed to discover these as forms of treatment for kidney disease without any physical measurements.

Box 5: Participant descriptions

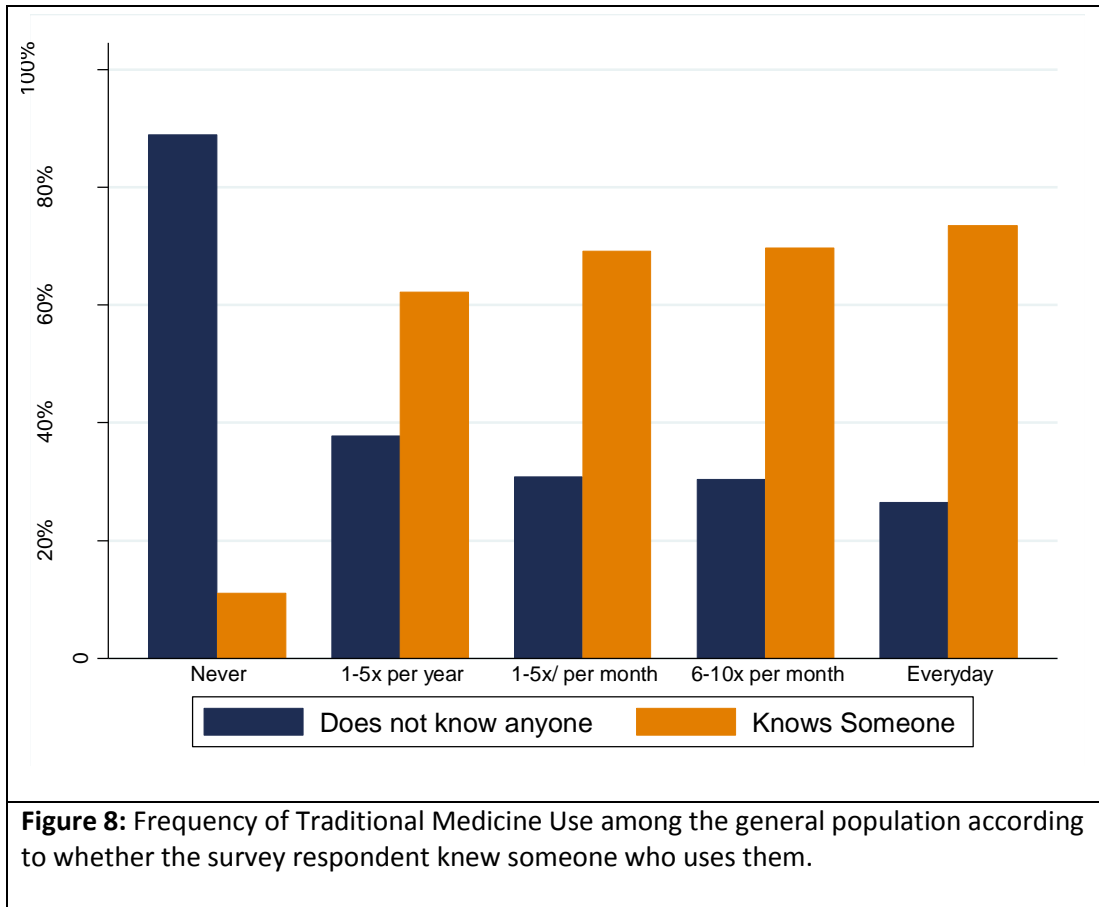
3.4. Survey Results

The Cronbach alpha was >0.70 for the following domains: reasons for use (0.80), treatments (0.91), mode of use (0.75), and means of access (0.81).

Overall, 56% of participants (26% male) reported the use of traditional medicines at some point during the previous year. 39.6% reported using traditional medicines 1-5 times in the past year,

8.7% reported using them 6-10 times in the past year, 3.2% reported using them 11-20 times, and 4.1% reported using them more than 20 times in the past year. There was no significant difference in the self-reported frequencies between male and females ($p=0.21$), level of education ($p=0.54$), age ($p=0.28$), marital status ($p=0.31$), occupation ($p=0.41$) or ethnicity ($p=0.63$). Likewise, there was no significant difference in the reported usage of traditional medicines when stratified by disease state with the exception of hepatitis (OR 3.1, $p=0.01$), heart disease (OR 5.5, $p=0.002$), and malaria (OR 1.8, $p=0.01$) for which the self-reported frequency of traditional medication usage was higher than expected when compared to those without disease **Table 4**).

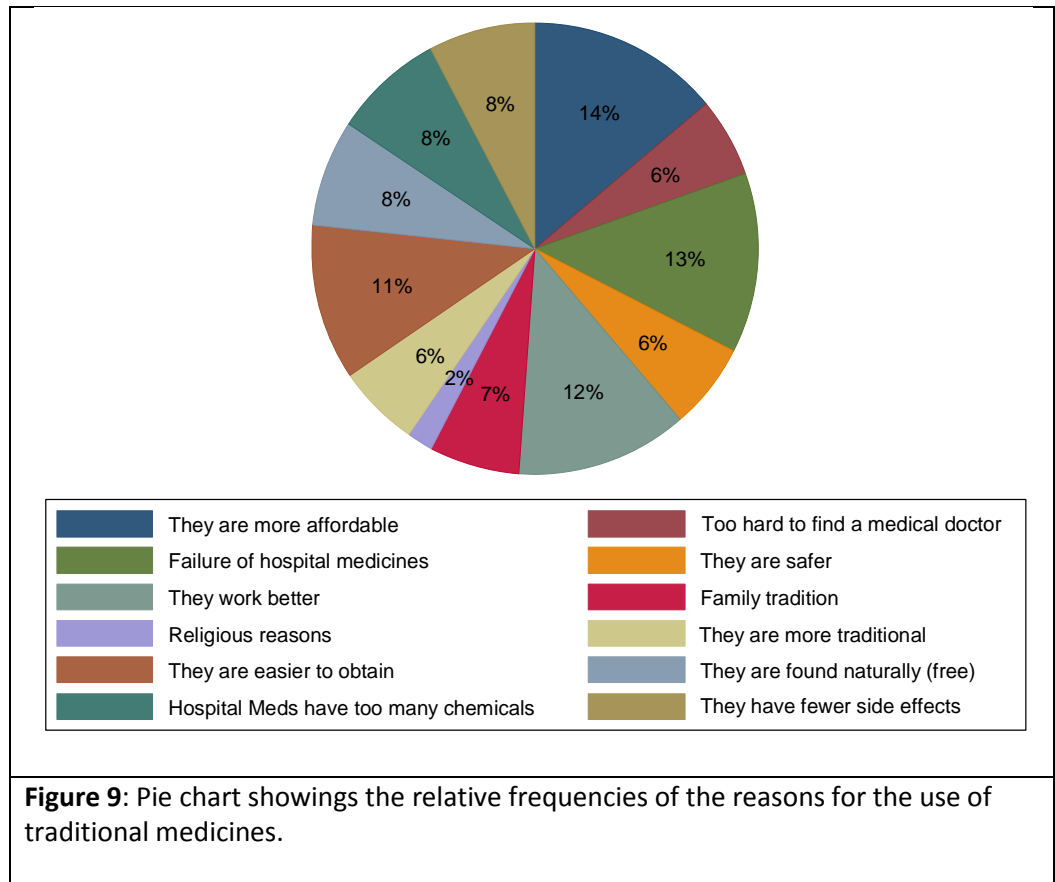
The majority of participants (69%, 95% CI 63.4-73.7) reported knowing someone who uses traditional medicines, and these respondents also reported more frequent use of traditional medicines among the general population ($p<0.001$) (**Figure 8**). Among those who know someone who uses traditional medicines, 88% (83.2-91.2) reported the person to be a family member. Neighbor (6%, 3.4-9.2), friend (5%, 2.9-7.5), or other (3%, 1.1-8.4) were less frequently reported to be known users of traditional medicines.



Over a quarter (26%, 21.9-30.8) of all participants responded that people do commonly use hospital medicines and traditional medicines concurrently. Those with a secondary level or higher education were significantly more likely to report knowledge of concurrent use (RR 1.7, $p=0.02$). Participants currently taking hospital medicines for chronic conditions were nearly twice as likely to report traditional medicines usage in the past year (RR 1.5, $p=0.003$).

The most common reasons for taking traditional medicines were that they are more affordable (14%, 12.0-16.0), failure of hospital medicines (13%, 11.1-15.0), they work better (12%, 10.7-14.4), they are easier to obtain (11%, 9.48-13.1), they are found naturally or free (8%, 6.56-

9.68), hospital medicines have too many chemical (8%, 6.33-9.40), and they have fewer side effects (8%, 6.25-9.30) (**Figure 9**). Less common reasons included family tradition (7%, 5.24-8.09), too hard to find a medical doctor (6%, 4.93-7.71), they are safer (6%, 4.70-7.43), they are more traditional (6%, 4.48-7.14), and religious reasons (2%, 1.25-2.84).

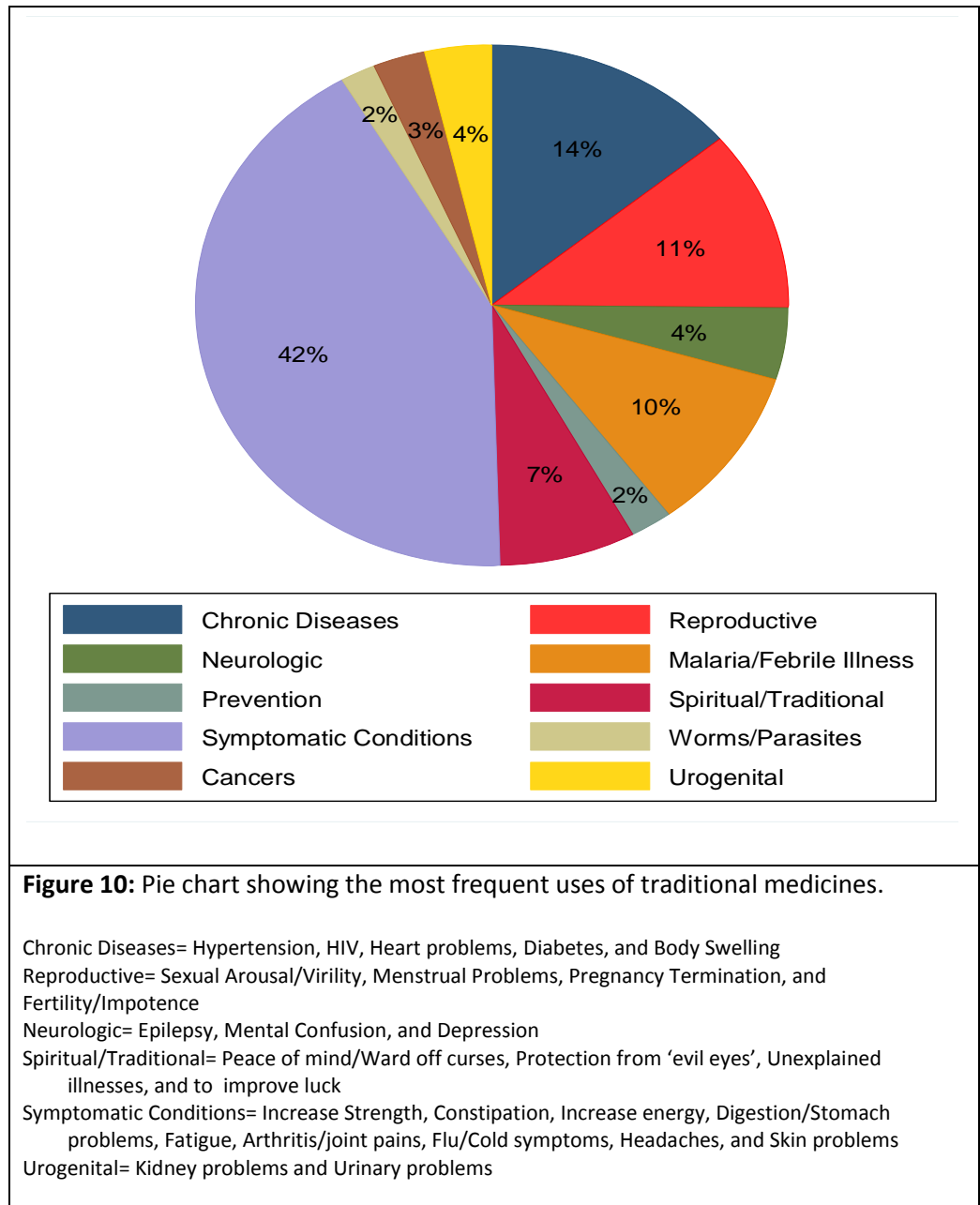


There were no significant differences in the responses when stratified by gender, age, or ethnicity. Those with a secondary or higher education (RR 1.75, $p=0.047$) and small business owners and professionals (RR=1.72, $p=0.035$) were more likely to respond that hospital medicines have too many chemicals as a reason for traditional medicine. Small-business owners and professionals were more than twice as likely to report that traditional medicines are easier

to obtain (RR=2.23, p=0.001) and are more affordable (RR=2.05, p=0.003) and nearly twice as likely to report that medical doctors are too hard to find (RR=1.82, p=0.037) as reasons for use. They were also more likely to report family tradition (RR=1.80, p=0.031) as an important reason for the use of traditional medicines.

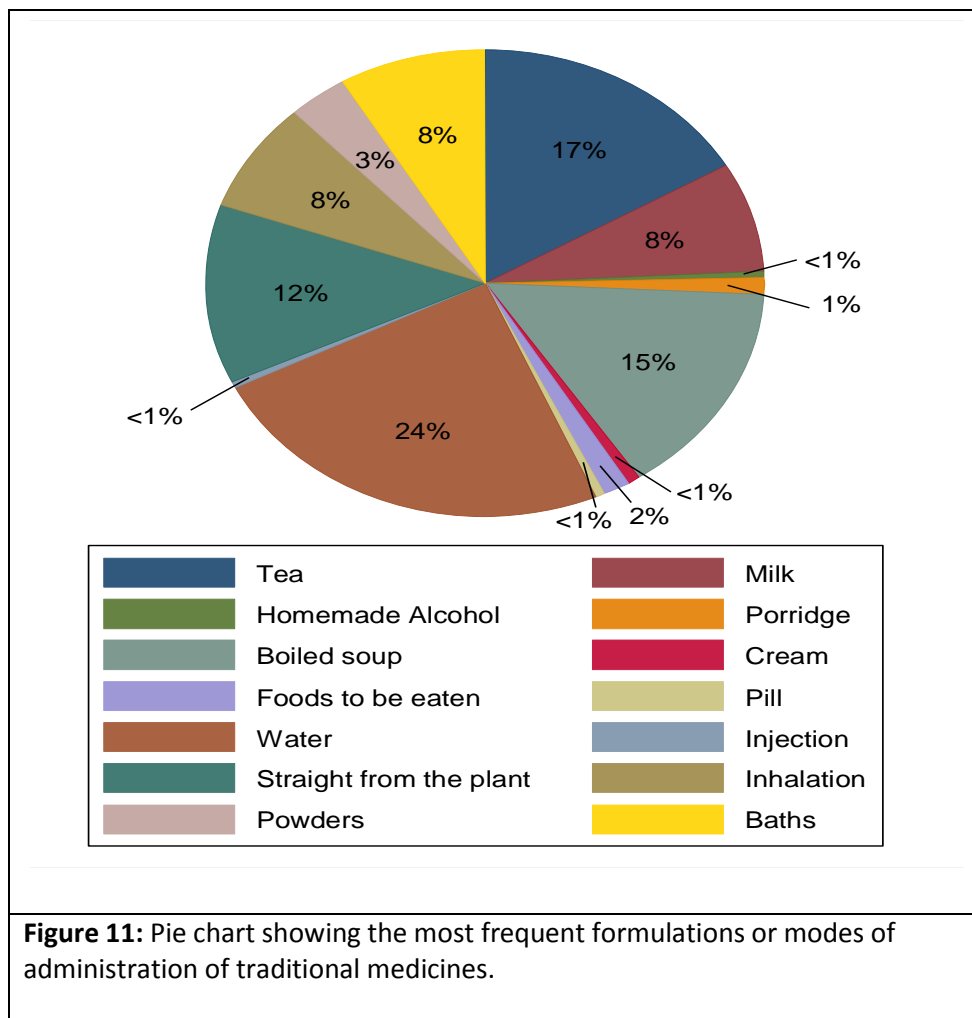
When participants were directly asked about cost without competing answer choices, the majority (63%, 62.7-76.3) said that cost was an important factor in the decision to use traditional medicines. However, when participants were asked in the context of other competing answer choices (**Figure 9**), there was a significant difference in the responses (p<0.001). Only 70% of those who responded yes when asked directly whether cost was an important factor chose 'more affordable' when presented with multiple choices (and given the option to pick all that apply). Those who were currently using hospital medicines were significantly less likely to answer that cost was an important factor in the decision to use traditional medicines (RR=0.37, p=0.004).

The most common use of traditional medicines was for symptomatic conditions (42%) (**Figure 10**). Other common uses included chronic disease (14%), reproductive problems (11%), malaria and febrile illness (10%), and spiritual or traditional reasons (7%). Less common uses were urogenital problems (4%), neurological problems (4%), cancers (3%), prevention of disease (2%), and worms or parasites (2%).



Mixing with water (24%), tea (17%), boiled soup (15%), and chewed or eaten straight from the plant (12%) were reported to be the most common formulations or modes of administration for traditional medicines. Less frequently, baths (8%), inhalation (8%), milk (8%), foods to be eaten

(2%), porridge (1%), homemade alcohol (<1%), pill (<1%), cream (<1%), and injection (<1%) were reported as formulations (**Figure 11**). There were no significant differences in the choice of formulations among the Chagga, Maasai, Sambia, and Pare tribes or among the different occupations or age groups. Men were more likely use a boiled soup formulation compared to women (OR 1.9, $p=0.014$), but there were no significant gender differences for use of other formulations.



4. Discussion

The explanatory model for the use of traditional medicines is complex, and previous work by others has fallen short. Some have suggested that cost and access or poor quality of healthcare delivery are alone responsible, and others have suggested that cultural beliefs and disease understanding may entirely explain the use of traditional medicines.²⁷⁻²⁹ Others have suggested that it is only the type of disease or current health status that dictates the use of traditional medicines.³⁰ We have demonstrated the limitations in these approaches by building a broad explanatory model that is generalizable across the entire region.

The use of traditional medicines is not isolated to rural populations, uneducated populations, or elderly populations. In fact, these populations represent only a fraction of those using traditional medicines, and the importance of traditional medicines among the young, urban, and educated repeatedly emerged throughout our project. This coincides with the surge of herbal vendors and media advertisements in Tanzania which are found predominantly in urban areas and more easily accessed by younger classes.

The role that family tradition and the elderly play in the explanatory model for the use of traditional medicines is evident (**Box 4**), but this should not be confused with a presumption of more frequent use among the rural, uneducated, or elderly. This would simplify the explanatory model to only include cultural beliefs and healthcare delivery, and as we have shown, cultural beliefs and healthcare delivery only form two links in the broader model (**Figure 4**). Our structured survey results demonstrated strong convergence with the qualitative sessions on this topic. There was no significant difference between age groups, education level, occupation, or ethnic groups in the frequency of use.

Closely related to strong cultural beliefs is the perceived credibility of traditional medicines and practices. While traditional medicines form an important aspect of the healthcare in the region, they are not viewed as unequivocally superior to hospital medicines. As such, the lack of scientific credibility among traditional healers and traditional medicines emerged as a major theme. On the other hand, the credibility of the hospital in regards to testing is very strong. Triangulation between the qualitative results and the quantitative results showed divergence on this topic, and this may provide a good opportunity for future research such as discrete-choice experiments.

Our results show that people easily and frequently transition between traditional healthcare and biomedical healthcare. On this basis, the people of Kilimanjaro exhibit not only biomedical doctor shopping or traditional healer shopping but also 'ethnomedical doctor shopping'. Local healthcare practitioners must recognize this concept given its implications. Nearly a quarter of people reported concurrent use among the general population which may still under-estimate the true prevalence due to reporting bias, and more importantly participants currently taking hospital medicines had a two-fold risk for the use of traditional medicines in the past year.

Central to recognizing concurrent use or people at increased risk of concurrent use is an understanding of the most common uses of traditional medicines. Older models have used highly stigmatized diseases such as epilepsy and mental health disorders as their basis for understanding, and while these conditions do highlight the importance of disease understanding in the role of traditional medicine usage, they speciously over-emphasize traditional medicines as being mostly used for spiritual, traditional, or religious reasons.³⁰ In Kilimanjaro, symptomatic conditions, chronic diseases, reproductive illnesses, and malaria or febrile illnesses constitute

77% of all uses of traditional medicine while spiritual, traditional, and neurological conditions (epilepsy, mental confusion, and depression) only represent 11% (**Figure 10**).

There are many strengths of our current study. Our novel application of insider-outsider coding to the inductive Framework Method ensured that all emerging themes would be grounded in the data. It also allowed for finer granulation of the data; nuances and cues that may have been overlooked by either coder alone were detected through a semi-dialectic process during review of the analytic memos and the code indexing stage. Additionally, the mixed-methods technique allowed for triangulation from multiple sources. We discovered insidious, subtle tensions between traditional practices and modern healthcare, and we were able to generalize our results across the entire population. This triangulation through the synthesis of the qualitative and quantitative data highlighted converging and diverging results, and is one of the biggest strengths of our approach.

The biggest limitation in this type of work is reporting bias, i.e. participants are either reluctant to tell the truth regarding certain issues or are more likely to report seemingly desirable information to the researchers. As an example, the discrepancy between the survey and qualitative sessions in regards to the frequency of self-use highlights the difficulty that the survey had in capturing this stigmatized issues. Also, there was divergence on the topic of testing and diagnosis at the hospital. To address this potential bias, we only used local, native interviewers throughout the entire project, we incorporated a cultural insider into the data analysis phases, and we used triangulation from multiple data sources when building our model which allowed us to uncover diverging results.

In conclusion, we have presented a broad explanatory model for the use of traditional medicines in Kilimanjaro. Additionally, we have shown that the use of traditional medicines is pervasive even among the urban elite. Concurrent use of traditional medicines and biomedicine is high, and ethnomedical doctor shopping is frequent. This model provides a working framework for understanding the complex interactions between biomedicine and traditional medicine. Future disease management and treatment programs will benefit from this understanding, and it can lead to synergistic policies with more effective implementation.

Appendix A

Standard Operating Protocol (SOP) for Household Selection

PURPOSE:

To provide a reproducible and systematic method of selecting households for sampling.

DEFINITIONS:

- Cluster = randomly, pre-selected geographic location that includes multiple households for sampling
- Dwelling= A free-standing building that is covered by a roof. Buildings that share a foundation or appear to share a foundation should be considered as one dwelling.
- Household = Persons residing within a dwelling whose food is prepared by the same person(s)
- ID = Unique Identification Number that is assigned to each participant and each household.
- Household ID= Two digit Unique Identification Number contained in the study ID number that is assigned to each household.
- Eligible Individuals: Adults over the age of 18 who are not pregnant. Ex-pats or Residents should be excluded unless they are FULL citizens who reside in Tanzania full time (i.e. more than 9 months out of every year).

OVERVIEW:

- Cluster site identification
- Household identification
- Household selection process

PROCESS:

1. Cluster site identification: the starting point from which household selection will occur has been pre-selected based on a random process.
 - a. You will be provided with aerial photographs and a map to indicate the cluster site.
 - b. There are 30 clusters in total included in Moshi Urban.
 - c. To ensure that the sampling occurs at the proper location, the study coordinator will accompany you to the cluster site on the initial site visit.
2. Household identification: the first household that will be targeted for sampling has been pre-selected based on a random process.

- a. The dwelling physically closest to the random geographic point has been numbered 1.
 - i. The number 1 represents the dwelling from which sampling will begin.
3. Household Selection Process
- a. The first dwelling should be approached
 - i. If that dwelling fulfills the definition of a household assigned a household ID.
 - 1. If there is no response at the household then still assign the household an ID number (e.g. U01-01000 ; where the 000 refers to no individual having been contacted at that house).
 - a. You should try at least one additional approach during the day or during the follow-up day to see if there is a response.
 - b. If you do get a response on the second or third visit, then re-assign the study ID to include an individual ID number. (change from U01-01000 to U01-01001)
 - 2. If someone at the household responds but then refuses to participate then he/she should STILL BE assigned a Study ID and marked as refused. You should still try to collect as much information as possible to fill out the Enrollment Logbook.
 - a. Every person you approach should receive a study ID; then you can mark ineligible, refused, or enrolled.
 - 3. Protocol for Gated Houses
 - a. Gated Community: For entire communities that are gated and walled off, if access cannot easily be obtained then the entire community can be skipped.
 - b. Closed Gate House
 - i. If a gatekeeper is present then proceed as below.
 - ii. If no gatekeeper and no way to contact the household members, then record as non-response (along with household ID as above).
 - iii. Additionally write “closed gate” in the Comments section of the Enrollment Logbook. Should also try one additional attempt.
 - c. Open Gate
 - i. First, ensure that there is no gatekeeper.
 - ii. If no gatekeeper, then approach the house as you would any other home.

- iii. Write 'Open gate' in the Comments Section of the Enrollment Logbook.
 - d. House with a Gatekeeper
 - i. First, contact the gatekeeper to explain your intentions. If agreeable, he may allow entry.
 - ii. If not agreeable to entry, then leave a study overview pamphlet along with your contact information.
 - 1. Record the Household as no-response and write 'gatekeeper' in the Comments on the Enrollment Logbook.
 - 2. Try to arrange a follow-up time to see if the owners have expressed interest.
 - ii. If that dwelling does NOT fulfill the definition of a household then move on to the next dwelling. → these dwellings do NOT require a study ID.
 - iii. Unless the dwelling is clearly marked as a business, shop, or restaurant then you should assume that it could be a household. You should then approach to confirm. (Remember that sometimes people who own shops also live in the back – if any doubt then you should always approach to confirm).
- b. To identify the next dwelling to approach for sampling, the following methods should be used:
 - i. Stand with your back to the main/front entrance of the first dwelling.
 - ii. One team member should flip a coin.
 - iii. If the coin lands on TAILS then proceed to your LEFT. If the coin lands on HEADS then proceed to on your RIGHT.
 - iv. Next, roll the die to determine which house to approach. The numbers on the die represent which house number (in sequential order according to physical distance to the front door) will be chosen. *Remember, as dwelling is any free-standing building that is covered by a roof.* Therefore, the dwelling should be approached and confirmed to either be a household or not be a household before moving on.
 - v. If you come to an intersection or dead-end, then flip the coin again to determine your direction. Again, TAILS will be LEFT and HEADS will be RIGHT.
 - vi. In instances where there is only one physical direction to go, then proceed in that direction.
 - vii. If a dwelling repeats, then simply repeat the coin-flip process after you approach the dwelling and have your back to it.

- c. The goal is to enroll 12-16 (or more) participants from each cluster.
 - i. This will likely mean that an average of 7-8 households are sampled
 - ii. The number of eligible participants from each household should be recorded in the Enrollment Logbook.
 - iii. On recruitment days, each Field Worker should try to enroll at least 6 participants from 3 or 4 households.
 - 1. If members of the household were not present during the initial meeting, then try to return to that household later in the afternoon.
 - 2. On the second day of recruitment from the Cluster, the Field Workers should return to all houses where there were eligible participants who were not previously enrolled and to households where there was no response on the first day.

Appendix B

**General Questions Related to Traditional Medications and Health Survey
(Final Version)**

English and Swahili Versions

General Questions Related to Traditional Medications and Health

(To be read to the participant): Herbal and Natural medications are important components of health and wellness. We are seeking to understand the nature and frequency of commonly used herbal medications. Traditional medications may include herbs, drugs, vitamins, teas, foods, creams, lotions, potions, and soups that are used to treat health and wellness problems. The responses you provide do not mean that you use herbal medications or that you believe in their use; rather, your responses will provide valuable information for addressing some of the unknown factors that influence access and costs of healthcare in this region.

1. What herbal or natural medications have you heard about?

2. Do you know anyone who uses any herbal medicines (*mitishamba*), natural medicines, vitamins, foods, teas, potions, or creams for health or wellness problems?

Yes No

If yes, how do you know him/her?

Family Member Friend Neighbor
Other

What do they use?

Cost is a big factor in people's decision to use herbal or natural medicines:

Yes

No

I do not know

Worry of side effects from hospital medicine is a big factor in people's decision to use herbal or natural medicines:

Yes

No

I do not know

People commonly use herbal medications and hospital medications at the same time.

Yes

No

I do not know

3. For what health reasons do people commonly use herbal or natural medicines? Natural medicines may include herbs, foods, drugs, vitamins, soups, teas, potions, or creams. (*Circle all that apply*)

Epilepsy	Sexual arousal/increase virility	Menstrual problems	High Blood Pressure
Mental confusion	Constipation	Pregnancy termination	Fever
Heart problems	Depression	Infections	To stay healthy
Arthritis (joint pains)	Worms/parasites	Flu/Cold symptoms	Fertility/Impotence
Urinary problems	Peace of mind/ward off curses	Protection from "evil" eyes	Unexplained illnesses
Diabetes	Inside Cancers	Body Swelling	Malaria

Please write any additional uses:

4. How often do you think people use herbal or natural medicines?
Natural medicines may include herbs, foods, soups, vitamins,
teas, potions, or creams.

Never.....	<input type="checkbox"/>
Everyday.....	<input type="checkbox"/>
1 to 5 times per month.....	<input type="checkbox"/>
	<input type="checkbox"/>
6 to 10 times per month.....	
1 to 5 times per year.....	<input type="checkbox"/>

5. In the past year, how many times did you use herbal or natural
medicines? Natural medicines may include herbs, foods,
inhalations, soups, vitamins, teas, potions, or creams.

None.....	<input type="checkbox"/>
1 to 5 times	<input type="checkbox"/>
	<input type="checkbox"/>
6 to 10 times	
11 to 20 times	<input type="checkbox"/>
More than 20 times.....	<input type="checkbox"/>

6. When you have a health problem whom do you see for advice?
*(circle all that apply)(place an asterisk by the one considered to
be the most common)*

Family Member	Friends or Neighbors	MD (Doctor of Medicine)
Tribal Chief or Elder	Village Elder or Leader	Wamaasai
Pastor or religious leader	Pharmacist	Traditional Healer

7. Why would you go to a hospital?

- Diagnosis only
- Treatment only
- Diagnosis and Treatment
- You would never go to a hospital

8. What are the most commonly used preparations or forms that people use? (*circle all that apply*)

Tea	Milk	Boiled Soup
	Foods to be eaten	

Lotion or Cream	(black chicken, rooster, goat, sheep)	Pill/vitamin
Water	Injection	Chewed or taken straight from the plant
Inhalation	Powders	Baths

Another way that is not listed:

9. Some persons commonly use natural medicines and some persons commonly use prescription medicines as given by a Medical Doctor.

Why do people commonly use natural medicines? Natural medicines may include herbals, foods, drugs, soups, vitamins, teas, potions, or creams. (*circle all that apply*)

They are more affordable	Too hard to find a Medical Doctor	Failure of Hospital Medicines
They are safer	They work better	Family tradition
Religious reasons	They are easier to obtain	They are more traditional
They are found naturally (free)	Hospital Medicines have too many chemicals	They have fewer side effects

Comments for the Interviewer:

Maswali ya Jumla yanayohusiana na Matibabu ya Mitishamba na afya.

(Isomwe kwa mshiriki): Mitishamba na dawa za asili ni kiungo muhimu katika afya na uzima. Tunatafuta kuelewa asili na mfululizo wa dawa zinazotumika kwa kawaida za mitishamba. Matibabu ya asili yanaweza kuhusisha mimea, dawa za kemikali, virutubisho/vitamin, chai, chakula, krimu, losheni, dawa inayosemekana kuwa na athari za kichawi, na supu vinavyotumika kutibu matatizo ya afya na uzima. Majibu unayotoa hayamaanishi kuwa unatumia matibabu ya mitishamba au unaamini katika matumizi yake; isipokuwa majibu yako yatatupa taarifa muhimu ili kushughulikia baadhi ya mambo mbalimbali yasiyojulikana yanayoathiri upatikanaji na gharama za matibabu katika mkoa huu.

1. Ni miti shamba ipi au dawa za asili umeshawahi kusika?

2. Unafahamu mtu yeyote ambaye anatumia mitishamba, dawa za asili, vitamin, vyakula, chai, dawa zenye athari za kichawi au krimu kwa matatizo ya afya au uzima?

Ndiyo

Hapana

Kama ndiyo, unamjuaje?

Mwanafamilia
Mwingine

Rafiki

Jirani

Wanatumia nini? _____

Gharama ni jambo kubwa sana katika maamuzi ya watu kutumia mitishamba au dawa za asili:

Ndiyo

Hapana

Sijui

Hofu ya madhara ya dawa za hospitali inachangia katika maamuzi ya watu kutumia mitishamba au dawa za asili.

Ndiyo Hapana Sijui

Je kwa kawaida watu hutumia dawa za hospitali na dawa za mitishamba kwa wakati mmoja?

Ndiyo Hapana Sijui

3. Ni sababu gani za kiafya ambazo watu kawaida hutumia mitishamba na dawa za asili? Dawa za asili zinaweza kuhusisha mimea, chakula, dawa za tiba, virutubisho/vitamin, krimu (*zungushia duara yote yanayohusika*).

Degedege	Hisia za kufanya mapenzi/Kuongeza nguvu za kiume	Matatizo ya Hedhi	Shinikizo la damu
Kuchanganyikiwa	Choo ngumu	Kutoa mimba	Homa
Matatizo ya moyo	Msongo wa mawazo	Infections Maambukizi	Kuwa na afya
Maumivu ya viungo	Minyoo	Mafua/ dalili za kifua	Uwezo wa kuzaa/Uhanithi
Matatizo ya kukojoa	Amani/kuondoa mikosi	Kujikinga na macho mabaya	Magonjwa yasiyoeleweka
Kisukari	Saratani ya ndani ya mwili	Mwili kuvimba	Malaria

Tafadhali andika matumizi yoyote ya nyongeza

4. Unafikiri ni kwa kiasi gani watu hutumia miti shamba au dawa za asili? Dawa za asili zinaweza kuhusisha mimea, chakula, dawa za tiba, vitamini au krimu.

Hawatumii.....

Kila siku.....

Mara 1 hadi 5 kwa mwezi.....

.....

Mara 6 hadi 10 kwa mwezi.....

Mara 1 hadi 5 kwa mwaka.....

5. Kwa mwaka uliopita ni mara ngapi umetumia dawa za mitishamba au dawa za asili? Dawa za asili zinaweza kuhusisha mimea, chakula, dawa za tiba, vitamin au krimu.

Haijatokea

Mara 1 hadi 5

.....

Mara 6 hadi 10

Mara 11 hadi 20 kwa mwezi

Zaidi ya mara 20.....

6. Ukiwa na matatizo ya kiafya huwa unamuona nani kutafuta ushauri? (*Zungushia yale yanayohusika*)

Mwanafamilia	Rafiki au Jirani	Daktari
Chifu wa kabila au Mzee	Mzee wa Kijiji au Kiongozi	Wamasai
Mchungaji au kiongozi wa kidini	Mfamasia	Mganga wa mitishamba

7. Kwa nini unachagua kwenda hospitali?

- Kupima tu
- Kupata matibabu tu
- Kupima na kupata matibabu
- Siwezi kwenda hospitali kabisa

8. Ni aina gani ya matayarisho au namna ambayo kawaida watu huitumia? (*zungushia yote yanayotumika*)

Chai	Maziwa	Supu ya Kuchemshwa

Losheni au Cream	Chakula chakuliwa (Kuku mweusi,mbuzi wa kuchoma,kondoo)	Vidonge/Vitamini/virutubisho
Maji	Sindano	Kutafuna mizizi au kuchukua moja kwa moja kwenye mti
Kuvuta hewa	Unga	Kuoga

Namna nyingine ambayo haijaorodheshwa

9. Baadhi ya watu kawaida hutumia madawa ya asili na baadhi kawaida hutumia dawa walizoandikiwa na Daktari.

Kwa nini watu kawaida hutumia dawa za asili. Dawa za asili zinaweza kuhusisha mimea, chakula, dawa za tiba, vitamin au krimu.

(Zungushia yote yanayotumika).

Ni rahisi kuzimudu	Ni vigumu kumpata Daktari	Kutumia dawa za hospitali bila kupona
Ni salama	Yanafanya kazi vizuri	Mila za kifamilia
Sababu za kidini	Ni rahisi kupatikana	Ni za kitamaduni zaidi
Yanapatikana zikiwa asilia (Bure)	Dawa za hospitali zina kemikali nyingi	Madhara kidogo kimwili

Maoni ya mhojaji/mdahili:

References

1. United Republic of Tanzania: *2012 Population and Housing Census*. Central Census Office and National Bureau of Statistics. Dar es Salaam; 2013. Accessed online: <http://www.nbs.go.tz>
2. Education Sector Development Committee (2011) United Republic of Tanzania: Education Sector Performance Report, 2010-2011. Available: <http://www.ed-dpg.or.tz>. Accessed online: 10 Jan 2014.
3. WHO: *National Policy on Traditional Medicine and Regulation of Herbal Medicines*. Report of a WHO global survey, WHO, Geneva: 2005.
4. WHO: *Traditional Medicine Strategy 2002-2005* World Health Organization. Geneva; 2002.
5. Minja MMJ. The Maasai Wonder Plants. People and Plants Conference of the *Tropical Pesticides Research Institute*. Arusha, Tanzania: March 1999.
6. Aderibigbe SA, Agaja SR, Bamidele JO. Determinants of Utilization of Traditional Bone Setters in Ilorin, North Central Nigeria. *J Prev Med Hyg* 2013; 54: 35-40.
7. Moshi MJ, Otieno D, Weisheit A. Ethnomedicine of the Kagera Region, northwestern Tanzania. Part 3: Plants used in Traditional Medicine in Kikuku Village, Muleba District. *J of Ethnobiology and Ethnomedicine* 2012; 8: 14.
8. Ministry of Health: *The National Birth Attendants Implementation Policy Guidelines, Tanzania*. Dar es Salaam 2000.
9. Kayombo E, Uiso F, Mahunnah R. Experience on Healthcare Utilization in Seven Administrative Regions of Tanzania. *J of Ethnobiology and Ethnomedicine* 2012; 8:5.
10. Colson, Conny and Marc E DeBroe. "Kidney Injury from Alternative Medicines" *Adv Chronic Kidney Dis*. 2005 Jul; 12(3):261-75.
11. Bagnis, Cl; Deray, G; Baumelou A, et al. "Herbs and the Kidney." *Am J Kidney Dis*. 2004; 44:1-11.
12. Simaan JA. Herbal Medicine, What Physicians Need to Know. *J Med Liban* 2009; 57: 215-217.

13. Ioannides C. Pharmacokinetic Interactions between Herbal Remedies and Medicinal Drugs. *Xenobiotica* 2002; 32: 451-478.
14. Maunya M. Traditional Healers now in Mainstream Health Services. *Daily New* Feb. 1991: Dar es Salaam.
15. Gessler MC, Msuya DE, Nkunya MHH, Schar A, Heinrich M, Tanner M. Traditional Healers in Tanzania: Sociocultural profile and three short portraits. *J of Ethnopharmacology* 1995; 48: 145-160.
16. Kayombo E, Uiso F, Mahunnah R. Experience on Healthcare Utilization in Seven Administrative Regions of Tanzania. *J of Ethnobiology and Ethnomedicine* 2012; 8:5.
17. Kirby JP. The Islmanic Dialogue with African Traditional Religion: Divination and Healthcare. *Soc Sci Med* 1993; 36: 237-247.
18. Nkwi PN. Perceptions and treatment of diarrhoeal diseases in Cameroon. *J Diarrhoeal Dise Res* 1994; 12: 35-41.
19. Aikins A. Healer Shopping in Africa: new evidence from rural-urban qualitative study of Ghanaian diabetes experiences. *BMJ* 2005; 331: 737.
20. Rekdal OB. Cross-Cultural Healing in East African Ethnography. *Med Anthropol Q* 1999; 13: 458-82.
21. Ryan GW. What do Sequential Behavioural Patterns Suggest about the Medical Decision-Making Process? Modeling home case management of acute illness in a rural Cameroonian village. *Soc Scie Med* 1998; 46: 209-25.
22. Marian V, Neisser U (2000) Language-dependent recall of Autobiographical Memories. *J Exp Psychol Gen* 129(3): 361-368.
23. Rattray J, Jones, M. Essential Elements of Questionnaire Design and Development. *J of Clinical Nursing* 2007; 16: 234-243.
24. Bowling A (1997) *Research Methods in Health*. Buckingham: Open University Press.

25. Bowden A, Fox-Rushby JA, Nyandieka L, Wanjau J. Methods for pre-testing and piloting survey questions: Illustrations from the KENQOL survey of health-related quality of life. *Health Policy and Planning* 2002; 17: 322-330.
26. Ferguson E, Cox T (1993) Exploratory Factor Analysis: A Users' Guide. *Int. Journal of Selection and Assessment* 1(2): 84-94.
27. Rutebemberwa E, Lubega M, Katureebe S, Oundo A, Kiweewa F, Mukanga D. Use of Traditional Medicine for the Treatment of Diabetes in Eastern Uganda: A qualitative exploration of reasons for choice. *BMC International Health and Human Rights* 2013; 13(1): <http://www.biomedcentral.com/1472-698X/13/1>.
28. Olisa NS, Oyelola FT. Evaluation of use of herbal medicines among ambulatory hypertensive patients attending a secondary health care facility in Nigeria. *Int J Pharm Pract.* 2009; 17: 101–5.
29. Gearhart R, Abdulrehman MS. Concepts of Illness Among the Swahili of Lamu, Kenya. *Journal of Transcultural Nursing* 2013; Available online: <http://tcn.sagepub.com/content/early/2013/12/30/1043659613515713>
30. Dillip A, Alba S, Mshana C, Hetzel M, et al. Acceptability – A Neglected Dimension of Access to Health Care: Findings from a Study on Childhood Convulsions in rural Tanzania. *BMC Health Services Research* 2012; 12(113): <http://www.biomedcentral.com/1472-6963/12/113>.