UNREGULATED DRUG VENDORS' KNOWLEDGE, ATTITUDES, BELIEFS AND PRACTICES RELATED TO MALARIA MANAGEMENT OF CHILDREN FIVE AND UNDER IN BUTALEJA DISTRICT, UGANDA

by

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B.Sc., The University of British Columbia, 2009

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES

(Pharmaceutical Sciences)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

October 2013

Abstract

Background: It has been estimated that there are 4000 licensed drug shops throughout Uganda with approximately 39% being unlicensed and unregulated with the latter being common in rural areas. Unregulated drug vendors play a major role in malaria management for young children (age five and under) since they are often the first points of access for caregivers seeking treatment for their sick children. As a result, their ability to manage malaria has a great influence on malaria outcomes in the rural community.

Objective: The study assessed practices of unregulated drug vendors related to case management for children five and under. Knowledge, attitudes and beliefs in other areas of malaria management were also assessed to better understand their practices.

Methods: This study employed a descriptive and qualitative design using a semi-structured interview. A district-wide census identified 88 unlicensed, unregulated drug vendors in which 75 participants were recruited into the study through a purposive sampling strategy.

Results: The study found that a large proportion of drug vendors were unqualified to operate a drug shop. Several flaws in their practices were identified including vendors dispensing quinine instead of first-line ACT, irrational poly-pharmacy, dispensing oral quinine indiscriminately, providing under-dose treatment and selling ineffective antimalarials. Only 26.7% of vendors stocked ACTs while 90.7% stocked quinine (oral). Only 27.9% reported ACT as the best option to treat malaria, while others believed in less effective medicines. Some vendors also offered responses to questions that indicated incorrect beliefs related to cause, prevention, and

effectiveness of different antimalarials. Although many were unqualified and demonstrated poor knowledge, beliefs and practices related to malaria management, many were interested in participating in future programs. About 89.0% expressed preference for short-term training sessions.

Conclusion: Small proportion of drug vendors stocking ACTs suggests effective treatment of malaria at home may be compromised due to clients and children likely receiving less effective antimalarials for treatment. The findings also call for a program to deliver training to unregulated vendors to enhance treatment practices and also correcting misconceptions and flawed beliefs in other areas of malaria management.

Preface

This thesis is based on work that was conducted by myself with the help of local Ugandan field research under the supervision of Dr. Rosemin Kassam. This thesis work as part of a larger public health research project titled " *Reducing Malaria Related Child Mortality in Uganda: Defining a Sustainable Community Self-Management Program*" was designed and funded by the Principle Investigator Dr. Rosemin Kassam. This thesis was designed to answer a sub-set of research questions from the larger study, as it pertains to the practice of unregulated drug vendors within Butaleja, Uganda. Findings from this thesis, together with data from other research that is part of the larger study will be used to inform the larger public health research project. The research team included the Principle Investigator, local field research assistants, field coordinators, site manager and myself.

Under the supervision of Dr. Kassam, I was responsible for and have participated in the design of my study, training of field research assistants, coordination of recruitment of the study participants, data collection, administrative tasks, providing quality assurance of collected data, data analysis and writing of this thesis. Data collection was primarily done by the local research assistants that spoke the local language. This thesis will be used for publications in peer reviewed journals. Ethical approval of this research project was part of the larger public health research project and was provided by UBC Behavioural Research Ethics Board (H10-0290).

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List of Abbreviations

Abbreviations

ACT	Artemisinin-derived Combination Therapy
AL	Artemether-Lumefantrine
AMFm	Affordable Medicines Facility-malaria
ANC	Antenatal Care
AS	Artesunate
AQ	Amodiaquine
CQ	Chloroquine
DV	Drug Vendor
GHI	Global Health Initiative
GMAP	Global Malaria Action Plan
HC	Health Centre
IMCI	Integrated Management of Childhood Illnesses
IRS	Indoor Residual Spraying
IPT	Intermittent Preventative Treatment
ITN	Insecticide-Treated Net
LLIN	Long-Lasting Insecticide Treated Nets
MDG	Millennium Development Goals
MOH	Ministry of Health
NDA	National Drug Authority
NMCP	National Malaria Control Strategic Plan
OTC	Over-The-Counter
PMI	President's Malaria Initiative

PP	Private Providers
RBM	Roll Back Malaria
SP	Sulphadoxine-Pyrimethamine
SSA	Sub-Saharan African
SSI	Semi-Structured Interviews
UN	United Nations
UNDP	United Nations Development Plan
UNICEF	United Nations Children's Fund
UNMCP	Uganda National Malaria Control Plan
USAID	United States Agency International Development
USD	United States Denomination
USG	United States Government
WHO	World Health Organization

Acknowledgements

This thesis embodies the generous of efforts of several people in my life that have provided support to me academically and personally. I am grateful for the support of my thesis committee members: Dr. Urs Hafeli (Chairperson), Dr. Rosemin Kassam (supervisor), Dr. John Collins, Dr. Lesley Bainbridge, and Dr. Kishor Wasan. I am thankful for your in sharring your knowledge, expert guidance, and critical feedback throughout my academic progress.

I would like to express my deepest gratitude to my supervisor Dr. Rosemin Kassam for the opportunity to be part of the larger project and for funding my travel, lodging and other expenses that were essential for me to complete this work as part of my thesis. From this opportunity, I have gained invaluable field work and travelling experience that has really given me a whole new perspective on life. Your attention to detail, diligence, and dedication to research has always been something I have admired. I have gain important life skills throughout my time under your guidance. I believe that all of the things I have learned from you will transfer over to any endeavour I wish to pursue and, for that, I cannot thank you enough. Without your support and encouragement over the last four years I would not have made it this far.

I would also like to take this opportunity to thank research team members on and off the field both here and in Uganda. In particular, I would like to thank Theresa Cunningham for providing all the support in the field. Adrian Limpus, thank you for your all your help throughout the project. I would also like to thank the local Butaleja research team. All the field research assistants were indispensible. I am deeply appreciative of your dedication and hard work in the

field. To Daniel, your positivity, energy and laughter made field work exciting. Thank you for your help in training and organizing the research assistants and being there every single day. I would also like to mention the important role that the late Dr. Mweru had provided for the whole project. Without your help the project would not have been as successful as it was. You will be missed by the Butaleja community, your colleagues, and the entire research team.

To my family, thank you for being there. My mother and father, you have been there every important moment in my life. Your love and support is something that I can always count on. I don't think a simple 'thank you' is enough to express my gratitude. But I want you to know that both of you are greatest role models in my life. To my brothers, Kang-Ming and Kang-Wei, thank you for putting up with me. Both of you are very important to me.

Chapter 1: Introduction

1.1 Malaria - Disease

Malaria is an ancient disease that has plagued human-kind since early human history. It's origin is believed to coincide with that of humans originating from Africa. Documented cases of a disease characterized by periodic fevers that is similar to malaria have existed throughout human history.[1] The earliest written report on malaria is known to date back to 2700 BCE in China.[2] Many other civilizations have documented cases of symptoms of malaria including Egypt, Greece and Rome.[2] Its name is derived from the Italian words 'mala' and ' aria' meaning "bad air", since the disease was commonly associated with swamps and stagnant bodies of water.[1,2] Realization of this association led the Romans to implement the earliest malaria intervention by draining stagnant bodies of water.[1] Malaria is often described in history as one of the diseases that has profoundly influenced human events.[1]

1.1.1 Parasite Life Cycle

Malaria is caused by the protozoan parasite Plasmodium that is transmitted to humans through a mosquito vector. There are four Plasmodium species that are known to cause malaria in humans: *P. falciparum, P. vivax, P. ovale, and P. malariae*.[3] Of the four species, *P. falciparum* is the most virulent species and accounts for most of the infections in Sub-Sahara Africa (SSA).[3]

The life cycle of the Plasmodium parasite is complex and involves two distinct hosts, mosquitoes and humans.[4,5] It goes through various developmental and transmission phases between these hosts to cause malaria. The female mosquito takes up Plasmodium parasites

from an infected human during feeding. In the gut of the mosquito, the parasite undergoes sexual development to form the motile infectious form known as sporozoites. The transmission phase begins with the bite of a female Anopheles mosquito carrier in subsequent feedings where the sporozoites, now in the salivary glands of the mosquito, are transferred into its human host bloodstream. Inside the human host the parasite undergoes its asexual life cycle in two stages: the liver stage and the blood stage. The liver stage involves the sporozoites rapidly migrating to the liver where they infect liver cells. During the next 14 days, the sporozoites in the schizont (infected cells) undergo differentiation and asexual replication producing thousands of merozoites that eventually causes the schizont to rupture. In the blood stage, merozoites rapidly invade the red blood cells and continue its perpetuate its asexual life cycle. Some of the merozoites undergo sexual differentiation and become gametocytes. These gametocytes are ingested by mosquitoes during a blood meal and the cycle continues starting from the mosquito host.

1.1.2 Malaria Pathology

The characteristic clinical feature of malaria is a cyclical pattern of mild to high fever with accompanying symptoms such as chills, and perspiration.[4,5] Other symptoms of uncomplicated malaria are often non-specific, which include headache, fatigue, muscle and joint aches, vomiting, and diarrhoea. The cyclical pattern reflects the various erothrocytic cycles that occur in either the liver or blood stage.[5] The distinct property of the parasite infection is the changes on the surface of red blood cells that cause the red bloods cells to adhere to endothelial cells of blood vessels of various organs.[5] This effect (termed sequestration) affects various organs

including the brain, the kidney, and the spleen by obstructing the microcirculation in these organs causing the various pernicious clinical features of malaria.[5] Severe malaria is the result of sequestration and is often characterized by at least one of the following symptoms: anemia, metabolic acidosis, hypoglycaemia, respiratory distress, acute renal failure and coma and seizures (associated with cerebral malaria).[6,7] Cerebral malaria is the most severe form that often culminates into death quite rapidly. The case fatality rate is high when severe malaria is untreated or provided an ineffective treatment.[3]

The severity of malaria clinical disease depends on various factors pertaining to the infected individual.[4,7] An individual's immune status is an important one. The level of acquired protective immunity of an individual is partially determined by the age, local pattern and intensity of transmission, pregnancy status and genetics.[8] The acute clinical disease of malaria, however, is particularly confined to young children (age five and under) due to a lack of naturally acquired immunity to the Plasmodium parasite.[7,8] Partial immunity develops through repeated infections but with a lack of recurrent infections, immunity wanes. Children five years of age and under face this predicament because they lack this opportunity to strengthen their immune system through recurrent infection and furthermore lose the passive immunity from their mothers relatively soon. Moreover, malaria can act together with various social determinants, malnutrition, poor living/sanitary conditions and other diseases that fall prey upon the most vulnerable. Rural areas in Africa often reflect many of these realities and illustrate the pernicious nature of malaria.

1.2 History of Malaria

1.2.1 Malaria Burden

Burden of Malaria Globally

Malaria is one of the leading causes of morbidity and mortality in the world and remains one of the most important global public health challenges to date.[4,9] Most recent estimates show that, world-wide, malaria contributes to approximately 216 million clinical cases and 655,000 deaths annually, of which 81% of the cases and 91% of deaths were in the African Region.[9] Malaria's pervasive morbidity and mortality imposes the greatest burden on children age five and under. Children are considered one of the most vulnerable populations burdened by malaria due to their lack of acquired immunity.[4,10] It cannot be ignored that children who have been inflicted by malaria can also be burdened by life-long development impairments including low birth weight, chronic anaemia, reduced growth, and possibly severe mental retardation.[4,11] It has been estimated that 86% of malaria deaths globally were attributed to children under five years of age.[9] The economic burden of malaria is equally staggering, with an estimate of $14 billion USD in direct cost to the economies of African nations.[4] Sachs and Gallup argue that malaria is a cause of poverty in many of the African countries.[12]

Burden of Malaria in Uganda

There are 35 countries in Africa that bear the highest burden of malaria, in which Uganda is consistently amongst the top five countries that contribute the greatest to malaria morbidity and mortality.[4,10] Due to a lack of seasonal variability in temperature and rain-fall, malaria transmission is year round. High malaria transmission contributes to malaria being the most widespread disease in Uganda, which accounts for 25-40% of outpatient visits in health facilities

and 9-14 percent of in-patient deaths.[11,13,14] Furthermore, it has been reported that malaria admissions to hospitals and health centres have increased between 1999 and 2009 in Uganda, providing a contrast to several other countries in East Africa and South Africa that have shown a decline in malaria admissions.[9,15]

The Uganda Ministry of Health (MOH) reported that 70% of all child mortality results from malaria. [16] Close to 6.5 million cases and 39,000 deaths in children under the age of five from malaria have been reported in Uganda.[17] These figures not only show how immense a problem malaria is for the people of Uganda, but illustrates that it continues to be an important public health issue despite valiant strides made on the malaria control front.[4]

1.3 Malaria Control in Uganda

Currently efforts focus on extensive widespread malaria control to reduce malaria disease burden that primarily involves: interventions that promote (1) prevention and (2) prompt case-management of malaria.[4] Malaria control is defined by the World Health Organization (WHO) as any deliberate action taken in "reducing the malaria disease burden to a level at which it is no longer a public health problem."[18] The strategies and approaches towards these areas of control efforts remain the core of all control programmes. These recommended interventions are reflected in the Uganda National Malaria Control Strategic Plan (NMCP) which has established the following specific targets regarding malaria control to be reached by 2010[19]:

- Proportion of households having at least one insecticide-treated net (ITN) increased from 15% to 85% and households with at least two ITNs from 10% to 60%

- Proportion of children under 5 and pregnant women having slept under an ITN the previous night increased to 85%
- Number of districts covered by indoor residual spraying (IRS) (i.e. regular, high quality spraying of at least 85% of structures) increased from 0 to 15
- Proportion of children under five receiving correct treatment according to national treatment guidelines within 24 hours of onset of symptoms increased from 55% to 85%.
- Proportion of pregnant women attending antenatal care (ANC) services who have received IPT2 increased from 33% to 85%.
- Case fatality rate among malaria in-patients under five years of age reduced from 3% to 2%.

1.3.1 Prevention

Prevention forms the larger part of malaria control resources in virtually all national control programmes. It has been estimated that in 2010, preventative measures would require $3.98 billion USD for the Global Malaria Action Plan (GMAP) with vector control being the bulk of the funding.[20] Preventative measures protect individuals by reducing the local transmission of malaria and therefore the overall incidence and prevalence of infection. This involves reducing the life-span and density of female mosquito vector and limiting the physical contact between humans and mosquito vector.[20] Prevention through effective vector control interventions that are currently widely implemented in African settings are insecticide-treated nets (ITN) and indoor residual spraying (IRS). Scientific studies have shown the efficacy of both these interventions giving rationale for them to be a main focus in many vector control policy and

strategies. Additional forms of preventative measures such as environmental management and intermittent preventative treatment (IPT) for pregnant women also complement these large-scale strategies.

Currently, In Uganda, with the aid from President's Malaria Initiative (PMI) goals targeted at providing effective prevention have met some success with interventions such as large-scale distribution of long lasting insecticide treated nets (LLINs) to vulnerable populations and providing large-scale deployment of IRS as a major headway to reduce transmission. Although these strategies are effective, providing universal coverage to all districts to create dramatic differences in malaria outcomes is a difficult task and reflects the reality of financial and human resource limitations. In addition to this, ineffective use and lack of proper re-treatment of ITN are other shortcomings that hamper the full potential benefits of ITNs.

1.3.2 Treatment Guidelines

Failure at the level of proper and timely case-management is still a key impediment in improving health outcomes.[4] Although, accurate confirmation of malaria through parasitological diagnosis (through microscopy or rapid diagnostic tests) and referral to proper health facilities for severe malaria are integral parts of case management, providing prompt and appropriate treatment within 24 hours of fever onset, at home or through public/private health providers, is a cornerstone of effective case management of malaria in children.[18] Ensuring effective treatment for individuals lacking naturally acquire immunity to the malaria parasite, such as children five and under, is a time-sensitive matter; hence, failure at this level can contribute greatly to malaria mortality in children five and under. Effective and appropriate

treatment encompasses providing the first-line treatment as recommended under the national treatment guidelines and ensuring treatment within 24 hours for the child diagnosed with malaria. Any delays and/or incorrect drug/drug dosing can be life threatening event.[3]

The Uganda National Malaria Treatment Policy as outlined in the Uganda Clinical Guidelines 2012 as follows[21]:

i. Treatment of uncomplicated malaria

- The recommended first line medicine is Artemether-Lumefantrine (AL). Any other Artemisinin-derived combination therapy (ACT) that has been recommended by World Health Organization (WHO) and Ministry of Health (MOH) and registered with the National Drugs Authority (NDA) will be the alternative first line.
- The recommended second line medicine is oral quinine for all patients.

ii. Treatment of severe and complicated malaria:

- Parenteral quinine is the recommended treatment for the management of severe malaria for all patients. Parenteral artesunate or artemether are the alternatives. Rectal artesunate shall be used as pre-referral treatment for severe malaria.

Changing Uganda Malaria Treatment Policy

The Uganda National Malaria Treatment Policy has undergone several changes over the last decade.[22] In 2002, the first-line treatment of chloroquine (CQ) in combination with sulphadoxine-pyrimethamine (SP) replaced CQ monotherapy. The latter treatment policy was abandoned due to increasing parasite resistance.[22] Around the same time, studies were

undertaken in 3 sites in Uganda to determine the safety, tolerability, and efficacy of various artemisinin combination therapies.[23] The findings from these studies concluded that artemether-lumefantrine (AL) was the suitable choice as the new first-line medicine for treatment of uncomplicated malaria and the policy was enacted in 2004. Artesunate-amodiaquine (AS+AQ) was the alternative first-line medicine. Although these first-line recommendations were effective, ACT implementation has faced several challenges since 2004 including stock out in facilities, the relatively expensive cost of ACT in private sectors and the availability of alternative antimalarial drugs in Uganda.[22,24] Caregivers have the option to choose less effective treatments in the private sector retail outlets and with challenges related to acccess to ACTs, effective case-management is potentially compromised.

1.3.3 International Malaria Control Efforts Guiding Uganda

The Uganda National Malaria Control Plan (UNMCP) is guided by targets set at the international stage. Much of these targets have been established as a result of several key events in history. This section provides a summary timeline of closely related major global events and initiatives from the 1990's to the present time that were significant towards controlling and eradicating malaria.

Global Malaria Control Strategy

Worldwide interest on malaria control and eradication has been gaining momentum within the last two decades.[4] Prior to the late 1980's the African continent received little attention in the global malaria eradication campaign that occurred from 1955-1969.[25] Renewed interest was sparked by the unacceptable levels of morbidity and mortality in SSA. At the international level,

it became readily apparent that malaria-endemic countries in SSA needed greater support at the financial and technical level.[25] A culmination of several conferences from 1991-1992 where leading experts from various institutions and organizations gathered to discuss all pertinent matters pertaining to malaria control resulted in a the Global Malaria Control Strategy, which was presented in Amsterdam in 1992 at a Ministerial Conference. The objectives of the Global Malaria Control Strategy aim to reduce malaria mortality and morbidity in concert with strengthening of local and national capabilities which promotes four key elements[25]:

- to provide early diagnosis and prompt treatment;
- to plan and implement selective and sustainable preventative measures, including vector control;
- to detect early on, contain or prevent epidemics; and
- to strengthen local capacities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, in particular the ecological, social and economic determinants of the disease.

Momentum of the Roll Back Malaria Partnerships

The "Roll Back Malaria" (RBM) initiative is a global partnership established in October 1998 that consisted of the World Health Organization (WHO), the United Nations Development Programme (UNDP), the United Nations Children's Fund (UNICEF) and the World Bank to align partners towards a common goal. Additional partners that make up the partnership include governments of malaria-endemic countries, non-governmental organizations, development agencies, the media, private sectors, and research and academic groups amongst others. One

of the primary objectives of the RBM Partnership aims to “halve the burden of malaria for the world’s people by the year 2010”.[26]

Abuja Declaration

The momentum garnered by the RBM initiative was further strengthened by continued commitment of African leaders in April 2000 during the African Summit on Roll Back Malaria in Abuja, Nigeria. This monumental event (later collectively known as the Abuja Declaration) signalled a re-dedication to the Harare Declaration in 1997 on malaria prevention and control as well as full commitment to the RBM initiative established in 1998, which strongly emphasize to “commit ourselves to an intensive effort to... halve the malaria mortality for Africa's people by 2010”.[27]

Millennium Development Goals

At the United Nations front, two important events were salient in a global effort against malaria. First, In September of the same year as the Abuja Declaration, the Millennium Declaration was signed by all 192 UN member states to initiate a 15 year course to achieve all Millennium Development Goals (MDG) This declaration introduce MDG 6.C., which demonstrated the continued interest to commit to the battle against malaria. The target was to “have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.”[28] Additionally MDG 4, aiming to reduce the under-5 mortality rate, further aligns with goals of global health advocates. Second, in 2001a resolution by the UN’s General assembly proclaimed that 2001-2010 as “the decade to roll back malaria in developing countries, particularly in Africa”.[28]

Global Malaria Action Plan

The Global Malaria Action Plan (GMAP) developed by the RBM Partnerships in 2008 represents a renewed attention and commitment to the fight against malaria. The GMAP is a "unified global strategy" to coordinate efforts around the world to control, eliminate, and further research on malaria. [29] This global blueprint reaffirms the goals by RBM which include: to achieve universal coverage of all interventions to populations at risk; to reduce of malaria cases and mortality by 50% from 2000 levels by 2010[30]; and to reduce malaria cases to 75% from 2000 levels and to near zero preventable deaths for malaria mortality by 2015.[30]

President's Malaria Initiative and Global Health Initiative

The President's Malaria Initiative (PMI) was a $1.2 billion USD interagency initiative launched in June 2005 to reduce the burden of malaria in 15 African countries. The aim was to scale-up malaria treatment and prevention interventions to in high-burden countries. This 5-year investment by the United States Government (USG) for foreign assistance was lead by the government agency, United States Agency for International Development (USAID), which has been a major contributor to economic and humanitarian aid globally for the last four decades. The initiative began with 3 high-burden countries in 2006, one of which included Uganda, with subsequent funding in incremental amounts and additional countries added in 2007 and onwards to 2010. The PMI marks an important turning point in malaria control in Uganda, as PMI continues to be one of the largest source of funding for Uganda (the second being Global Fund). PMI became a part of a larger whole in the Global Health Initiative (GHI) in 2009 after the announcement by President Barack Obama to provide further assistance to partner countries to improve health outcomes and reduce burden of disease with particular emphasis

on women, newborns and children.[31] PMI has been extended to 2014 after passage of Lantos-Hyde Act in 2008.[32] The GHI will invest a total of $63 billion USD within 6 years with PMI continuing as a core component alongside HIV/AIDS and tuberculosis.[32]

1.4 Malaria Treatment

Treatment with antimalarial medicines is a central element in management of malaria. These medicines can be described from supply and demand perspective. Drugs and health services are commodities and they naturally have a supply and demand component. Key persons that come into play at the supply side are private or public health service providers that provide access to antimalarial drugs. At the opposite side, the relevant persons are children five years of age and under with malaria and the caregivers, typically mothers or other family members, of these children. Since children may not have the capacity nor the competence to demand or seek health themselves, caregivers act as their proxy for health seeking, and fittingly, is the primary focus of much malaria research.[4]

1.4.1 Demand Side – Caregivers

The Relevance of Caregivers

Failure to provide proper and effective case-management for malaria is a multifaceted issue that primarily reflects the treatment-seeking practices of caregivers of children five years and under.[4] Within households, caregivers, play a primary role in the health of child since they ensure, on a day-to-day basis, the well-being of the child. In relation to malaria management, they are generally the ones that seek health services or medications when the child falls ill. Factors that influence a caregiver's use of certain antimalarial drugs include: perception of

disease, perception of the drug's efficacy, cost of the drug, and availability of the drug which further factors in on the outcome of the treatment.[4,33]

Caregiver's Preference for Private Sector Care

Caregivers have two options of seeking treatment for a febrile child: (1) the public health sector such as hospital or parish/village level health facilities or (2) the private sector, which typically includes but not limited to drug shops, mobile vendors, general shops, and private clinics. In Uganda, the private sector serves more than half of those who seek treatment for malaria.[4,13] It has been reported, including a more recent study by Rutebemberwa[33], that over 60% of those who sought first treatment for febrile children outside of home bought drugs from a drug shop or private clinic.[33] Kemble et al, on the other hand, found a greater proportion of those who first sought treatment from the private sector, which included general shops, drug shops, pharmacies, and private clinics to be up to an astounding 96%.[34]

Rural populations in Uganda are particularly underserved by the health system and offers an explanation of the observed preference for private sector services.[4] Some of the challenges noted in the literature include distance from health facilities, shortage of trained health professional to adequately serve a growing rural population and regular stock-outs of medications at health facilities.[4,35] In rural Butaleja District, at the time of this study, there were only two practicing physicians serving the whole population.[36]

On the other hand, the perception of private sector providers, including drug vendors, by the community is a favourable one. Despite some drawbacks a relatively large proportion of caregivers continue to seek medicine from them as their first line of care, especially for malaria

medication.[4] Drug vendors have been characterized to have a "doctor-like status" in the community.[37] Preference for drug vendors over public health professionals draws from:

1) greater ease of accessibility [38];
2) shorter waiting periods compared to public health facilities [38];
3) longer, more flexible operating hours [38,39];
4) vendors being more sensitive to client's needs[40,41] ;
5) flexibility pricing and affordability through credit [35];
6) availability of medicine to be sold at varying doses[42,43];
7) availability of medicine without prescription [42,44];
8) lack of drugs at public facilities [33];
9) dissatisfaction with service of public health workers [45];

1.4.2 Supply side – Role of Private and Public Health Services for Access to Antimalarial Drugs

Public Service Providers

The public health infrastructure in Uganda is stratified by district, sub-district, sub-county, and parish. In Butaleja District, there is only one hospital located in Busolwe Town Council which serves at the level of the entire district as well as the sub-district level as well where Illnesses are managed by a variety of medical practitioners. Doctors (medical officers) work at this level but are limited in numbers in the district. There is one doctor for every 100,000 people.[36] Health centre (HC) IV serves at the sub-district level, but is absent in Butaleja District. Health Centre III are the next level of health services which operates at the sub-county levels that is headed by a medical clinical officer. It includes all services of HC but also in-patient care and

environmental health. Other staff include: a laboratory assistant, two nurses, midwife and a nursing assistant. However, it is important to note that 6 sub-counties of Butaleja District lack a health centre III.[36] Health centre II operates at the level of the parishes and its headed by a nurse. Other staff include: a midwife and two nursing assistants. Health services provided at this level includes outpatient care, antenatal care, immunisation. At the community level, health centre I exist as community volunteers and not a physical establishment. These volunteers offer basic health education and report to health centres II.

Private Service Providers

The supply-side of the equation is the private sector with direct contact with consumers and is represented by a heterogeneous group of practitioners (see Fig. 1.1) with legal status, education, as well as training that varies greatly.[4] Private sector practitioners that are trained and qualified include doctors, nurses, midwives, pharmacy technicians, clinical officers and pharmacists that operate in the public health care sector in private clinics, pharmacies and even licensed drug shops. These health professionals are regulated under their respective professional associations and work in licensed establishments, which qualifies them as formal private providers. Also included in this cadre of formal health services are Class C licensed drug shops (Class C refers to the type of over-the-counter class of scheduled drugs these shops are licensed to sell), that are operated by a qualified health professional such as a pharmacy technician, nurse, midwife, or clinical officer. Any of these above health providers are typically trained and hold a license for practice and dispensing of medicines. In contrast, those that are unqualified and/or unregulated (also referred to as informal private providers that include the

general category of unregulated drug vendors, village doctors, tradition healers, etc., that operate in a range of establishments outside the government's regulatory framework.[35]

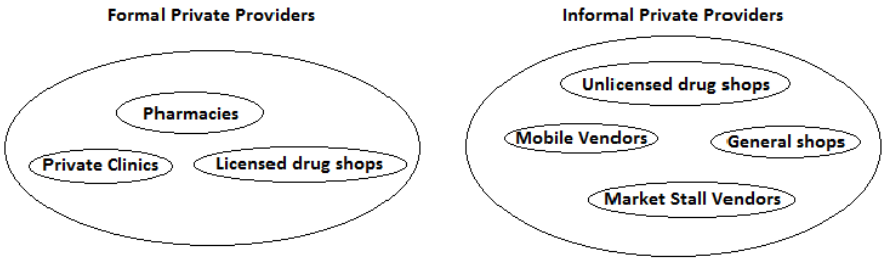

Figure 1.1 - Formal and Informal Private Sector Medicine Sources

Unregulated drug vendors are simply for-profit commercial entities that offer consumers access to drugs. In the literature various names have been use to classify this group of private providers, for example medicine sellers, chemical sellers, drug shop retailers.[35] Unregulated drug vendors are informal private providers who sell and dispense western medicines while at the same time the qualifying term “informal” describes either their lack of formal qualified training or their lack of licensure. Therefore, “unlicensed” can also be used to describe the unregulated nature of such drug vendors. Proper licensing from the appropriate authorities dictate a certain level of training and regulation of practices; hence, an absence of one suggests a lack of formal training and regulations that guide their practices. From figure 1.1, *unlicensed* drug shops are a clear group of providers that can be classified as unregulated drug vendors; general shops and mobile vendors also meet the inclusion criteria. General shops, that is, shops that sell drugs as well as general household items, typically do not even qualify for a license for over-the-counter (OTC) medicine, yet have been documented to illegally carry antimalarial and

various other prescription-only drugs.[43] It has been estimated that throughout Uganda, there are approximately 4000 unlicensed drug shops.[13] Moreover, considering that 65% of private providers in Uganda are not licensed with the appropriate authorities, contact between consumers, for instance, caregivers of febrile children and unregulated drug vendors is common place.[41,46]

Drawbacks of Using Drug Vendors That are Not Pharmacies

Private sector providers throughout Sub-Saharan Africa remain a popular source for treatment of childhood illnesses, including malaria, despite that their quality of services is as varied as their legal status, education, and training.[4,47] Their provision of care is often of questionable quality.[47] Drugs and/or drug dosage dispensed by drug vendors are often inappropriate and conflict with national guidelines.[4,41,47] In addition, inappropriate handling and storage of drugs coupled by selling individual units from packaged anti-malarial medicine by drug vendors has been documented.[4,48] The latter is a catalyst for promoting drug resistance for malaria; therefore, the practices of private providers are not to be ignored in policy and strategies to improve case management, since currently there are no better alternatives to ACT once they lose their efficacy as a result of drug resistance. Furthermore, their ability to provide proper advice or instructions for taking medicine to caregivers is potentially hampered by their lack of formal or qualified training. Furthermore, they exist as small commercial enterprises that are more sensitive to profit motivations than their public counterparts.[47] In short, drug vendors sell what their consumers demand. Consumer expectations or demands maybe a powerful impetus in their social environment that influences their often sub-standard practices. Moreover, their own needs and expectation of their own social environment as health providers, in turn,

feedback to influence their care providing behaviours affecting the community, the household, and the individual. Equally important in providing appropriate management to the community is the provider's knowledge base as derived from the training, practical experience, and access to protocols and guidelines for practice, which they can often lack.[38]

Policies and Regulations Surrounding Unregulated Drug Vendors

Beyond the patient-provider dynamic, there exists a national context or regulatory framework under which private providers operate under. Licensed, regulated drug shops are included in this regulatory framework. Unregulated drug vendors, however, demonstrate a gap between policy/regulations and actual practice. Uganda's National Drug Policy and Authority Statute, National Medical Stores Statute and three professional bills work together to establish a national policy body, the National Drug Authority (NDA), and various councils to ensure the proper oversight of drug policy related to pharmaceutical products as well as ensuring that health professionals maintain a certain set of standards of practice through registration.[46] Because unregulated drug vendors are unqualified and most importantly not registered to the appropriate district authorities, the "National Strategy for Utilizing the Potential of Private Practitioners in Child Survival" in Uganda do not formally recognize their roles as official health providers, despite the fact that they play a prominent source of medication for childhood illnesses. Coupled by the fact that the country lacks the sufficient resources to fully enforce policies and regulations that drug vendors and such often violate, a clear gap between policy and practice exist.

1.5. Literature Review - Studies on Unregulated Drug Vendors in East Africa

1.5.1 Purpose of Literature Review

The objective of the literature review in this section was to gain an understanding of the current landscape regarding *unregulated* drug vendors in East Africa, specifically, Uganda, Kenya and Tanzania. The primary goal was initially to understand available information on unregulated drug vendors in various districts in Uganda to make any generalizations or inferences to my current proposed project in Butaleja District. Subsequent searches were performed on neighbouring countries to Uganda for the reason that the literature search on Uganda were limited to a few studies. So it was logical to expand the geographic scope of the current knowledge on drug vendors to get a better grasp on what has been previously done in the region of East Africa to gain some insight. Even though within country, district to district comparison has its limitations to make inferences due to possibility of differences in tribes, religions, socioeconomic, education, language, and culture, nonetheless, understanding of unregulated drug vendors in East Africa provides opportunities to realize successes and failures of other studies to inform and guide a possible community intervention with respect to unregulated drug vendors in the future.

1.5.2 Methods for Literature Search

A systematic search for published literature was conducted using MEDLINE (OvidSP and PubMed) and EMBASE (OvidSP) databases with a strategic combination of search terms

regarding the illness, the geographic location and various terms representing “drug vendors” as summarized in table 1.1. Articles after 1994 published in English were checked to meet inclusion criteria. Grey literature, published and unpublished, were accessed by searching through websites of government and development organizations or agencies which were involved in projects related to malaria management in SSA. Primary literature was supplemented by reviews, reports, and other documents obtained from grey literature searches. A total of 61 documents were identified of which 9 included studies that matched my operational definition of unregulated drug vendors with such informal private practitioners playing a role in managing malaria in children in the three East African countries.

1.5.3 Inclusion Criteria for Search

1) Health Focus: Malaria in children under five years of age (but other childhood illnesses were included as long as malaria was included)
2) Geographic location: Uganda, Kenya, and Tanzania (separate searches)
3) Unlicensed, unregulated drug vendors as primary or partial focus of the study
4) Explicit mention of drug vendors' licensure status
5) Quantitative or qualitative assessment of drug vendor (interventions or situation analysis)

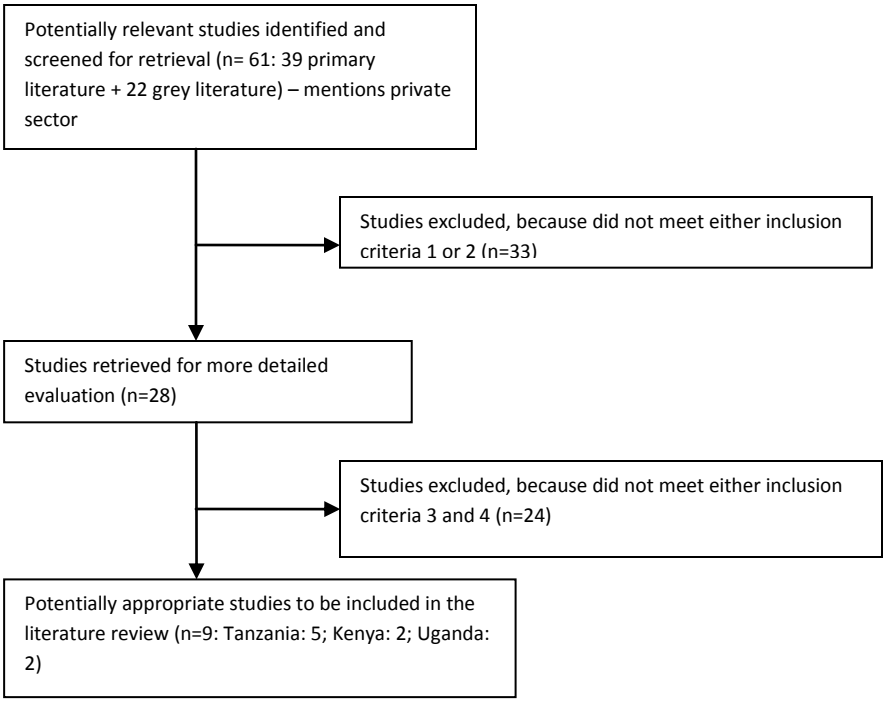

Figure 1.2 - Flow Diagram of Literature Review Search

Table 1.1 - Summary of Select Studies for Literature Review				
Study reference	Description	Methods for needs assessment	Intervention	Results
UGANDA: 2 studies[37,40]				
The CORE Group, Minnesota International Health Volunteers, 2004. **Improving Malaria Case Management in Ugandan Communities: Lessons from the Field.** Washington, DC: The Core Group.	Intervention: Training a network of community volunteers but primarily focus on training of traditional healers and drug sellers in Sembabule District, Uganda Drug vendors trained: n=167	Interview: MIHV's Baseline and Final Knowledge, Practice and Coverage Survey Focus Group Discussions Survey with DV: assessed licensure status	District Health Team and MIHV project staff provide 3 day training of DV and TH to provide accurate advice and correct doses; monitoring and supervision of DV/TH; creating malaria awareness via community events (30); creation of malaria calendars/posters as job aids for DV/TH	Pre- and post-intervention evaluation of various indicators related to caregivers. Improvements in all indicators presented.
Tawfik Y, Nsungwa-Sabitii J, Greer G, Owor J, Kesande R, Prysor-Jones S, 2006. **Negotiating improved case management of childhood illness with formal and informal private practitioners in Uganda.** *Trop Med Int Health 11:* 967–973 See also: George G, Abiodun A, Leila M, Beth P, Bolaji F, Youssef T, Rebecca H, Joseph O, Uzo G, Cathy C, Bob L: **Improving management of childhood malaria in Nigeria and Uganda by improving practices of patent medicine vendors Arlington, Va.** *BASICS II for the United States Agency for International Development* 2004	Intervention: Negotiation sessions conducted with formal and informal private practitioners to improve upon deficiencies in certain practices related to providing care for childhood illnesses in Luwero District, Uganda. Focus on private clinic and drug shops	Inventory of all formal/informal private practitioners through assistance from community informants interview PP with structured form to collect information on various characteristics Situational analysis conducted by MOH IMCI Unit and SARA project (see [1] Republic of Uganda, Ministry of Health, IMCI Unit and SARA Project. 2001. *Utilizing the Potential of Formal and Informal Private Practitioners in Child Survival in Uganda—Situational Analysis and Outline for Developing a National Strategy*. [2] Republic of Uganda, Ministry of Health, IMCI Unit and SARA Project. 2002. *Inventory of Private Health Practitioners in Luwero, Ntungamo and Rakai Districts.*	Simulated visits from mystery clients assessed whether practices of PP met standards of IMCI 2 day training before negotiation sessions Negotiation session carried out with PP on certain practices; participants sign contract of agreement to adopt agreed upon practices needing change	Inventory revealed various types of private health providers. Informal providers: 268 nurse assistant/aides, 54 drug sellers and 27 ordinary shop keepers. Pre- and post-intervention evaluation of various indicators following IMCI guidelines in Private provider's practices in childhood illnesses. Improvements in several key indicators while some indicators resistant to change.
KENYA: 2 study[49,50]				
Tavrow P, Shabahang J, Makama S. **Vendor-to-vendor education to improve malaria treatment by private drug outlets in Bungoma District, Kenya.** Malar J. 2003;2:10. doi: 10.1186/1475-2875-2-10. See also: Tavrow P, and Shabahang J. January 24, 2001. **How Rural**	Intervention: Implementation of a low-cost education outreach program in rural Bungoma District managed by DHMT to increase provider knowledge. N=73 retailers consisting of shops, kiosks, pharmacies, and private clinics – "many of them unlicensed"	Not provided	One-day training of wholesaler counter attendants and mobile vendors by DHMT to serve as unpaid outreach educators to other drug retailers for new guidelines. Providing job aids and client awareness posters to participants.	Informed outlets scored better than the control in 7 of 10 items for malaria knowledge quiz. Informed outlet more likely to stock recommended antimalarial (SP) Greater proportion of shoppers

Table 1.1 - Summary of Select Studies for Literature Review				
Study reference	Description	Methods for needs assessment	Intervention	Results
Vendors Reduced Harmful Anti-Malarial Practices in Kenya's Private Sector: Results of a Mystery Shopper Evaluation. USAID Operations Research Presentation, Ronald Reagan Building, Washington, DC.			Informed vs control outlets compared. Subsequent monitoring of wholersalers and mobile vendors	receiving correct drug and dose at informed outlets than control. Informed outlets more likely to ask diagnostic question and provide referral.
Abuya T, Fegan G, Rowa Y, et al. **Impact of ministry of health interventions on private medicine retailer knowledge and practices on anti-malarial treatment in Kenya**. *Am J Trop Med Hyg*. 2009;80(6):905-913.	Intervention: Evaluation of Kenya Ministry of Health (MOH) training programs in 3 Districts. General shops: N= 485 (summative of all intervention and control districts) Drug shops: N = 26(summative of all intervention and control districts)	Not provided	Intervention program two core components: workshop based training and wide spread public information campaigns on the use of OTC AMs.	Greater proportion of Intervention retail outlets sold correct antimalarial medicine and with correct advice to surrogate client than control. Greater proportion of intervention retail outlets with correct knowledge on dosing than control
TANZANIA: 5 Studies[51-56]				
Hetzel MW, Dillip A, Lengeler C, Obrist B, Msechu JJ, Makemba AM, Mshana C, Schulze A, Mshinda H: **Malaria treatment in the retail sector: knowledge and practices of drug sellers in rural Tanzania.** *BMC public health* 2008, **8:**157	Situational analysis: Interviews with shopkeepers regarding malaria knowledge and treatment during a comprehensive shop census n=489 shopkeepers; 29 Part II Pharmacies; 460 general shops (not licensed to sell any drugs) In addition a complementary mystery shopper study was also conducted in 2004 n= 118 retail outlets 20 Part II Pharmacies; 98 general shops (not licensed to sell any drugs) Kilombero and Ulanga Districts	Interviews conducted with shopkeepers and simulated clients (mystery shoppers)	n/a	- Out of 15 symptoms for malaria, shopkeepers of drug stores mentioned more symptoms than shop keepers of general stores (however, both rather low) -Shopkeepers of drugs stores significantly better knowledge of treatment vs general shops. -Drug stores did not adhere better to the guidelines than general shops. -Lower percentage of referral than compared to what was said. - Sample to low to make comparison for accurate advice or treatment
Goodman C, Kachur SP, Abdulla S, et al. **Retail supply of malaria-related drugs in rural Tanzania**: **Risks and opportunities.** *Trop Med Int Health*. 2004;9(6):655-663.	Situational Analysis: Interviews with structured questionnaire as a part of a census to identify retailers stocking malaria medicines. General retailers: N =675 Drug shops (N =43)	Structured questionnaire identifying types of drugs stocked and source of wholesale supply.	n/a	1/3 of general shops stocked antimalarial medicines; 98% of drug shops stocked antimalarial medicines Sources of medicines for drug shops: pharmacies or retailers Sources of medicines for general retailers: local general wholesalers

Very Few Studies on Unregulated Drug Vendors Exist

This present summarized literature review reveals that there are very few studies that exists looking at the role of unregulated drug vendors in malaria case-management for children under five in East Africa. My findings corroborated with a past review guided by RBM Case Management Working Group[43] to identify interventions across SSA dealing with medicine sellers, that indicated there were very few studies, specifically interventions, on medicines seller and malaria management throughout SSA. From this, it is not surprising that even fewer studies pertaining to unregulated drug vendors exists. There are no studies that exists outside of the intervention or situational analysis design. Summary of the select studies is presented in Table 1.1.

Studies From Kenya and Tanzania

Seven studies matched the inclusion criteria for studies involving unregulated drug vendors in Kenya and Tanzania. Studies in identified from both country contained drug shops that were licensed. General shops were an abundant source of medicine in these two countries; however, the laws of selling medicines in these general shops differed between the two countries. In Kenya, general shops fell under the supervision of the district public health office and the local council through annual health clearance and by the former and trade licensing by the latter.[57] Hence, studies involving general shops were included for Kenya only if their unlicensed status was mentioned explicitly.

For Tanzania, although large-scale accreditation interventions for medicine sellers have been set in place, many of these medicines sellers belong in the Part II Pharmacies categories that are licensed with a Pharmacy Board permit to sell OTC drugs as well as requiring a retailer with at

least 4.5 years of experience. So because of such an arrangement, only general stores appear to fall under the category of unregulated drug vendors. The laws pertaining to general shops suggests that general shop are not allowed to stock any drugs at all, but this is unclear.[54] General shops were included for Tanzania, because they were officially not licensed to sell medicines.[54] But in practice the government allowed the sale of OTC medicines, including CQ.[54]

Studies From Uganda

Many informal private providers exists in Uganda but there are very few studies that address the particular group of informal private providers that explicitly lack licensure status. From the literature search only two studies matched the inclusion criteria. Both studies had some sort of evaluation with respect to the licensure status of the informal private providers. In addition both studies included both formal and informal private provider, and therefore unregulated drug vendors, in the intervention as well. Although both studies share similarities in that they are both located in relatively close proximity in Central Uganda, contain the same predominate ethnic tribe, and the majority speaking the same language, it is very much different in comparison to Butaleja District, with respect to the mentioned items. These two studies conducted in Central Uganda may not be cross-culturally relevant. Generalizability or inferences from these studies may be limited.

Gaps in Knowledge

Thorough review of these studies revealed that overall there is a lack of studies on unregulated drug vendors with respect to malaria management for children under five in East Africa. Studies from Kenya or Tanzania primarily include general shops, which are not as prevalent of drug sources for Uganda. The few studies from in Uganda are further limited by the differences in

region, ethnicity, and language, and likely different cultural or religious perspectives regarding malaria and disease to make any bona fide inferences that is readily applicable to the current project. Furthermore, most of these studies were conducted prior to the ACTs as the first-line medicine. This demonstrates that studies that have been conducted prior to the time frame of the project do not reflect the most current treatment policy of using ACTs; hence, knowledge, attitudes, and practices of drug vendors reported for previous treatments may not be applicable to the my study.

1.6 Problem Statement

Providing prompt and adequate treatment in the management of malaria is one of the essential strategies in malaria control. It is clear that caregivers play a critical role in this strategy to improve health outcomes from children five and under suffering from malaria. While studies have noted appreciable improvements in caregivers recognizing the initial indicators of malaria and understanding the cause of malaria, there is still much more improvements to be made to ensure that a greater number of caregivers have the capacity to respond appropriately to a malaria episode. In rural areas in Uganda, the extensive malaria mortality in children five and under may be attributable to circumstances where the caregivers' capacity to make proper decisions in malaria management are lacking compounded by their overuse of unlicensed, unregulated drug vendors as a result of an inadequate public health system.

The literature reveals limited studies related to unlicensed, unregulated drug vendors in malaria management for children in Uganda. Even when extending the scope of literature search to include studies from East Africa (Kenya and Tanzania) notable differences such as laws, tribes,

languages, and geography from these two countries may limit the generalizabilty of findings to Uganda. Most importantly, there were no studies included in this literature review that were conducted in the ACT era. Finally, there were no studies conducted that exclusively addressed *unregulated* drug vendors that reveal information on their knowledge, attitudes, and practices relevant to current treatment guidelines.

This current study sought to provide a situational analysis to understand unregulated drug vendors' knowledge, attitudes, beliefs and practices related to malaria management. Understanding the important role of unregulated drug vendors in the treatment seeking process of caregivers underscores the rationale for the current study.

1.7 Research Study Objectives

The goal of this study is to conduct a systematic needs assessment of malaria management for young children in rural Butaleja District, Uganda with specific focus on the role of unregulated drug vendors in relation to the treatment seeking behaviours of caregivers of children age five and under. This study will help shed light on why a gap exists between availability of effective treatment measures and practice that leads to such extensive mortality, as well as generate new knowledge to fill in the existing knowledge gap related to unregulated drug vendors. Altogether, these insights will help inform the larger project to design a community intervention that is relevant and transformative.

1.7.1 Specific Objectives

1) To assess if drug vendors' malaria treatment practices align with the Uganda National malaria treatment guidelines.

2) To assess if drug vendors' malaria treatment practices are influenced by caregivers of children five and under.

3) To assess drug vendors' knowledge and beliefs about the cause, prevention, diagnosis, and treatment of malaria.

4) To assess drug vendors' experiences with previous training programs and their attitudes towards future training opportunities.

5) To assess drug vendors' experiences as a "health provider" within the community and how this experience influences their practice.

6) To assess drug vendors' experiences with the informal health support system (i.e. health providers from private or public health facilities).

Chapter 2: Methodology

Overview

The purpose of this chapter is to describe the methodology used in the current study on the knowledge, attitudes, beliefs and practices of unregulated drug vendors. This chapter will describe the study design and how it relates to the larger parent project on malaria management in Butaleja Distrct. In addition, it will provide details and considerations related to the sampling strategy used, the study site and population characteristics, training of research assistants, data collection in the field, data management, data analysis of the data collected and ethical considerations.

2.1 Study Design

The parent project titled *Reducing Malaria Related Child Mortality in Uganda: Defining a Sustainable Community Self-Management Program* is an exploratory project aimed to assess baseline malaria-related knowledge, attitudes and decision-making processes of households, drug vendors and decision makers as it related to the management of malaria for children five years and under, in Butaleja District.[4] The project consists of several qualitative and quantitative studies, and data from these multiple studies together will help define future public health interventions for improving care of young children in Butaleja, Uganda. This thesis work aims to inform the larger project by assessing unregulated drug vendors' knowledge, attitudes, beliefs and practices related to malaria management

A descriptive and qualitative study design was carried out from August 1 to September 10, 2011 to understand the knowledge, attitudes, beliefs, and practices of unregulated drug vendors in

malaria management. The current research was conducted to provide insights for a future community strategy for effective management of malaria for children. This formative research comprised of three components: a literature review, qualitative field research, and descriptive and qualitative data analysis. First, the literature review provided the necessary and relevant background information, context, and understanding of the current state of knowledge related to malaria management and drug vendors. This literature review was also an important step in guiding and developing the questions for the semi-structured interview (SSI) instrument used for data collection. The field research component employed the use of a semi-structured interview to examine the various research questions on unregulated drug vendors. Specifically, field data collection is a one interview per participant design through the use of semi-structured interviewing. Qualitative data analysis will uncover themes or patterns related to drug vendors knowledge, attitudes, beliefs and practices towards malaria management that will be used to triangulate with data collected from other instruments and techniques used in the parent project.

2.2 Sample

2.2.1 Study Setting

The study was conducted in Butaleja District, a predominantly rural district in Uganda. The district has a total land area of 644 sq. km. that consists of 10 Sub-Counties and two Town Councils.[4] Prior to its formation in July 2005, Buteleja District was Bunyole County until it separated from Tororo District to bring services closer to the people of Bunyole.[58] Briefly, the district in 2002 had a population size of 160,900 and is projected to increase to 206,200 people

within 41,240 households in 2010 with an annual growth rate of 3.3%.[58] Ethnic composition is predominantly the Banyole people (85%), a Bantu tribe, whose language is Lunyole. Other ethnic groups consists of: Jopadhola, the Bagisu, the Basorga, the Iteso, the Karimojong and the Bagwere. The district has an agrarian population of 77.9% and the population census in 2002 reports that 40% are living below poverty.[36]

The district has a sub-humid climate that experiences temperatures from 16.2 °C and 28.7 °C and rain fall with two peaks in the months of May to October.[36] This climate is conducive for a stable and high year-round malaria transmission.

Due to relatively high malaria transmission levels and is a hyper-endemic area with malaria, which contributes to 46% of outpatient visits and 23% of admissions at health facilities, Butaleja District was chosen as our study site.[4,59] In addition, malaria was ranked the highest cause of morbidity in 2007 to 2009.[58]

Like many other newer districts, it faces major health challenges related to an inadequately functioning health system. The public health infrastructure in Uganda is stratified by district, sub-district, sub-county, and parish. In Butaleja District, there is only 1 hospital located in Busolwe Town Council which serves at the level of the entire district as well as the sub-district level as well. Butaleja lacks a Health centre IV that is suppose to serve at the sub-district level. Recruitment of certain health providers has been a major challenge, especially that of doctors.[36]

2.2.2 Sample Population

Unregulated drug vendors will be operationally defined as drug-dispensing individuals who do not have formal licenses and training in the dispensing of anti-malarial medication. Seventy-five respondents offered consent to participate and were included in the study. In addition to dispensing antimalarial medication, two inclusion criteria were also required for participants to be included in the study: 1) respondents were licensed (therefore, unregulated) and 2) respondents must be present on site for at least 50 percent of the operating hours. The exclusion criteria is where the potential participant does not meet any of the two inclusions above.

2.2.3 Sampling

Participants for the drug vendor study were purposefully sampled from villages where the household survey component of parent project was conducted. The aim of the household surveys was to understanding treatment seeking practices and behaviors of caregivers with respect to malaria management for children; engaging drug vendors in the same locations where caregivers were likely to visit due to proximity generates relevant knowledge to the phenomenon of interest.[4,60] A step-wise purposive and random sampling process was used to recruit households to ensure representation of all 10 Sub-Counties and two Town Councils, the different village household sizes, common religious denominations, dominant tribes and proximity to a government health center.

A census was created to identify and enumerate the total number of drug vendors available to potentially recruit in the study. The census was completed by two of the project's research assistants and the project's field coordinator. They visited each of the villages within the parishes and met with the local village leaders to identify unregulated drug vendors within the community. Community members were informed about the research team's presence through this process. The completed census identified 88 potential drug vendor respondents.

Sampling priority was given to these villages where surveys had been conducted for the parent project; however, the census revealed that some of the villages where the survey had taken place did not have any drug vendors. In such cases, the interviewers were instructed to find the closest village containing potential respondents, seek consent, and administer the interviews. At the end, all potential drug vendors outside urban areas and Town Councils identified on the census were visited. A second visit was made to unavailable respondents during the first visit to achieve maximum recruitment. However, 13 respondents were ultimately excluded because they were not present during the visit or refused to participate. All of these shops were visited at least twice before they were excluded for sampling.

2.2.4 Methodological Considerations for Sampling

Whether or not a sampling strategy adequately addresses the research goals of the study will prove to have profound effect on the quality of the data.[61] There are several types of sampling strategies available in qualitative research as Coyne has summarized.[61] Purposeful sampling (or theoretical sampling as it is also known as in the literature) is one of the most common

sampling technique used in qualitative research and was suitable for the research study's purposes.[62]

Determining sample sizes in qualitative research requires consideration of several factors.[63] Generalizability of results is often sought after in quantitative research through random sampling and large sample sizes.[62] Qualitative studies, on the other hand, do not avoid smaller sample sizes nor is random sampling useful in most cases. Although in quantitative research rigor and randomized sampling often go hand-in-hand, it is often inappropriate for qualitative research as Marshal explains that[62]: 1) in qualitative studies, the characteristics under study are typically not known for the entire population; hence, a sample size calculation is moot; and 2) random sampling requires drawing from characteristics that are normally distributed, in which such characteristics as attitudes, values, and beliefs have not been demonstrated to be so. Next, using a large sample size to uncover complex human issues that are typically associated with quantitative research may not be productive nor efficient.[62]

In purposeful sampling, the researcher actively selects for participants that address the research questions or the aims of the study.[60,62] Coyne argues sampling strategy should be adaptable and responsive to real-world situations.[61] This point is particularly important when we take into consideration that recruitment is also based on willingness or availability of respondents to participate. Moreover, in the field, strategies to recruit participants from a sub-county would often require reconsideration and re-planning due to unexpected environmental conditions such as excessive downpour and floods, which made certain road inaccessible for days.

2.2.5 Methodological Considerations for Sample Size

Although, smaller sample sizes are generally more favoured upon in qualitative research, saturation of data, an important driving force in sample size selection, can be affected by several factors.[62] Morse explains several factors to consider for sample size and data saturation[63]: 1) the scope of the study; 2) the nature of the topic; 3); quality of the data; 4) study design; and 5) the use of shadowed data (participants discussing the experience of others).

Although my study recruited a rather large sample size of 75 participants, several of the factors described by Morse as listed above provide strong reasoning for this sample size. I will address factors 2-4 in favour of when a qualitative approach may require a larger sample size. Topics that are more difficult to discuss as it may be the case for a few of the questions or as in the case of being a drug vendor where their presence is illegal to begin, Morse recommends to increase the number of participants.[63] A lower "quality of data" should also require more participants to reach saturation.[63] As is the case for many drug vendors as we have discovered, but also mentioned in the literature, many drug vendors lack a adequate education and formal training. From initial reading the transcripts in field, the responses of some participants were convincing to have a larger sample size. From the study design stand point, my study only employed one interview per participant, rather than multiple interviews per participants as is the case for some qualitative studies, which generate a lot of "useable" data for one participant and, therefore, would not require as a large of a sample size overall. Morse makes a final

comment regarding the need for more participants (at least 30-60) when using semi-structured interviews and obtaining "relatively shallow data" per interview question.[63]

2.3 Data Collection

2.3.1 Instrument Development

The semi-structure interview instrument was developed by reviewing the literature to understand major concepts related childhood malaria management, caregiver treatment seeking behaviours, and drug vendors. The interview instrument was developed with the intent to aligned with the major themes and concepts of other instruments and techniques used in the parent project*;* hence, questions were designed to help inform (triangulate) with other instruments and techniques used in the parent project. Several experts on malaria were invited to participate in the parent project's instrument validation phase. Experts were emailed a letter requesting their expert opinion with face and content validity of the topics, themes, and questions considered in the SSI. All comments provided by the experts were collated and reviewed and appropriate modifications were made to the instruments.

2.3.2 Recruitment of Research Assistants

Six research assistants were recruited to conduct the SSI for the study on drug vendors. These research assistants were recruited as a part of the parent project. Since, much of the people in Butaleja District spoke Lunyole it was fitting to recruit research assistants who spoke the local language fluently Research assistants were all recruited locally in Butaleja. Recruitment was based on their verbal and written competency in both English and the local language, Lunyole.

All Research assistants obtained a level of education at the university level. They have all gained extensive field experience while engaged with other study components of the parent project prior to entering the training for the current study.

2.3.3 Training

The research assistants were debriefed about the study objectives and methodology in the early phase of the training. This initial phase of training took on a class-room based approach centred on a training manual I had created. The training manual outlined the objectives of the current study and describe how the study related to the parent project. Other topics of discussion in the manual included information related to drug vendors, data collection, and interviewer skills. The first two days of the formal classroom-setting training utilized the training manual to facilitate discussion on the topics of the manual.

The next phase of training involved having the research assistants familiarizing themselves with the questions from the interview guide. Each of the research assistants were asked to work in pairs to write and later describe out loud, in their own words, their personal interpretation of the questions and their thoughts on what the researcher's purpose and intent of each question was. The purpose and intent of the question were later revealed to the research assistants by myself as well as the PI to allow the research assistants to fully understand the questions with the researcher's goals in mind.

The remaining days of the formal training was focused on providing the research assistants hands-on interviewing experience. This was partly achieved through role-playing exercises

where one pair of research assistants performed a role-playing interview having one person conduct the interview and the other act as a drug vendor respondent in front of their peers and available senior research team members in attendance. The role of the research team was to identify strengths and weaknesses during the exercise so that not only those active in the role-playing exercise received constructive criticism, but also the remaining research assistants in attendance. Research assistants were asked to attentively take notes on the feedback provided to their peers. This exercise in a group setting was important because we knew that the research assistants varied in their interviewing skill sets and attentive monitoring on the development of their skills ensured a level of reliability. An emphasis on the feedback provided to RAs was placed on where each research assistants had opportunities to probe, since our data collection instrument allowed for questioning that was more open-ended. This role-playing exercise activity in a group setting continued until all research assistants had the opportunity to play the role of an interviewer. Afterwards, all role-playing pairs separated from the group and paired with one senior research team member that monitored the role-playing exercise more closely. This final exercise was meant for the research team members to provide any final comments and or criticisms for each of the research assistants before moving on to conducting a mock interview with invited guests.

A mock interview with an invited drug vendor was conducted after extensive training through role-playing exercises. The invited guest was a nurse that worked at the local pharmacy where training took place that had relevant experience in drug dispensing. This mock interview allowed the research assistants to hone their interviewing as well as their note-taking skills. This

exercise was particularly important for the research assistants to pay close attention to detail during the interview and consider where there were opportunities for probing of extra relevant information. This first mock interview was conducted in English and allowed all the local and Canadian senior research team members to provide any final comments on the each of the individual research assistant's interviewing abilities. The final mock interview was conducted in Lunyole with a drug vendor from the Town Council in Butaleja so as to provide the most realistic simulation of an interview. This final mock interview was conducted in Lunyole so only feedback provided by the local research team members was given. Research assistants deemed fit for field work activity was sent out to recruit and interview drug vendors.

2.3.4 Translation of Interview Instrument

Prior to the mock interviews, the research assistants, who now had extensive exposure to the questions and demonstrated their understanding of the purpose and intent of the question, were asked to translate the interview guide into the local language of Lunyole. The project's field coordinator who is fluent in the language lead this activity. Each participant wrote down their translation of each question in their own notebooks. Following that, a group discussion took place to discuss the translation of each question with field coordinator facilitating the process. As a group, a consensus agreement was reached for each question to be the most practical, accurate and culturally-senstive translation from English to Lunyole. In between each question, I participated in the translation process by further clarifying the purpose and intent of the questions. Other local members of the research team also joined in the discussion to

provide their input on the translation process. Each research assistant had a final copy of the translated question to use for practice as well as for their own records.

2.3.5 Quality Assurance for Training

Quality assurance was provided as several levels throughout the study. During the formal training, assessments of the research assistant's competency in describing the purpose and intent of each of the question was conducted before the PI and myself. Two assessments were made: pre- and post-training. The pre-training assessment was conducted before the PI and myself had revealed the researcher's purpose and intent of the question. This had given us the opportunity to see where the research assistants stood in terms of their interpretation of the questions and also given us a glance of their verbal abilities. This assessment was conducted by the principle investigator as well as myself. The scale was a 4 point Likert scale ranging from 0-3. A final post-training assessment was conducted prior to the last mock interview to gauge whether the research assistants were field-competent, required further training, or more suitable for other positions.

During the course of fieldwork, quality assurance was provided by the project's site manager and Medical Health Officer/District Liason, the field coordinator and the project's behavioral scientist from Makerere University. Each of these individuals played a part in listening to the audio recordings of the completed interview as well as read through the Lunyole-to-English translated transcripts thoroughly. These local research team members worked very closely with each of the research assistants and provided them with feedback based on the accuracy and completeness of the translation. I would meet with these research members to discuss their

translating and transcribing abilities. Research assistants who demonstrated competence in translating and transcribing were given the approval by these research members to continue their field work and their work was examined with less frequency in order to provide attention to those whose translating and transcribing abilities required a bit more consideration. As research assistants continued to improve more and more in their translating and transcribing abilities, the local research team members provided periodic spot checks of randomly selected interview recordings and transcripts to check for quality. I read through the translated English transcripts to examine the research assistants' competency in interviewing. Moreover, I carefully read the interviews after they had been completed to identify areas of weakness, particularly in probing, and also to identify idiosyncratic or confusing dialogue. I brought any issues to the attention of the team members as well as the research assistants to prevent any problems from continuing. In addition, during the reading of the transcripts I would take down self-reflective notes on the progress of the research assistants, the interview dynamics, and anything noteworthy to explore further in subsequent data analysis.

Field data collection was undertaken in Butaleja District, Uganda from August 5 to September 10, 2011. The field coordinator and the six research assistants played an important role in data collection. The role of the field coordinator was to communicate with the local village leaders either by phone or in person to gain consent for research to be conducted in their villages. The village leader would identify various drug vendors within his village and inform these potential participants of our team's intention. This process was essential in confirming the number of potential respondents that can be purposively sampled, which was organized into a census that

specified how many potential respondents were available in each parish and village. The census was used as a sampling frame and to plan the day-to-day scheduling of where research assistants would be sent out to recruit participants. Once the research assistants had located their potential participant, the research assistant obtained verbal and written consent process from the participant after thoroughly explaining the purpose of the research and the voluntary nature of their willingness to participate (see consent form in Appendix C).

Interviews would generally take place immediately after the research assistants obtained consent. As the interviews took place, research assistants took field notes to write down unique information or supplemental details that might have been useful during the translation and transcription process later on. The research assistant asked questions according to the interview guide and probed where opportunities were available. Certain questions were more open-ended and allowed for much more exploration. Most of the time the interviews took place inside the drug shop of the respondent where both the research and respondent would sit on a stool with the respondent behind the counter. All interviews were recorded with an audio recorder, which would be placed on a the table or a nearby stool. Drug shops would often be located in busy areas. Interruptions were common and generally included incoming customers and environment noise (e.g. nearby conversations, motorcycles, and animals). Research assistants would often have to continue the interview after interruptions had passed. Interviews would often resume immediately after the interruptions, but there were occasions that required the interview being rescheduled or relocated. Some interviews took place in the comfort of the respondent's home. The duration of the interviews generally ranged from 1 hour

to 2.5 hours depending on the flow and dynamics of the interview as well as possible delays due to interruptions. Respondents were given a small token of appreciation in the form of a bag after interviews were completed. Upon completion of the interview, research assistants were instructed to complete a series of self-reflection questions as well as include any additional information for their field notes.

On average, each research assistant was able to obtain two interviews per day usually starting from early morning to mid-afternoon. Afterwards, the research assistants would return to the research office at Butaleja Headquarters where I would transfer the electronic audio files from the audio recorder onto a laptop. They would continue to translate and transcribe the audio recordings into a note book for the remaining part of the work day and carry over incomplete work into the following day. At the end of the work day (usually 6 pm or so), note books, audio recorders, and all field work equipments were collected and placed in a locked cupboard, in which only I had access to. At the beginning of the next work day I would briefly discuss with the research assistants on issues related to transcripts I have read the previous night for quality assurance. Following this, I would help organize and prepare the research assistants that needed to be out in the field or help organize and prepare those that remained in the office and needed to complete the transcription process.

Completed transcripts and all field work documents were scanned and converted to portable document file documents. All of these files including audio recording files were saved on a password protected computer. Document files were checked for completeness and to ensure they were not corrupted. Only the consent forms were brought back to Canada. The physical

hard-copy transcripts were locked in a secure storage facility at Makerere University in Kampala, Uganda.

2.4 Methodological Considerations for Qualitative Research

2.4.1 Rigor and Trustworthiness

Rigor is a concept that is central to the work of all research paradigms and methodology. Quantitative and qualitative research paradigms often run into disagreement when discussing and assessing the concept of rigor. In quantitative research (or rationalistic inquiry) that is more or less synonymous with the positivist paradigm, reliability and validity form the core of rigor. However, qualitative research (or naturalistic inquiry), on the other hand, have faced opposition in describing its "rigor" with the terms like reliability and validity.[64,65] The opposition argue that reliability and validity are inappropriate terms to address naturalistic inquiry.[64-66] Naturally, many researchers that follow the naturalistic inquiry paradigm has pushed for the recasting of various terms employed in quantitative inquiry to describe rigor that is more suitable for naturalistic or qualitative inquiry. Guba has reframed many of the positivistic terms such as internal validity, external validity, generalizability, and objectivity into its qualitative equivalents: credibility, transferability, dependability, and confirmability, respectively.[65] Guba has been at the fore front in her efforts to establish criteria for rigor that is more suitable for qualitative inquiry[65]; much of her criteria has been firmly established in practically all subsequent attempts to describe qualitative rigor. In addition, while rigor is still the rightful

word to describe any research paradigms or methodology, trustworthiness has become the equivalent term in describing qualitative research.

In this section, I will describe the trustworthiness of my research by addressing my attempts to ensure credibility, transferability, dependability and conformability of this research project. I will discuss the methodological considerations used to establish the trustworthiness of my research below.

2.4.2 Credibility

In the rationalistic paradigm, internal validity of the research tackles the "truth value" of research data, in which the phenomenon to be measured or tested returns data that truly measures or tests what was initially intended.[65] In essence this provides researchers the confidence in the truth of the findings. Guba explains that the assumption to quantitative stand point is that there is only one tangible reality in the findings, but for naturalistic inquiry it is not restricted by this assumption and in fact, there could be multiple realities to the phenomenon in question; hence, credibility replaces internal validity in the truth of the findings.[65] A credible qualitative research study, then, becomes one that accurately describes or interprets the human experiences that varies so much depending on a variety of physical, social-cultural and psychological factors.[66]

Credibility is by far one of the most important aspects to consider in establishing trustworthiness.[65] I will describe some of the steps taken to ensure credibility in my study that

aligns with provisions made by Guba and additional provisions that have been laid out since Guba's inception of criteria for trustworthiness in qualitative inquiry. [65]

A thorough literature review has been undertaken prior to the start of the study to identify related projects and methodologies that may inform my current study. This aligns with two provisions mentioned by Shenton[64] that describes adoption of appropriate well established research methods and examination of previous research findings to be conducive in improving credibility.

Guba mentions prolonged engagement with the site to make adjustments and create an understanding and trust with the locals.[65] While I did not have opportunities to talk with the participants (the drug vendors) due to a language barrier, I had ample opportunity to familiarize myself with the local research team during my time training and directing the research assistants as well as my time working with the senior site and field manager for quality assurance of data and daily debriefing for smooth operation of daily activities. The site manager, field coordinator, or any of the research assistants were excellent sources of information about the local culture that were indispensable, especially during my time reviewing the transcribed data where questions would often come up that required clarifications. I often sought their etic (insider) knowledge and expertise to ensure that my emic (outsider) perspectives did not impose an inaccurate interpretation to the data. My seven weeks working with local research team has allowed me to develop an adequate understanding of the prevailing culture behind malaria treatment in Butaleja to ensure that my interpretation, although nonetheless still influenced by my outsider's perspective, will still accurately depict

the reality of malaria management in this rural district. During this time, I have kept a journal to record my reflective commentary regarding the research assistants, the day-to-day events of field work, and my initial impressions of the data collection. Such note-taking and journal keeping have also been kept intact during my data analysis phase where computer assisted qualitative analysis program has allowed me to keep memos and annotations throughout the analysis process.

Triangulation is one provision that Guba has described in being essential in ensuring credibility.[65] The larger research project employs various techniques such as key informant interviews, surveys, focus groups, and case studies to gain a better understanding an understanding on household decision making. The findings from these strategies will in turn corroborate or reveal disagreements between my study and parts of the larger study. The limitations or gaps from any one method or participant will be filled or complemented by data from the current study on drug vendors and vice versa to ensure a more accurate depiction of community treatment seeking behaviors.

Shenton suggests iterative questioning to uncover lies on inconsistencies in the participants responses to improve upon credibility.[64] Several questions related to treatment practices within the semi-structured interview guide employed this strategy where more than one interview question might have addressed the same phenomenon. For example several questions asked about the antimalarial medicines sold to caregivers for their children with malaria employed this "safety-measure" iterative questioning. Any discrepancies that are revealed in the analysis will allow for me to offer explanations and further discussions on the discrepancies.

Further adding credibility to the study is frequent debriefing sessions with the research team.[64] I have worked closely with my supervisor throughout the process of training and field work. In addition, I have held periodic meetings with one of my supervisor and the some committee members to discuss about the progress of my work and to obtain advice regarding data analysis.

Guba considers member checking (confirmation of results from respondents) as one of the most important provisions for establishing the credibility criterion.[65] Although, due to time constraints and other limitations, member checking at the end of data collection in the fashion of returning to the original participant was not permitted; instead, "on the spot" member checking was a provision that was implemented. That is, the research assistants were instructed to ask for reclarifcation of statements particularly topics of interest I have identified during my reviewing of the transcripts of previous interviews. I would debrief the research assistants on any particular question or conversation topics that would benefit from having more clarity. Research assistants would very often prompt the respondents for their thoughts on the responses of other drug vendors after the drug vendors have provided their personal response for a particular question. Research assistants would introduce the opinions and responses of other drug vendors previously visited and then ask for the respondents' thoughts on the responses of other drug vendors.

2.4.3 Transferability

Transferability relates to the applicability of the research study and is parallel to external validity or generalizablity within the rationalistic paradigm.[65] Naturalistic inquirers promulgate

the idea that generalizablity for naturalistic inquiry is not achievable due to context-specific limitations.[64-66] Guba and Lincoln suggest that what is important for the researcher to establish applicability of the study is to provide sufficient descriptive data at the outset.[67] Readers themselves will use such contextual information to make decisions as to whether findings are transferable to other studies. To establish the criterion of transferability in my study, I have outlined all the contextual information in my methods section regarding the research team, the training, the sampling, the participants, and the entire data collection process including instruments used and the time frame of the study. In addition, the sampling process allowed for us to maximize the range of information that allows for better applicability to the district as a whole. Interviews spanned across multiple sub-counties and parishes providing perspectives that better reflects the district.

2.4.4 Dependability

Reliability is one of the important aspects to establish consistency in rationalistic inquiry; in naturalistic inquiry, dependability is the parallel that takes into consideration that very little can be controlled in naturalistic settings, social phenomena are extremely context-dependent, and the humans are the primary instruments for data collection.[65] Dependability of a qualitative study is to a great extent established by enforcing the credibility and transferability criterion. What is pertinent in establishing dependability is to provide dense contextual and methodological information. Providing an "audit trail" whereby other readers can follow the step-by-step actions that the researcher has taken enhances the dependability of the study. As described previously, I have outlined and described all the contextual information that has

informed my decisions in field. With regards to data analysis, I have devised a codebook that includes description and examples of all codes to allow others coders to use. An inter-rater reliability coefficient was used to calculate the agreement between myself and another research team member to ensure that my coding process was reliable.

2.4.5 Confirmability

While objectivity is essential establishing neutrality, that is freedom from bias in the rationalistic paradigm, it is impossible to impose absolute neutrality in naturalistic inquiry as it requires the researcher to take part of the social phenomenon under scrutiny. Guba instead uses confirmability to describe the emphasis based on the confirmability of the data rather than on the neutrality or objectivity of the methods imposed upon the study by the researcher.[65] Again, actions to establish the other criterions are applicable here. It is recommended that triangulation and the use of an "audit trail".[65] The former is to reduce investigator bias by introducing data obtained from various techniques or data sources and the audit trail provides other "auditors" to scrutinize the decisions made throughout the process. I have described both aspects in previous sections, which equally applies to the confirmability criterion.

2.5 Data Analysis

Thematic analysis was employed for the analysis of the data obtained from semi-structured interviews with drug vendors across Butaleja. Braun and Clarke describes this method for "identifying, analysing, and reporting patterns (themes) within data".[68] Themes are patterned responses from the data set that have a meaning and most importantly relate back to the

research question(s).[68] It is important to note that the researcher takes an active role in identifying and interpreting these patterns or themes and that they do not simply "emerge" from the data passively.[68] Thematic analysis is used commonly in a variety of qualitative methodology, due to its flexibility in that it is not necessarily attached to any particular theoretical framework or epistemological stance.[68] The aim of my data analysis was to provide a rich thematic description of the data set that accounts for the content of the entire data set. Specific themes may have more emphasis in the discussion, but take into consideration of all themes identified. In addition, the analysis will primarily be a top-down, deductive (theoretical) approach guided by a coding frame developed in alignment with the research questions. However, in the coding process, research questions can evolve to produce data-driven themes. While, the data set will be guided primarily by a deductive approach, a data-driven, inductive approach will be used where necessary. Certain questions within the interview guide will naturally benefit from one approach over the other. I will describe the development of a coding frame and the coding process in further detail below. The process of data analysis through thematic analysis I have used is guided by the framework presented by Braun and Clarke, which follows a 6-phase process[68]: 1) familiarizing yourself with your data; 2) generating initial codes; 3) searching for themes; 4) reviewing themes; 5) defining and naming themes; and 6) producing the report.

The initial phase of familiarizing myself to the data is not exclusive to only thematic analysis, but it is an activity common and useful in all areas of qualitative research. The verbal data recorded onto audio recorders were transcribed by the research assistants who conducted the

interview. The recorded interviews were translated and transcribed verbatim by the research assistants soon after completing the interviews. Their field notes that included verbal and non-verbal information were used during the transcribing process to include supplemental information in the transcribed interviews. I had the opportunity to familiarize myself with the data soon after audio recordings were transcribed. Immediately, I would examine the written documents for responses that needed more clarification and areas of weakness of the interviewer, particularly areas where further probing could have produced richer responses for a particular question. During this time, I would make notes either alongside the written document or on a separate field note journal to note down early ideas as a reminder for later analytic stages. It was decided that this physical written transcription documents would remain in Uganda, so all transcribed documents were scanned and stored in a secure cloud-based storage service. When I returned from Uganda, I transformed these scanned written documents into electronic documents with the use of a voice recognition software (Dragon Naturally Speaking® 11).[69] During this process, I again had to re-read and dictate word-by-word the written transcribed content to create the electronic version on a word document. It is during this stage where I also entered my personal comments that reflected my initial interpretive process of the data.

The second phase was to generate initial codes.[68] The initial set of codes was very much theory-driven, in fact, guided by the interview questions to code the entire data set. It was decided that these codes be developed from at least 10% of the data, which resulted in me examining 8 interviews thoroughly to identify and define the initial set of codes. This initial process was

performed manually using highlighters and coloured pens to extract information line-by-line to distinguish responses that answered the interview questions directly from information that was extraneous but still provided insight. This process is coding is what is known as opening coding in Grounded Theory.[70] The development of a codebook or coding frame was the next step. The codes identified in the manual coding process was organized in a table format to define each of the initial set of codes and also to provide an example or instance of the code. This purpose of the codebook was to ensure a level of consistency in coding the subsequent interviews. Alongside in the development of this codebook, I have also entered reflective notes relating to the responses and the codes to aid in later theory development. As a novice research, I had periodic meetings with my supervisor as well as one of my committee members to review as well as deliberate over the codes that I had identified and defined.

The use of a computer assisted qualitative data analysis software was introduced after the development of the initial set of codes and the codebook. I used Nvivo 9® qualitative analysis software to help in the analysis of my data.[71] Prior to importing the data, the interview documents required specific formatting to the headings to perform auto-coding functions available in Nvivo®. The auto-coding function allowed the interview text to be separated on question-by-question (and also sub-question) basis, which allowed for an extra level of analysis based on questions. Within Nvivo®, coding of the text continued using the initial set of codes as the coding frame to apply to the whole data set. Coding of the text was supplemented by written notes from a notebook as well as memos and annotations within the program to record any thoughts or ideas regarding potential patterns or themes identified. The final codebook

identifies all the (theory-driven) codes developed initially as well as the (data-driven) codes developed during the coding process.

The later phases of analysis involved examining these codes to identify broader levels of patterns or themes that exist. This involves searching for the themes, reviewing the themes, and defining and naming the themes before producing a report where all themes and relationships have been worked out.[68]

2.6 Ethical Consideration

Permission for the current Master's level research project was already received from the research proposal as submitted and approved under the project title: *Reducing Malaria Related Child Mortality in Uganda: Defining a Sustainable Community Self-Management Program* with Dr. Rosemin Kassam as the Primary investigator. The primary ethical considerations involving human participants are privacy, informed consent, and confidentiality. Respondents was detailed about the research goals, the voluntary nature of their participation, the confidentiality of information gathered, and their rights to privacy. Participants who agreed to participate would be asked to sign a consent form prior to their participation (see Appendix C for consent form).

Chapter 3: Results

Overview

In this study I explored drug vendors' knowledge, attitudes, beliefs, and practices related to malaria management in the District of Butaleja Uganda. Findings from this study revealed whether drug vendors treatment practices were aligned with that of the national malaria treatment guidelines to achieve a successful outcome in the treatment of malaria for children five years and under. In addition, findings related to their knowledge, attitudes, and beliefs in relation to malaria management are presented here to provide a more complete understanding in their overall management of malaria. These unregulated drug vendors play an essential role in the delivery of health services in resource-limited, rural settings such as that of Butaleja.

The findings from this study are presented in a quantitative and qualitative manner. Descriptive (quantitative) information were reported as frequencies and proportions of respondents and/or responses. Qualitative information elicited from open-ended questioning have been thematically analyzed and presented with exemplary quotations for dominant themes and sub-themes. While this study primarily employs qualitative methodology in the use of a semi-structured interview style, frequencies and proportions have been commonly used throughout to summarize data in order to gain a better perspective of our sample population taken as whole and its implications for generalizability. Moreover, frequencies and proportions helped compliment the important qualitative data to understand the prevalence of certain perspectives captured by themes.

In this chapter, I begin with brief information on the data obtained from the census and characteristics of the sample population, which will be followed by the findings related to malaria management that have been organized in the order of the research objectives presented earlier.

3.1 Census

The table below summarizes the information gathered from the census, which identified various types of health services offered within the district. Formal health services are offered by public and private health facilities and private regulated drug outlets. Informal health services can be obtained through unregulated drug vendors.

Table 3.1 - Census of Various Health Services in Butaleja District

Type of Health Services	Responses (n =125)	
	Frequency	Percent (n = 124)
Public Health Facilities		
Hospital	1	0.8
Community Health Centre 4	0	0.0
Community Health Centre 3	10	8.1
Community Health Centre 2	5	4.0
Private Health Facility		
Private Clinic	2	1.6
Private Regulated Drug Outlet		
Pharmacies	0	0.0
Regulated Drug shop	18	14.5
Unregulated Drug Outlets		
Drug Shop	83	66.9
Mobile Vendor	3	2.4
General Shop	1	0.8
Market Stall	1	0.8

3.2 Characteristics of Sample

3.2.1 Gender and Education

Unregulated drug vendors in the study were predominantly female (65.3%). Most of the drug vendors (70.7%) have reported receiving some sort education at the post-secondary level. Eight percent of respondents reported secondary school as their highest level of education and 8.0% reported they did not complete secondary school. At the level of primary education, 2.7% of the respondents had completed only primary school and another 4.0 % reported not completing primary education. Only one respondent did not have any education. See table 3.2 for further information.

Table 2.2 - Characteristics of Sample Population

Characteristic	Respondents (n=75)	
	Frequency	Percent
Gender		
Female	49	65.3
Male	26	34.7
Type of structure:		
Drug Shop	70	93.3
Mobile vendor	3	4.0
Market vendor	1	1.3
General Store	1	1.3
Affiliation with Drug Outlet		
Owner	42	56.0
Shop attendant	33	44.0
Education		
Post secondary (vocational/technical training)[a]	53	70.7
Secondary incomplete	6	8.0
Secondary complete	6	8.0
Primary complete	2	2.7
Primary incomplete	3	4.0
No Education	1	1.3

[a] Training in nursing aide/assistant program was the commonly reported training received.

3.2.2 Information Related to Business Operations of Drug Outlets

Information was gathered on drug vendors related to their business operations: including the hours and days of operation, the number of staff, their affiliation with the shop as either an owner or a shop attendant, the type of unregulated drug vendors (i.e. type of outlet drug vendors operated in), what they sell in addition to drugs, and their availability after hours. With regards to the type of drug outlets, a majority of our drug vendors (93.3%) worked in a drug shop structure (4-walled, closed structure); 4 % were mobile vendors (selling medicines from vehicles or bicycle); 1.3% sold medicines in a general store; and 1.3% sold medicines in market stalls during weekly markets. In addition, medicines were reported to be the primary merchandise sold in their business with 94.7% reported selling medicines only, 2.7% reported selling medicines and other goods; and 2.6% reported selling food in addition to medicines. Most drug vendors were owners of the business (56.0%) compared to 44.0% of the drug vendors who operated as shop attendants. The duration that these drug vendors have worked in their business ranged from 3 weeks to 30 years. The number of hours of operation per day ranged from 3-15 hours with an average of 10.9 hours (± 2.5; N=75). Their business typically opened for 7 days of the week (avg: 6.5 hours (± 0.7); range 3-7; N=75). The number of other staff members that worked in the store ranged from 0-3 person (average: 0.65 (± 0.7). Three quarters of the respondents (74.7%) reported they were available after hours of closing their business.

3.2.3 Location of Drug Vendors

Table 3.3 summarizes the Sub-Counties where drug vendors were recruited from the study. Figure 3.1 below contains a map of Butaleja to provide a visual illustration of the distribution of recruited respondents throughout the district.

Table 3.3 – Distribution of Participants by Sub-County

Subcounties	Respondents (n=75)	
	Frequency	Percent (n=75)
Bunyole West		
Budumba	9	12.0
Busaba	18	24.0
Busabi	15	20.0
Busolwe	4	5.3
Busolwe Town Council	3	4.0
Bunyole Central		
Butaleja	2	2.7
Butaleja Town Council	3	4.0
Bunyole East		
Kachonga	2	2.7
Himutu	2	2.7
Mazimasa	4	5.3
Nawanjofu	6	8.0
Naweyo	7	9.3
TOTAL	75	100.0

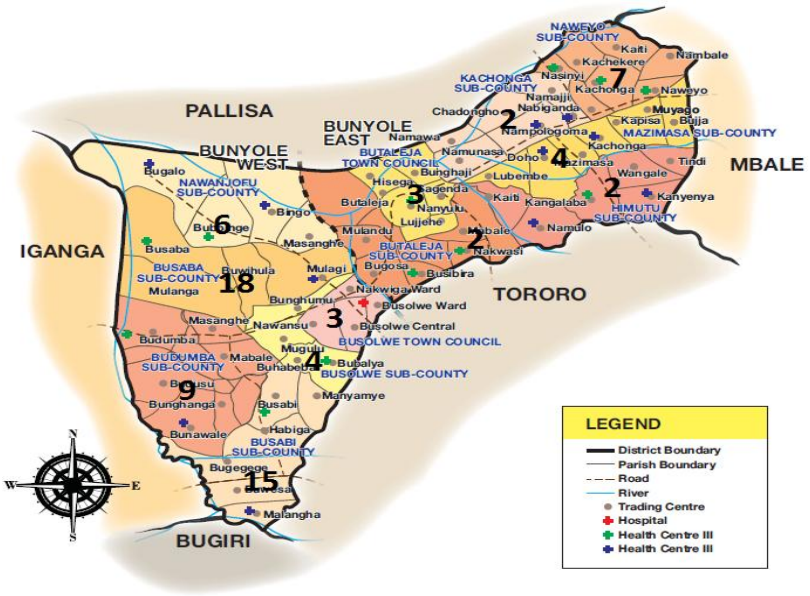

Figure 2.1 - Map of Butaleja District - Distribution of Sample by Sub-County

3.3 Findings Related to Research Objectives

3.3.1 To Assess if Drug Vendors' Malaria Treatment Practices Align with the Uganda National Malaria Treatment Guidelines

The malaria treatment practices of a majority of the unregulated drug vendors in Butaleja District, did not align with the Uganda National Malaria Treatment Guideline. To assess whether drug vendors were aligned with the national malaria treatment guideline, a series of questions were asked to determine what was recommended and what was sold as a treatment for uncomplicated malaria presented in a child of five years of age and under. The type of antimalarial medicine that has been recommended or sold has been categorized as either: 1) a first-line antimalarial medicine, 2) a second-line antimalarial medicine, 3) a non-guideline recommended antimalarial medicine or 4) a non-antimalarial medicine. The former two

categories are those that the government recommends for treatment of malaria. The latter categories contain antimalarial medicines that are not recommend under the treatment guideline or medicines that were not antimalarials at all. Non-guideline recommended antimalarial medicines included chloroquine, sulphadoxine-pyrimethamine, quinine injection, artemether, and comaquine amongst others. These four categorical recommendations for treatment of uncomplicated malaria are depicted in Figure 3.2.

Recommendations For Treatment of Uncomplicated Malaria

Drug vendors were asked what malaria medicines they would recommend for children five and under for the treatment of uncomplicated malaria. Figure 3.2 below summarizes their reported recommendations in a Venn diagram. This diagram illustrates the proportion of drug vendors that stated they would recommend antimalarial medicine(s) versus those who would recommended medicines that were not antimalarial medicines (circles 1-3 vs. circle 4). A large proportion of drug vendors (88.0%) recommended antimalarial medicines for the treatment of a child five years of age and under (circles 1-3). Partitions within circle 1 contains drug vendors that stated they would recommend a first-line antimalarial medicine (ACT); circle 2 contains drug vendors that stated they would recommend a second-line antimalarial medicine (oral quinine); and circle 3 contains drug vendors that would recommend a non-guideline recommended antimalarial medicine.

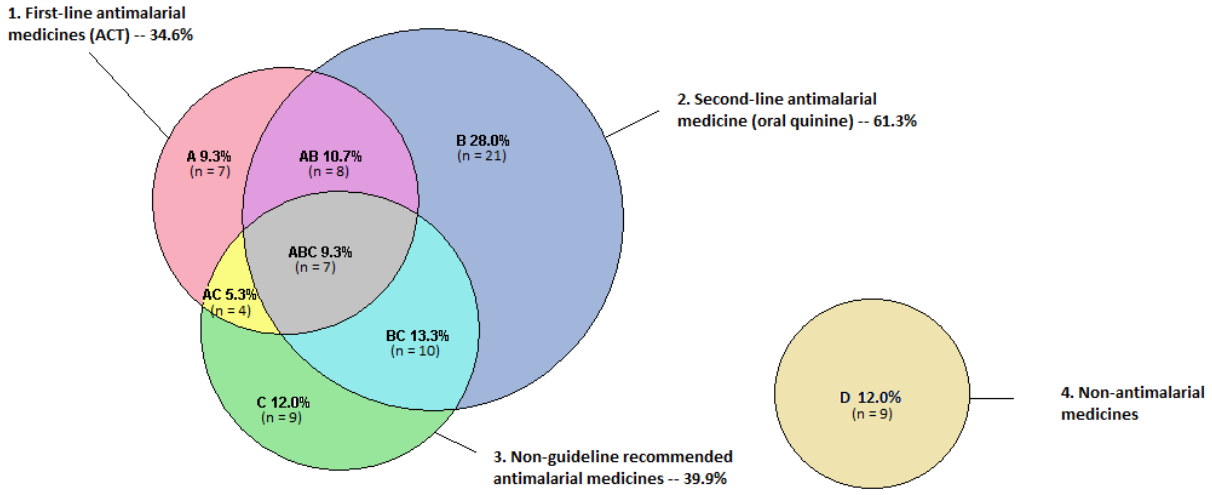

Figure 3.2 - Proportion of Drug Vendors That Recommended Antimalarial Medicines vs. Drug Vendors that Recommended Non-Antimalarial Medicines. Overlaps between the 3 major circles indicate multiple responses provided indicating recommendations of *either* of the overlapping antimalarial medicines. Overlaps do not indicate a combination of 2 or more antimalarials.

Some drug vendors provided multiple responses when asked what they would recommend for treatment of uncomplicated malaria in children five and under. Overlaps between circles demonstrate multiple options recommended. For example, in partition AB, drug vendors stated they would recommend an ACT or oral quinine. Overlaps do not imply the recommendation of both of antimalarials at once (except CQ and SP combination), instead it represents that drug vendors have more than one option they would recommend and were indiscriminate in their recommendations between antimalarial medicines. Important points to take from this diagram are those that always recommend an ACT, sometimes recommended an ACT but indiscriminate between other antimalarials, never recommended an ACT, always recommended the second-line treatment (oral quinine), and never recommended antimalarial medicines at all. Each of these mentioned groups are part of separate partitions.

Drug Vendors Who Always Recommended ACTs

Under 10 percent of drug vendors could be categorized as those who always recommended an ACT. In partition A of figure 3.2, these 9.3% of drug vendors stated they would recommend ACT as the medicine for treating malaria in children five and under, a recommendation that adheres to the national treatment guidelines. These drug vendors did not recommend any other antimalarial medicines. This group (partition A) is part of a larger proportion of drug vendors (34.6%) that mentioned they would recommend ACT medicine (circle 1 in figure 3.2) but the remaining 25.3% (partition AB, AC, and ABC) also had other options for recommendation besides ACT suggesting they were indiscriminate in recommending between ACT and other antimalarial medicines, which contradicts the guideline.

Drug Vendors Who Sometimes Recommended ACTs

Those who were categorized as drug vendors who sometimes recommended ACTs, mentioned other (antimalarial) options they would also recommend that included the second-line medicine and/or non-guideline recommended antimalarial medicines. This group of drug vendors who would sometimes recommend ACT (25.3%) is divided into overlaps in the Venn diagram where respondents stated they would also recommend: 1) a second-line treatment of oral quinine (10.7%; partition AB), 2) a non-guideline recommended antimalarial medicine (5.3%; partition AC) and 3) any of the first-, second-line, or non-guideline recommended antimalarial medicine (9.3%; partition ABC) in addition to ACTs for treatment of uncomplicated malaria. The drug vendors that would sometimes recommend a first-line ACT or a second-line treatment in oral quinine (10.7%) suggests a partial adherence to the national treatment guidelines.

The drug vendors who did not recommend an ACT at all (partitions B, BC, C) contributed to the remaining 53.4% of all respondents. This group is divided into three types of recommendations: 1) single treatment option of oral quinine (partition B) and 2) single treatment option of a non-guideline recommended antimalarial medicine (partition C) and 3) multiple treatment options of oral quinine or a non-guideline recommended antimalarial medicine (partition BC). Partition B describes drug vendors that only use the second-line option (oral quinine) as the main option for treatment.

Drug Vendors Who Recommended Incorrect Medicines

A large proportion of drug vendors (39.9%) stated they would recommend a non-guideline recommended antimalarial medicine (circle 3). The 39.9% is divided into 18.7% of drug vendors that reported recommending chloroquine. Recommendation of any of the medicines within this category (circle 3) was considered a lack of adherence to national treatment guidelines for malaria.

Twelve percent of drug vendors did not recommend any antimalarials at all (circle 4). Instead this group of drug vendors recommend either antipyretics, cough and cold preparations, and/or antibiotics.

Drug Vendors Who Practiced Polypharmacy

Findings revealed that polypharmacy was a common practice in this study. Approximately half of drug vendors (50.7%) recommended additional non-antimalarial medicines combined with antimalarial medicines as a part of treatment. Figure 3.3 illustrates the various combinations of antimalarial medicines and non-antimalarial medicines recommendation together as treatment. Red boxes juxtaposed on each partition of circles 1 to 3 from the Venn diagram of the previous

figure, indicate the types of non-antimalarials medicines that have been combined with antimalarial medicines. The box juxtaposed on circle 4 shows the non-antimalarial medicine combinations recommended that were not combined with a partner antimalarial medicine.

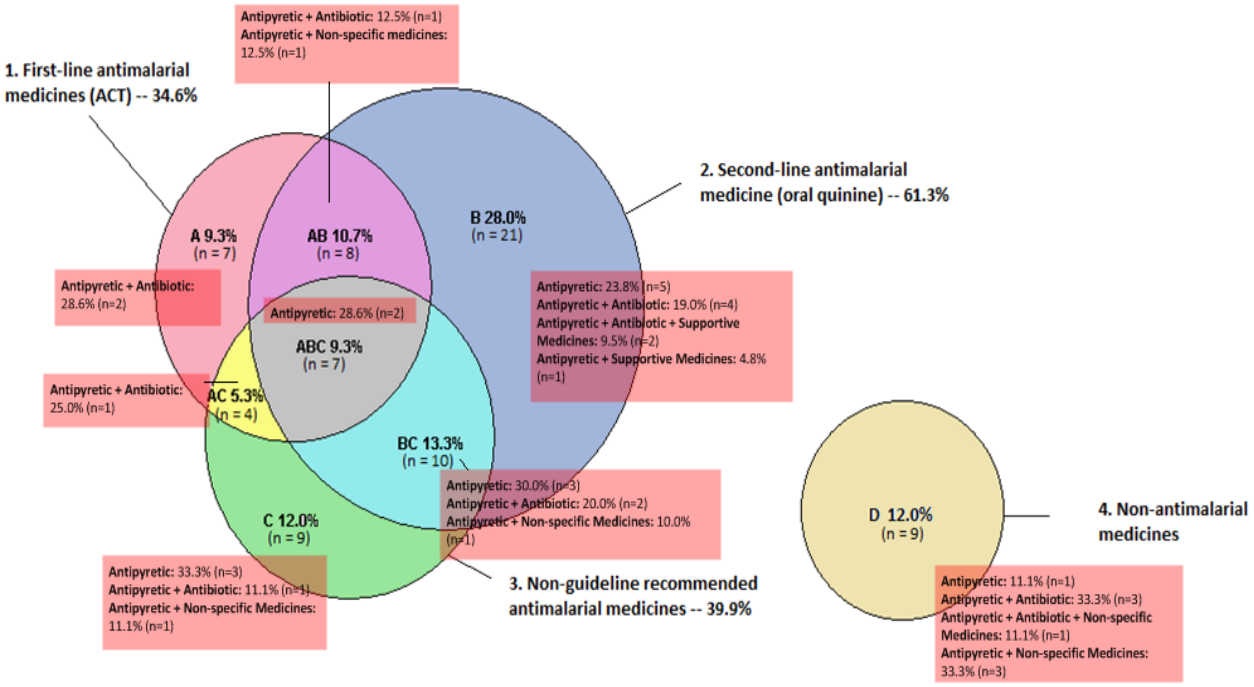

Figure 3.3 - Different Combinations of Antimalarial and Non-Antimalarial Medicines Recommended for Treatment of Malaria. Polypharmacy is illustrated through juxtaposition of non-antimalarial medicines (red boxes) over malaria medicines (circles). Different combinations of both medicines can be seen. Percentages for non-antimalarial medicines were calculated based on the total number for each partition.

The 50.7% of drug vendors that practiced polypharmacy combined an antipyretic with an antimalarial medicine. 13.3% combined an antimalarial medicine with more than one antipyretic. The 50.7% of drug vendors can be divided into four different types of recommendations: 1) an antipyretic alone (20.0%); 2) antipyretic + antibiotic (17.3%); 3) antipyretic + antibiotic + non-specific medicines for signs and symptoms (4.0%); and 4) antipyretic + non-specific medicines for signs and symptoms (9.3%).

Taking in consideration of irrational polypharmacy, the proportion of drug vendors that strictly adhered to treatment guidelines decreased. The percent of responds who adhered to the Uganda National Treatment Guideline decreased to 6.7%. Irrational polypharmacy in this context of this study was the recommendation of medicines combined with antimalarial medicines that are not indicated by the treatment guideline. Recommendations with antipyretics and anticonvulsants were not considered irrational polypharmacy as they have been indicated for severe malaria where temperature is greater than 38.5 °C and when convulsions were present. Although these recommendations have been indicated specifically for severe malaria, this study did not specifically separate signs or symptoms between simple and severe malaria during the interview to avoid imposing bias. Recommendation with antibiotics for the treatment of malaria have been deemed irrational polypharmacy.

Medicines Sold for Treatment of Uncomplicated Malaria

A variety of medicines were reported to be sold as antimalarial medicines including actual antimalarial medicines and non-antimalarial medicines that drug vendors perceived as "malaria medicines" that included antipyretics, antibiotics, iron-supplements, anticonvulsants, nutritional supplements, cough and cold preparations, amongst others. Table 3.4 below, lists all the medicines provided as an inventory of Western malaria medicines stocked in their shops. In this list, the most prevalent medicines stocked were various dosage forms of quinine and paracetamol with greater than 50% of respondents mentioning each of these medicines. 90.7% of drug vendors stocked the second-line antimalarial (oral quinine). Sulphadoxine-Pyrimethamine (SP) and chloroquine (CQ) were amongst the most reported medicines sold by

41.3% and 32.0%, respectively. Altogether, 26.7% of drug vendors stocked ACTs (either AL, DHA-PPQ, or AS-AQ).

Table 3.4 - 'Malaria Medicines' Sold by Drug Vendors				
Question: What varieties of Western malaria medicines do you sell in your shop?[b]				
Medicine Sold (n=75)	**Responses (n=525)**		**Respondents (n=75)**	
	Freq.	**Percent**	**Freq.**	**Percent**
Antimalarial medicines	**329**	**62.7**	**71**	**94.7**
Quinine (unspecified)	69	13.1	69	92.0
Quinine (tablets)[c]	59	11.2	59	78.7
Quinine (syrup)[c]	49	9.3	49	65.3
Quinine (injection)	40	7.6	40	53.3
Sulfadoxine-Pyrimethamine	33	6.3	31	41.3
Chloroquine	33	6.3	24	32.0
Artemether-Lumefantrine[d]	20	3.8	15	20.0
Dihydroartemisinin-Piperaquine[d]	5	1.0	5	6.7
Artemether	5	1.0	5	6.7
Amodiaquine	4	0.8	4	5.3
Artesunate-Amodiaquine[d]	2	0.4	2	2.7
Antipyretic	**87**	**16.6**	**49**	**65.3**
Paracetamol	57	10.9	47	62.7
Diclofenac	10	1.9	10	13.3
Paracetamol-Aspirin Combination	8	1.5	4	5.3
Ibuprofen	7	1.3	6	8.0
Aspirin	2	0.4	2	2.7
Indomethacin	2	0.4	2	2.7
“Painkiller”	2	0.4	2	2.7
Antibiotic	**79**	**15.0**	**34**	**45.3**
Co-Trimoxazole	26	5.0	24	32.0
Penicillin	15	2.9	12	16.0
Metronidazole (Flagyl)	11	2.1	11	14.7
Gentamycin	7	1.3	7	9.3
Amoxicilllin	6	1.1	5	6.7
Chloramphenical	5	1.0	5	6.7
Erethromycin	4	0.8	4	5.3
Ampicillin	3	0.6	3	4.0
Ciprofloxacin	1	0.2	1	1.3
Doxycycline	1	0.2	1	1.3
Cough and cold preparations	**42**	**8.0**	**20**	**26.7**
Piriton®	15	2.9	15	20.0
Piritex®	11	2.1	11	14.7
Coldafex®	6	1.1	6	8.0

Table 3.4 - 'Malaria Medicines' Sold by Drug Vendors				
Question: What varieties of Western malaria medicines do you sell in your shop?[b]				
Medicine Sold (n=75)	**Responses (n=525)**		**Respondents (n=75)**	
	Freq.	**Percent**	**Freq.**	**Percent**
Coldease ®	4	0.8	4	5.3
Flufed® tablets	4	0.8	4	5.3
Flucap® capsules	3	0.6	3	4.0
Sinarest®	3	0.6	3	4.0
Flucap® capsules	3	0.6	3	4.0
Coldcap®	2	0.4	2	2.7
Cofta®	1	0.2	1	1.3
Flurid® tablets	1	0.2	1	1.3
Good Morning®	1	0.2	1	1.3
Centamu® Syrup	1	0.2	1	1.3
Conflictus®	1	0.2	1	1.3
Mykoff®	1	0.2	1	1.3
Supplements	**12**	**2.3**	**9**	**12.0**
Vitamin B	6	1.1	6	8.0
Folic acid	3	0.6	3	4.0
Multi-Vitamin	2	0.4	2	2.7
Vitamin C	1	0.2	1	1.3
Antacid	**6**	**1.1**	**5**	**6.7**
Magnesium	3	0.6	3	4.0
Ranitidine	1	0.2	1	1.3
Tagamen®	1	0.2	1	1.3
Tumbocide®	1	0.2	1	1.3
Corticosteroid	**4**	**0.8**	**4**	**5.3**
Dexamethasone	4	0.8	4	5.3
Iron supplements	**4**	**0.8**	**3**	**4.0**
Ferro-B Complex	1	0.2	1	1.3
Haemoforte®	1	0.2	1	1.3
Vitaglobin®	1	0.2	1	1.3
Hameosprite®	1	0.2	1	1.3
Anticonvulsants	**4**	**0.8**	**3**	**4.0**
Diazepam	4	0.8	3	4.0
Anti-diarrhoeal	**3**	**0.6**	**3**	**4.0**
Loperamide	2	0.4	2	2.7
“Tablets for diarrhea”	1	0.2	1	1.3
Anti-asthmatic	**2**	**0.4**	**2**	**2.7**
Salbutamol	2	0.4	2	2.7
Antidepressant	**2**	**0.4**	**2**	**2.7**
Placil	1	0.2	1	1.3
Ronet®	1	0.2	1	1.3

Table 3.4 - 'Malaria Medicines' Sold by Drug Vendors				
Question: What varieties of Western malaria medicines do you sell in your shop?[b]				
Medicine Sold (n=75)	**Responses (n=525)**		**Respondents (n=75)**	
	Freq.	**Percent**	**Freq.**	**Percent**
Antiemetic	**1**	**0.2**	**1**	**1.3**
Stemitil® tablets	1	0.2	1	1.3
Antifungal	**1**	**0.2**	**1**	**1.3**
Nystatin®	1	0.2	1	1.3
Antihelmenthic	**1**	**0.2**	**1**	**1.3**
Mabendazole	1	0.2	1	1.3
Antipsychotic	**1**	**0.2**	**1**	**1.3**
Largactil®	1	0.2	1	1.3
Post-partum bleeding	**1**	**0.2**	**1**	**1.3**
Ergometrine	1	0.2	1	1.3
Unknown	**8**	**1.5**	**7**	**9.3**
Pridinsolin	2	0.4	2	2.7
Pyloscam	2	0.4	2	2.7
Phellas	1	0.2	1	1.3
Metrocromadine	1	0.2	1	1.3
Prolanol	1	0.2	1	1.3
Pedvet	1	0.2	1	1.3
TOTALS	525	100.0	>75[a]	742.7

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.

[b] Although respondents were asked specifically about antimalarial medicines, a variety of non-antimalarial medicines were provided as responses. 'Malaria medicines' here are referred to all Western Medicines the drug vendor perceived to be used for the treatment of malaria, but have been organized accordingly by drug category.

[c] 90.7% of respondents and second-line antimalarial (either quinine syrup or tablets)

[d] 26.7% of respondents sold a first-line antimalarial: ACT (either AL, DHA-PPQ, AS-AQ)

Drug vendors were asked which malaria medicine was sold the most in their shop. Table 3.5 below list the types of 'malaria' medicines that were reported to be sold the most. Various dosage forms of quinine ranked highest as medicines reported to be commonly sold by a drug vendors. Quinine tablets, syrups, and injections commonly sold as reported by 52.0%, 22.7% and 14.7%, respectively, of drug vendors. Paracetamol ranked second and was mentioned by 34.7% of drug vendors. Other antimalarial medicines mentioned were SP, CQ, ACT, and artemether mentioned by 6.7%, 6.7%, 4.0% and 1.3% of drug vendors, respectively. Also

included in this list were various antibiotics, cough and cold preparations, and antipyretics. Only 4.0% of drug vendors stated that ACT was sold the most.

Table 3.5 - Most Sold Malaria Medicines as reported by Drug Vendors

Question: Which malaria medicines are sold most in your shop?

Medicine Sold (n=16)	Responses (n=130)		Respondents (n=75)	
	Freq.	Percent	Freq.	Percent
Antimalarial Medicines				
Quinine Tablets[b]	30	23.1	30	52.0
Quinine Syrup[b]	17	13.1	17	22.7
Quinine Injection	11	8.5	11	14.7
Quinine (form unspecified)	5	3.8	5	6.7
Sulfadoxine- Pyrimethamine	5	3.8	5	6.7
Chloroquine	5	3.8	5	6.7
ACT	3	2.3	3	4.0
Artemether	1	0.8	1	1.3
Antipyretic				
Paracetamol	27	20.8	27	34.7
Aspirin	1	0.8	1	1.3
Multi-ingredient antipyretic	3	2.3	1	4.0
Co-trimoxazole	7	5.4	7	9.3
Antibiotic				
Penicillin	6	4.6	5	6.7
Metronidazole	3	2.3	3	4.0
Cough and Cold Preparations	4	3.1	4	5.3
Other	2	1.5	2	5.3
TOTAL	130	100.0	>75[a]	182.8[a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.

[b] 54.7% of respondents sold the second-line antimalarial quinine (tablets or syrups)

Comparisons:

- Only 4.0% of drug vendors said they sold ACTs the most even though 26.7% stocked ACTs
- Of the drug vendors who said they would always and sometimes recommend an ACT (34.6%, n=26):
    - Only 2 drug vendors mentioned they sold ACTs the most.
    - None of the 9.3% whose recommendation strictly adhered to guidelines (Partition A in Figure 3.2) who said they would only recommend an ACT said they sold ACTs the most.
- Of the drug vendors who said they would always and sometimes recommend oral quinine (61.3%, n=45):
    - 54.7% of drug vendors said they sold oral quinine the most.

From this set of data, there is far fewer ACTs sold then what drug vendors would lead you to believe when it was asked what they would recommend However, for the second-line medicine (oral Quinine), what the drug vendors say they recommended and what they actually sold are comparable.

3.3.2 To Assess if Drug Vendors' Malaria Treatment Practices are Influenced by Caregivers of Children Five and Under

To address this objective drug vendors were asked if drug vendors always sold to caregivers what they requested and if their recommendations were altered if caregivers could not afford

their original recommendation. Findings show that drug vendors were influenced by their interactions with caregivers.

Malaria Medicines Requested by Caregivers of Children

According to the responses of the drug vendors, caregivers demanded a variety of 'malaria medicines', which included actual antimalarial medicines and others that are not antimalarial medicines (e.g. antibiotics, antipyretics, anticonvulsants, and various supplements). Quinine and paracetmol ranked equally high as medicines requested by caregivers that 58.9% drug vendors reported. Artemether-Lumefantrine was reported by 27.4% of drug vendors to also be requested by caregivers. Other medicines that were mentioned by greater that 10% of the drug vendors included cough and cold preparations (21.9%), cotrimoxazole (20.5%), and chloroquine (20.5%). The remaining medicines are listed in Table 3.6 below

Table 3.6 - 'Malaria Medicines' Requested by Caregivers

Question: Which malaria medicines do caregivers normally ask for their children five and under who have malaria?

Medicines Requested	Responses (n=160)		Respondents (n=73)	
	Frequenc	Percent	Frequency	Percent
Antimalarial				
Quinine	43	26.9	43	58.9
Artemether-Lumefantrine	20	12.5	20	27.4
Chloroquine	15	9.4	15	20.5
Sulphadoxine-Pyrimethamine	6	3.8	6	8.2
Antipyretics				
Paracetamol	43	26.9	43	58.9
Aspirin-Paracetamol Combination	3	1.9	3	4.1
Aspirin	2	1.3	2	2.7
Cough and Cold Preparations				
Cough and Cold Preparations	16	10.0	16	21.9
Antibiotics				
Cotrimoxazole	15	9.4	15	20.5
Metronidazole	4	2.5	4	5.5
Amoxicillin	2	1.3	2	2.7
Penicillin	1	0.6	1	0.6

Table 3.6 - 'Malaria Medicines' Requested by Caregivers				
Question: Which malaria medicines do caregivers normally ask for their children five and under who have malaria?				
Medicines Requested	**Responses (n=160)**		**Respondents (n=73)**	
	Frequenc	**Percent**	**Frequency**	**Percent**
Chloramphenical	1	0.6	1	0.6
Magnesium	1	0.6	1	0.6
Other				
Dexamethasone	1	0.6	1	0.6
Diazepam	1	0.6	1	0.6
Iron Supplement	1	0.6	1	0.6
Multivitamin	1	0.6	1	0.6
Painkiller®	1	0.6	1	0.6
TOTAL	160	100%	>75[a]	236.1[a]
[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.				

Drug Vendors' Responsiveness to Caregiver Demands

When asked if drug vendors always sold what the caregivers requested, 80.8% stated they would whereas 19.2% explained that they would not always sell what the caregivers requested.

Table 3.7 - Drug Vendors' Responsiveness to Caregiver Demands		
Question: Do you always sell what the caregiver requests?		
Response	**Respondents (n=73)**	
	Frequency	**Percent**
Yes	59	80.8
Not always	14	19.2
TOTAL	73	100

When Caregivers Could Not Afford the Recommended Medicines

If caregivers could not afford the malaria medicines that was initially recommended for them, drug vendors mentioned several different types of actions when faced with this situation. Common responses included offering medicines on credit and referring patients to health facilities as mentioned by 85.3% and 66.7% of drug vendors, respectively. Twenty-four percent of respondents stated they would sell what the caregivers could afford. This implies that if

caregivers could only afford a sub-optimal dosage, drug vendors would be willing to sell an under-dose therapy to caregivers. Table 3.8 below provides other responses.

Table 3.8 - Actions When Caregiver Could Not Afford Recommended Malaria Medicines

Question: If caregivers cannot afford the malaria medicines you have recommended for their children five and under, what usually happens?

Action	Responses (n=166)		Respondents (n=75)	
	Freq.	Percent	Freq.	Percent
Offer medicines on credit	64	38.6	64	85.3
Refer patient to health facilities	50	30.1	50	66.7
Sell what caregiver could afford	18	10.8	18	24.0
Provide 'First Aid'[b]	11	6.6	11	14.7
Suggest alternative dosage form	9	5.4	9	12.0
Offer advice	5	3.0	5	6.7
Provide treatment first	4	2.4	4	5.3
Continue to negotiate	3	1.8	3	4.0
Refuse to treat	2	1.2	2	2.7
TOTAL	166	100.0	>75[a]	221.3[a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.
[b] 'First aid' is a common term referring to initial actions to remedy signs and symptoms of an illness. For example, use of paracetamol, tepid sponging, and fanning were often mentioned forms of 'first aid'.

3.3.3 To Assess Drug Vendors' Knowledge and Beliefs About the Cause, Prevention, Signs and Symptoms, and Treatment of Malaria.

Knowledge on Cause and Transmission of Malaria

Drug vendors were asked about their understanding on the cause and transmission of malaria. All drug vendors were able to identify the cause of malaria to be through the bite of mosquitoes. Responses provided such as a lack of nets (28.0%), stagnant water (18.7%), inappropriate use of nets (12.0%), bushes (6.7%), lack of bedsheet/covers (4.0%), and leaving doors open (1.3%) were additional causes of malaria demonstrated that drug vendors understood various factors related to mosquitoes that could promote malaria, since these responses were related to either barriers between human and mosquito contact or reducing

breeding sites for mosquitoes. Other responses, collectively reported by 38.7% of drug vendors, included additional causes which were misconceptions, for instance drinking dirty or unboiled water (as reported by 24.0% of drug vendors).

Table 3.9 - Drug Vendors' Knowledge on Cause of Malaria

Question: What do you think causes malaria in children 5 and under?

Cause	Responses (n=197)		Respondents (n=75)	
	Freq.	Percent	Freq.	Percent
Mosquitoes	75	38.1	75	100
Lack of bed nets	21	10.7	21	28.0
Drinking dirty/unboiled water	18	9.1	18	24.0
Stagnant water	14	7.1	14	18.7
Unhygienic living conditions	11	5.6	11	14.7
Poor Parental Care	10	5.1	10	13.3
Inappropriate use of nets	9	4.6	9	12.0
Transmission through cough	8	4.1	8	10.7
'Poor feeding' (lack of nutritious food)	7	3.6	7	9.3
Weather/seasonal factors	6	3.0	6	8.0
Bushes	5	2.5	5	6.7
Lack of bedsheets/covers	3	1.5	3	4.0
Eating spoiled/dirty food	3	1.5	3	4.0
Flies	2	1.0	2	2.7
Providing an underdose treatment	2	1.0	2	2.7
Leaving doors open allow mosquitoes to enter	1	0.5	1	1.3
Typhoid	1	0.5	1	1.3
Not having things to use	1	0.5	1	1.3
TOTAL	197	100.0	75[a]	262.7[a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided

Knowledge on Prevention of Malaria

The majority of drug vendors (69.3%) believed malaria was preventable (see table 3.10) Responses related to preventions that involved limiting mosquito-human contacts (e.g. using nets or sprays and closing of window and doors) and preventions related to environmental management to reduce mosquito breeding sites (e.g. clearing of bushes and/or preventing stagnant water from accumulating) accounted for a majority of the responses. The former

contributed to 43.6% of total responses (n=211), in which 88.6% of drug vendors provided a response of this nature, and the latter was 23.2% of total responses by 38.6% of drug vendors. Only 51.4% of drug vendors stated at least two preventative measures related to limiting mosquito-human contact or environmental management. 54.3% of DVs had misconceptions of various kinds including responses such as: improving cleanliness, sanitation, or hygiene, providing immunization, drinking boiled and unclean water, providing quality food, and providing medicines for treatment as preventative measures. See table 3.11 below for full list of responses.

Table 3.10 - Drug Vendors' Response to Whether Malaria is Preventable

Question: Is malaria preventable?

Response	Respondents (n=73)	
	Frequency	Percent
Yes	52	69.3
Not always	5	6. 7
Maybe	6	8.0
Don't know	12	16.0
TOTAL	73	100.0

Table 3.11 - Responses on How Malaria Can be Prevented

Question: How can malaria be prevented?

Action	Responses (n=211)		Respondents (n=70)	
	Frequency	Percent	Frequency	Percent
Nets	57	27.0	57	81.4
Slashing Bushes	27	12.8	27	38.6
Prevent Stagnant water	22	10.4	22	31.4
Sprays	22	10.4	22	31.4
Cleanliness/Hygiene/ Sanitation	15	7.1	15	21.4
Closing doors/windows	13	6.2	13	18.6
Immunization	11	5.2	11	15.7
Providing/Boiling water	11	5.2	11	15.7
Using medicines for treatment	7	3.3	7	10.0

Table 3.11 - Responses on How Malaria Can be Prevented				
Question: How can malaria be prevented?				
Action	**Responses (n=211)**		**Respondents (n=70)**	
	Frequency	**Percent**	**Frequency**	**Percent**
Using medicines for prevention	5	2.4	5	7.1
Assistance from government	5	2.4	5	7.1
Education	4	1.9	4	5.7
Provide quality food	3	1.4	3	4.3
Other[b]	9	4.3	9	12.9
TOTAL	211	100.0	>75[a]	301.4 [a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.
[b] Responses with frequencies less than 2 have been grouped under 'Other'.

Knowledge on Signs and Symptoms of malaria

According to the Uganda Clinical Guideline 2010, the common signs and symptoms of uncomplicated malaria for children under five years of age were: 1) fever/high temperature, 2) vomiting, 3) loss of appetite, and 4) weakness and lethargy as the common signs. Based on these four signs/symptoms, drug vendors' knowledge on signs and symptoms of malaria were assessed and responses are summarized in table 3.12 below. All drug vendors stated at least one of the four signs/symptoms of uncomplicated malaria together; 61% stated at least 2 of the 4 signs/symptoms; 47.0% stated at least 3 of the signs/symptoms; and only 21.3% stated all 4 signs and symptoms. 92.0% of drug vendors reported fever/high temperature as a sign/symptom of malaria. When asked what the main sign/symptom was, 63.4% of drug vendors reported fever/high temperature (see table 3.13). Only a small percentage (14.7%) mentioned shivering and feeling cold. Vomiting, diarrhoea, loss of appetite, and body weakness were amongst the top five ranked responses after fever/ high temperature contributing to

52.9% of responses and mentioned by 66.7%, 60.0%, 56.0%, and 40.0% of drug vendors, respectively. Flu was a response by 17.3% of drug vendors. See Table 3.12 for other responses.

Table 3.12 - Sign and Symptoms of Uncomplicated Malaria as Reported by Drug Vendors

Question : Can you tell me the signs/symptoms of malaria in children 5 and under?

Sign/Symptom	Responses (n=446)		Respondents (n=75)	
	Frequency	Percent	Frequency	Percent
Fever/high temperature	69	15.5	69	92.0
Vomiting	50	11.2	50	66.7
Diarrhea	45	10.1	45	60.0
Loss of appetite	42	9.4	42	56.0
Body weakness	30	6.7	30	40.0
Running nose/mucous	29	6.5	29	38.7
Coughing	25	5.6	25	33.3
Convulsions	22	4.9	22	29.3
Changes to eyes	17	3.8	17	22.7
Headache	16	3.6	16	21.3
Flu	13	2.9	13	17.3
Feeling cold/shivers	11	2.5	11	14.7
Skin rash (mosquito bites)	10	2.2	10	13.3
Crying	9	2.0	9	12.0
Fast breathing	8	1.8	8	10.7
Stomach pain	8	1.8	8	10.7
Anemia	8	1.8	8	10.7
Sneezing	6	1.3	6	8.0
Dehydration	5	1.1	5	6.7
Malaise/general discomfort	5	1.1	5	6.7
Joint pain	5	1.1	5	6.7
Weight loss	3	0.7	3	4.0
Changes to skin	3	0.7	3	4.0
Restlessness/irritable	3	0.7	3	4.0
Sores in the throat	2	0.4	2	2.7
Dizziness	1	0.2	1	1.3
Sweating	1	0.2	1	1.3
TOTAL	446	100.0	>75[a]	594.8[a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided

Table 3.13 - Main Signs/Symptoms of Uncomplicated Malaria as Reported by Drug Vendors				
Question: What is the main sign of malaria?				
Sign/Symptom	**Responses (n=71)**		**Respondents (n=71)**	
	Frequency	**Percent**	**Frequency**	**Percent**
Fever/High temperature	45	63.4	45	63.4
Vomiting	6	8.5	6	8.5
Body weakness	4	5.6	4	5.6
Convulsions	4	5.6	4	5.6
Running nose/mucous	3	4.2	3	4.2
Skin rash (mosquito bites)	3	4.2	3	4.2
Diarrhea	2	2.8	2	2.8
Coughing	2	2.8	2	2.8
Loss of Appetite	1	1.4	1	1.4
Flu	1	1.4	1	1.4
TOTAL	71	100.0	71	100.0

Sign and Symptoms of Severe Malaria

Drug vendors' demonstrated a weak knowledge of signs and symptoms of severe malaria. According to the Uganda Clinical Guideline 2010, seven signs or symptom of severe malaria can be recognized by drug vendor without the need for specialized equipment: 1) changes to behaviour, confusion or drowsiness, 2) altered level of consciousness or coma, 3) convulsions, 4) difficulty in breathing, 5) severe anaemia, 6) hyperpyrexia, and 7) severe vomiting. These signs/symptoms were used as a benchmark to determine if the drug vendors' knowledge were adequate. Only 82.7% were able to state at least one of the seven recognizable signs/symptoms of severe malaria; 36.0% were able to state at least two of the seven signs/symptoms; and 10.7% were able to state at least three of the seven sign/symptoms; no drug vendors were able to state more than 3 of the signs/symptoms. Amongst the list of signs/symptoms associated with severe malaria, convulsions was ranked the highest and mentioned by 40.0% of the drug vendors. Other signs/symptoms of severe malaria reported by 20.0-32.0% of drug vendors were

body weakness, fever/high temperature, vomiting, diarrhoea, loss of appetite and anemia had 20.0%-32.0% (see table 3.14 for more responses).

Table 3.14 - Signs/Symptoms of Severe Malaria as Reported by Drug Vendors

Question: How do you know a child is experiencing severe malaria?

Sign/Symptom	Responses (n=194)		Respondents (n=75)	
	Frequency	Percent	Frequency	Percent
Convulsions	30	15.5	30	40.0
Body weakness	24	12.4	24	32.0
Fever/High Temperature	23	11.9	23	30.7
Vomiting	21	10.8	21	28.0
Diarrhea	19	9.8	19	25.3
Loss of Appetite	17	8.8	17	22.7
Anemia	15	7.7	15	20.0
Fast breathing	12	6.2	12	16.0
Changes to eyes	10	5.2	10	13.3
Dehydration	10	5.2	10	13.3
Changes to skin	3	1.5	3	4.0
Sneezing	2	1.0	2	2.7
Other	8	4.1	8	10.7
TOTAL	446	100.0	>75 [a]	258.7 [a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.

Knowledge and Beliefs on Treatment of Uncomplicated Malaria

To assess drug vendors' knowledge on treatment of malaria, they were asked about the best option to treat malaria in children five and under. Oral quinine was the highest ranked medicine considered the best option for treatment for malaria as reported by 37.7% of drug vendors. Artemether-Lumefantrine and paracetamol were reported equally by 25.3% of drug vendors as the best option for treatment. Chloroquine was reported by a relatively large amount (22.7%) to be the best option. Other highly efficacious ACTs that were reported to be best options but at lower frequencies were artesunate-amodiaquine and dihyrdoartemisinin-piperaquine (both

reported by 1.3% of drug vendors). The remaining medicines identified as best options in Table 3.15 below ranged from antipyretics, cough and cold preparations, artemisinin monotherapry, to antibiotics.

Table 3.15 - Medicines Considered as Best Options to Treat malaria in Children Five and Under

Question: In your opinion, which is the best option to treat malaria in children five and under?

Medicine	Responses (n=158)		Respondents (n=75)	
	Frequency	Percent	Frequency	Percent
Antimalarial				
Quinine (oral)	30	19.0	28	37.3
Artemether-lumefantrine	20	12.7	19	25.3
Chloroquine	21	13.3	17	22.7
Quinine (dosage form unspecified)	13	8.2	13	17.3
Quinine Injection	13	8.2	13	17.3
Dihydroartemisinin-Piperaquine	1	0.6	1	1.3
Artesunate-Amodiaquine	1	0.6	1	1.3
Artemether	1	0.6	1	1.3
Antipyretic				
Paracetamol	19	12.0	19	25.3
Diclofenac	2	1.3	2	2.7
Antibiotic				
Co-Trimoxazole	6	3.8	6	8.0
Penicillin	5	3.2	5	6.7
Gentamycin	3	1.9	3	4.0
Chloramphenical	2	1.3	2	2.7
Amoxicillin	1	0.6	1	1.3
Ampicillin	1	0.6	1	1.3
Cough and Cold Preparations				
Piritex®	5	3.2	5	6.7
Coldease®	2	1.3	2	2.7
Piriton®	1	0.6	1	1.3
Flufed® tablets	1	0.6	1	1.3
Centamu® Syrup	1	0.6	1	1.3
Other				
Tablets (medicines unspecified)	4	2.5	4	5.3
Injection (medicines unspecified)	3	1.9	3	4.0
Syrup (medicines unspecified)	2	1.3	2	2.7
TOTAL	158	100.0	>75[a]	201.3[a]

[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided.

Beliefs - Quinine as Best Option for Treatment of Malaria

Drug vendors provided various reasons as to why oral quinine was the best option for treatment of malaria as summarized in Table 3.16 below. Several themes emerged in the responses as to why the best option was believed to be so. The most dominant theme pointed to the fact that quinine was an effective drug for treating malaria. Responses under this theme indicated that oral quinine had strong curative effects that allowed the child to recover or heal in a short period of time. For example, one drug vendor explained:

> "Because [using quinine] heals faster. Sometimes a person gets cured even before completing the dose."

Moreover, many indicated that their information regarding oral Quinine's effectiveness was passed down from the government. One drug vendor described the Uganda government promoting the use of oral Quinine and how it is powerful medicine:

> "Our Uganda [government] put it there, they saw it as it would be the most powerful. It will reduce that malaria."

There were several other themes that were not as frequent but highlighted important reasons why oral quinine was favoured. For example, quinine syrup was mentioned to be the best options because of its ease of administration, it being difficult to provide an overdose treatment with, it have better adherence, and its intended use for a particular age/weight group, namely younger children and those with lower body weight. One response highlighted the notion that certain children may be accustomed to certain treatment options. Two responses highlighted oral quinine having less side effects than other dosage forms, specifically

injections. Three responses elaborated that quinine was considered the best option simply because ACTs were not available due to legal restrictions. For example, one drug vendor highlighted Coartem® (brand name for AL) being too expensive:

> "Coartem is still expensive and … drug shops here there is no way we can sell it [when] at the health centre, they give it for free; that is why we use Quinine."

Table 3.16 - Thematic Analysis – Responses as to Why Quinine (tablets or syrups) is the Best Option for Treatment			
Question: Why is it the best option to treat malaria?			
Themes	**Respondents (n=22)**		**Select Quotes Illustrating Theme**
	Frequency	**Percent**	
Effective in treatment against malaria	10	45.4	• "Quinine [tablets] kills or reduces malaria parasites highly." • "Because if you give [quinine tablets] to child at around now, within 30 minutes the child will be okay" • "Our Uganda [government] put it there, they saw it as it would be the most powerful. It will reduce that malaria a bit."
Better adherence due to ease of administration	4	18.1	• "That [quinine] syrup is good. It is a full dose for 7 days. You can tell a patient that the tablets are supposed to be 7 and the patient buys 2 of the 7 tablets but if he buys a syrup, a syrup is a full dose bought." • "[Quinine] syrups are easy for the parent to administer because they have measurements, but for tablet when you write them one quarter, the parents can fail to break into four equal pieces."
Recommended option not available	3	13.6	• "We would be using Coartem to treat but we are not allowed to use it. So we use Quinine." • "Coartem is still expensive and still us with the drug shops here there is no way we can sell it but yet at the health centre they give it for free, that is why we use Quinine." • "That is what we have as malaria medicines [quinine]. That is what we know. ACT is
Treatment most effective for children five years and younger	2	9.1	• "Because five years and below gets [quinine syrup] when the kilograms of the patient will be low." • "[Quinine] syrups would be the best because their immunity is weak or the blood is not yet strong to use tablets or injections."
Difficulty in giving an overdose in treatment	2	9.1	• "I commonly use syrups because syrups even if someone gives the child a lot it's not too harmful like the tablet." • "[Quinine syrups] have measurements, now when you tell a parent that go and give 25 [millilitre], she may not exceed, but tablets if you tell her, or maybe you have given her all of them to go and crush at once, and get some she can give [an] overdose."
Patient becomes accustomed to Quinine	1	4.5	• "If a child is used to taking [Quinine] tablets, that child can take the tablets and the child cures."
TOTAL	22	100.0	-

Belief - Artemether-Lumefantrine as the Best Option for Treatment of Malaria

Artemether-Lumefantrine, commonly known as the brand name Coartem® in the community, was touted as the best option to treat malaria by 25.3% of the drug vendors (see table 3.17 for summary of themes identified for AL). The major themes as to why AL was the best option were: 1) it had less side effects compared to other alternatives; 2) it was effective in treating malaria; 3) it is the first-line medicine for treatment; 4) it was available for free; and 5) it had better adherence due to ease of administration. The first two themes were the most dominant and contributed to 55% of the responses addressing why Coartem® was the best option.

Coartem® was described as having less side effects when used to treat malaria compared to other medicines. Responses related to this theme contributed to 30% of the total responses on why Coartem® was the best (6 out of 20 respondents). The comparisons were made primarily with quinine. Drug vendors cited that quinine had various side effects and complications such as dizziness and requiring to consume plenty of fluids. One drug vendor described Coartem® as a better option because it did not require drinks as quinine commonly requires. Even if the drug vendor had recommended quinine, which required having drinks to go along with it, some caregivers still had difficulty to afford buying drinks as one drug vendor aptly describes:

> "[Coartem] has no problem like Quinine, Quinine needs a lot of drinks. There are other caregivers in the villages who are needy, you tell them that, 'this child go and give some Quinine". But [with Quinine] they need drinks [that they] cannot afford to buy."

Affordability is recurring theme throughout the study. Related to reasons as to why Coartem® is the best option, is a connected theme that raised the issue of affordability. A theme that

emerged in 15.0% of the responses (3 out of 20 respondents) discussed Coartem® being available for free in health centres that implied the issue affordability was an associated factor related to a medicine being considered as a best option.

Effectiveness in treatment of malaria was the second dominant theme (25.0% of responses) that emerged from the set of responses describing Coartem® as the best option for treatment of malaria. Responses described the effectiveness of Coartem® in its ability to generate visible improvements or its quickness in achieving results. One drug vendor made a comment on its superiority over chloroquine soon after praising it.

Perhaps related to the effectiveness of Coartem®, is a theme that captured responses indicating that Coartem® was simply a first-line medicine that one would begin with for treatment of malaria before proceeding on to subsequent treatment options. These theme contributed to 15% of the responses related to why Coartem® was the best option. Drug vendors described the very virtue of Coartem® being used first in treatment as an indicator that it was a better option than other alternatives. One drug vendor described the role of Coartem® as a starting medicine as a litmus test before considering other options:

> "Coartem is the medicine to begin with. It is not good to begin with a very strong medicine. Yes, it is good to begin with that which is not very strong, then if the illness persists, you go on climbing forward."

Table 3.17 - Thematic Analysis – Responses as to Why Artemether-Lumefantrine is the Best option to Treat Malaria					
Question: Why is it the best option to treat malaria?					
Themes	**Responses (n=20)**		**Respondents (n=20)**		**Select Quotes Illustrating Theme**
	Frequency	**Percent**	**Frequency**	**Percent**	
Less side effects compared to alternative antimalarials	6	30.0	6	30.0	• *"Coartem, even if you give overdose,...the reaction is not so high like that one of Quinine."* • *"Coartem reduces malaria faster in those children and they don't feel dizzy."* • *"For [Coartem tablets], they [health providers] say that they don't have complications."*
Effective treatment against malaria	5	25.0	5	25.0	• *"Coartem is very effective at treating malaria when the child is sick"* • *"… I see that … Coartem has made a difference [in treating malaria]"* • *"If they give[Coartem to] someone like a child, they show me a sign that they are effective [and] they work"*
Coartem is a first-line medicine	3	15.0	3	15.0	• *"Now Coartem replaced Choroquine, Choroquine [was] the first line treatment for malaria"* • *"Coartem is the medicine to begin with"* • *"Coartem is the first treatment for malaria"*
Better adherence due to ease of administration	3	15.0	3	15.0	• *"it also easy to [administer]."* • *"Coartem, it is easy to swallow"* • *" it can be easily swallowed, [it]takes only three days."*
Provided for free	3	15.0	3	15.0	• *"They give it out for free, it is not bought"* • *"At the health centre they give it for free."* • *They give us that Coartem. In the health unit it is there... they give it for free."*
TOTAL	20	100.0	20	100.0	-

Several of the major themes identified for quinine and artemether-lumefantrine have also emerged in responses describing why chloroquine (CQ) was the best option for treating malaria (see table below). The most dominant theme captured the effectiveness of CQ in treatment of malaria (56.25% of responses), followed by CQ being the medicine to be used first for treatment of malaria (31.25%), it having less side effects compared to alternative medicines (6.25%) and its ease of administration as themes that emerged from thematic analysis of responses.

The effectiveness of CQ in treatment of malaria was the most dominant themed that emerged. Responses indicated CQ's effectiveness by describing its ability to eliminate the parasite, its fast action in generating improvements, and past experiences (personal and through patients) with it resulting in curing of malaria. One drug vendor described receiving appreciation from caregivers to indicate CQ's effectiveness:

> “When caregivers come, I give them these medicines [and] after one week they come and thank me.”

Chloroquine as the starting first-line medicine for treatment was a common theme that was captured. Responses pointed to CQ being used first and only after failure do drug vendors proceed to more serious actions such as providing treatment involving injections or drips. Specifically for CQ tablets, one drug vendors described using CQ tablets as such:

> “Because tablets is the first treatment and if they fail you go for injection and they treat the children because tablets is first treatment, they call them "first aid".

The remaining themes were much more minor and described CQ having less side effects and its ease of administration for caregivers in providing CQ syrup because instructions were much easier to give. See table 3.18 for illustrative quotes for CQ.

Table 3.18 - Thematic Analysis – Responses as to Why Chloroquine is the Best Option for Treatment

Question: Why is it the best option to treat malaria?

Themes	Respondents (n=14)		Select Quotes Illustrating Theme
	Frequency	Percent	
Effective in treatment against malaria	7	50.0	• " Chloroquine tries to treat the [malaria] parasite." • " They think that these [chloroquine] are the ones that can kill the parasites caused by that malaria." • " because that [chlorquine] is what used to treat me and they [chloroquine] use [to] be very effective.
Chloroquine is the first-line medicine	5	35.7	• "I first [treat] with this Chloroquine, and when things fail then I give [Quinine]." • " Because [chloroquine] tablets is the first treatment and if they fail you go for injection and they treat the children because tablets is first treatment, they call them 'first aid'." • "Chloroquine and Fansidar is the first line it is the first and if it fails before you go to another." •
Ease of administration	1	7.1	• "These [chloroquine syrups], if you tell one that go and measure up to this line there it comes easy."
Less side-effects compared to alternative antimalarials	1	7.1	• "Chloroquine is good to children since it has no side effects."
TOTAL	14	100.0	-

Several non-malarial medicines have been identified as part of best option treatment. At least 6 drug vendors identified Cold Ease® syrup and Coldcap® (both cough and cold preparations), cotrimoxazole, penicillin, panadol, and diclofenac erroneously as medicines that treat malaria. For example, one drug vendor referring to penicillin, paracetamol, and diclofenac as best option, stated that these medicines corresponded to the illness of malaria. Others have described various medicines being: effective in treating various signs and symptoms that accompany malaria, intended for specific age/weight group (see table 3.19 below summary).

Table 3.19 - Thematic Analysis – Responses as to Why Certain Non-Antimalarial Medicines are the Best Option for Treatment

Question: In your opinion, which is the best option to treat malaria in children five and under? Why?

Themes	Respondents (n=11)		Select Quotes Illustrating Theme
	Frequency	Percent	
Effective in treatment against malaria	6	54.5	• **ColdEase® Syrup (2)[a]**: "It is not bitter even if you give it to the child, the child will take it and the malaria reduces and cures." • **Septrin® (2)[b]:** "I take Septrin to be the best option is a combination of treatment, it works and cough, the fever (malaria)." • **X-Pen (2)[b]:** "if you have not made them get used to Quinine injection and you just give them that X-Pen, like these syrups, you can keep that child up
Effective in treatment of signs and symptoms	4	36.3	• **ColdEase® Syrup[a]**: "Because they work much on cough... restores energy in the body." • **Piritex®[a]: "**why I use of syrups is because I have not took any tests that really this is malaria but it is through signs and symptoms at times that is why I give paracetamol and Piritex." • **Gentamycin[b]**: " I use it in case they have brought the sick person, I explain to them when the body is hot, breath, breathes rapidly, that is the time we
Intended for certain age/weight group	1	9.1	• **Piritex® syrup[a] and Panadol® syrupc[c]:** "This one 0 – 6 months you give Piritex; that child when he/she has just got out of the mother's womb the brain of that child has not yet matured like that one of one year it is like an egg, these tablets have charcoals or too much acid, if you give this child that tablets his/her brain will not comply with other, you have to start first with the syrup because it is equipped."
TOTAL	11	100.0	-

[a] Cough and cold preparation
[b] Antibiotic; septrin is the trade name for co-trimoxazole

3.3.4 To Assess Drug Vendors' Experiences with Previous Training Programs and Their Attitudes Towards Future Training Opportunities

Previous Training

Most drug vendors (48.0%) in this study have received some sort of formal health-related training through schooling to learn about febrile illnesses and malaria. These drug vendors have mentioned to receive training with an average duration of 1.6 years (± 0.9; n=25), which ranged between 6 months to 5 years. Out of the 36 drug vendors who reported to have received some sort of formal health-related training, training as a nursing aide/assistant was the most (75.0%) and four drug vendors reported receiving training as nurses (11.1%). Other less frequently reported training include: medical/health assistant (11.1%); and medical clinical officer (2.8%). Some sort of course or classroom setting training along with practical work in a health facility setting had been described by several drug vendors who received training as a nursing assistant or nurse. However, two drug vendors had mentioned that they did not complete their training as a nursing assistant as a result of lacking the financial means to complete the course. One drug vendor who did not have any formal training stated that she was promoted to the position of a nursing assistant through time and experience working at a health facility.

Locations for the training received either in a formal institution or practical training as part of mentorship in a health facility setting have been reported to take place in various districts. Learning took place in several districts ranging from neighboring districts of Butaleja such as Tororo (21.5%) and Iganga (13.8%) to districts much further away such as Kampala (10.8%) (see

Table 3.20 below for list of districts where drug vendors have gone for training). Much of the formal training that took place were reported to be nursing institutions or schools.

Table 3.20 - Districts Where Drug Vendors Received Training

Question: Where did you learn about treating children five and under with malaria?

District[b]	Responses (n=65)		Respondents (n=65)	
	Frequency	Percent	Frequency	Percent
Tororo	14	20.0	14	21.5
Iganga	9	12.9	9	13.8
Kampala[b]	7	10.0	7	10.8
Butaleja	6	8.6	6	9.2
Jinja	5	7.1	5	7.7
Kamuli	4	5.7	4	6.2
Namutumba	3	4.3	3	4.6
Mbale	2	2.9	2	3.1
Buguri	2	2.9	2	3.1
Sironko	2	2.9	2	3.1
Mityana[b]	2	2.9	2	3.1
Kayunga[b]	2	2.9	2	3.1
Mpigi[b]	1	1.4	1	1.5
Luuka	1	1.4	1	1.5
Ngora	1	1.4	1	1.5
Mukono[b]	1	1.4	1	1.5
Nakaseke[b]	1	1.4	1	1.5
Bwike	1	1.4	1	1.5
TOTAL	65	100.0	65	100.0

[a] All districts were in the Eastern region of Uganda unless otherwise specified.
[b] These districts are located in the Central Region of Uganda.

Outside of the formal training in school in institution setting, drug vendors may have learned about febrile illnesses and malaria through other means. Largely, these drug vendors acquire their skills through practical experience working in health centre or hospital settings (26.2%) taking part in a mentorship-type arrangement, learning through consulting colleagues, relatives, or health professionals (10.7%), or on-the-job work experience (7.1%) amongst other less frequent means of learning (see table 3.21 for complete list).

Table 3.21 - How Drug Vendors Learned About Treating Malaria in Children Five and Under				
Question: How did you learn about treating children five and under with malaria?				
Type of Learning	**Responses (n=84)**		**Respondents (n=74)**	
	Frequency	**Percent**	**Frequency**	**Percent**
Learning through formal training in school/course[a]	38	41.8	38	51.4[d]
Learning through practical experience at health centre or hospital setting (mentorship)[b]	24	26.4	24	32.4
Learning or consulting through colleague/relative/health professional	9	9.9	9	12.2
Workshops/seminars	8	8.8	8	10.8
Learning through work experience	6	6.6	6	8.1
Learning through print materials (eg. Books and charts)	5	5.5	5	6.8
No training	1	1.1	1	1.4
TOTAL	84	100.0	>74[c]	123.1[c]

[a] Training typically included occurred in nursing school. Formal training in school/course may have included learning through practical components of course at hospital and health-care settings.
[b] Respondents in this category did not attend training in formal training in school or courses.
[c] Totals for frequency and percent of respondents were greater than expected as a result of multiple responses provided.
[d] Of the 38 drug vendors that received formal training, 36 (48.0%) received formal health related training.

Future Training Opportunities

All drug vendors (98.7%) with the exception of one said they would be interested in participating in future training opportunities. They believed further training would help the community in managing malaria to improve health outcomes. Some drug vendors (27.1%) provided responses that expressed a sense of person benefit in the joy of better helping others, enhanced social status and reputation, job security, improved competence, and a sense of fulfillment. Other drug vendors (21.4%) explained that acquiring new knowledge and skills sparked their interest. A smaller proportion of drug vendors (12.9%) mentioned that they were interested because they would be able to update their current knowledge in treating malaria.

Table 3.22 - Thematic Analysis - Reasons for Interest in Future Training Opportunities				
Question: Why would you be interested in a training course offered to you?				
Source	**Responses (n=70)**		**Respondents (n=70)**	
	Frequency	**Percent**	**Frequency**	**Percent**
Helping community to improve health	27	38.6	27	38.6
Personal Benefit through joy, improved reputation, job security, competence, and a sense of fulfilment	19	27.1	19	27.1
More knowledge and skills	15	21.4	15	21.4
Update to current knowledge	9	12.9	9	12.9
TOTAL	70	100.0	70	100.0

When asked what source drug vendors would prefer to learn more about malaria, short training sessions that included typical training sessions like seminars and workshops were reported by 89.3% of drug vendors. A smaller proportion of drug vendors (25.3%) suggested that formal courses were also a preferred way to learn more about malaria. Radios were also mentioned by a quarter of drug vendors as a preferred sourced to learn more about malaria. Other less frequent responses are included in Table 3.23 below. When further probed about the drug vendors' thoughts on workshops, radios, dramas, seminars and TV amongst other items, workshops, radios, drama and seminars were favorable sources by 60.0%, 58.7%, and 57.3%, and 33.3%, respectively. Although it was important to note that probing was not consistent on each of these items (i.e. sometimes research assistants may have asked about all four but sometimes may have missed one).

Table 3.23 - Preferred Sources to Learn More About Malaria				
Question: Can you tell me your preferred source to learn more about how to treat malaria?				
	Responses (n=165)		Respondents (n=75)	
Type of Learning	Frequency	Percent	Frequency	Percent
Short training sessions	92	55.8	67	89.3
Formal Courses	23	13.9	23	30.7
Radios	19	11.5	19	25.3
Books	8	4.8	8	10.7
Mobile Phone	6	3.6	6	8.0
Learning through first-hand experience within	6	3.6	6	8.0
Mentorship	4	2.4	4	5.3
Pamphlet	3	1.8	3	4.0
Newspaper	3	1.8	3	4.0
Drama	1	0.6	1	1.3
TOTAL	165	100.0	>75 [a]	186.7[a]

[a] Totals for respondents were greater than 75 (maximum respondents) and 100% because drug vendors provided multiple responses.

3.3.5 To Assess Drug Vendors' Experience as a "Health Provider" within the Community and How Their Experience Influences Their Practice

In order to assess the drug vendors experiences as a "health provider", they were asked to describe their experiences in treatment of malaria within the community. With respect to their experiences in the community related to treatment of malaria, 5 major themes emerged from their responses that have been summarized in Table 3.24 below. The five major themes are: 1) their role in the provision of health services to the community, 2) the outcome of their services beyond the health of their patients, 3) challenges within the community, 4) challenges hindering treatment, and 5) challenges related to business operations.

Drug Vendors' Role in the Provision of Health Services to the Community

The first major theme captured a variety of responses related to the drug vendor describing their role in the provision of health services within the community. This particular theme contributed to 17.8% of the total responses (56.0% of respondents). Much of the major points of discussion captured by this theme described moments of providing successful treatments for the community. While some drug vendors simply described moments where they provided a treatment that resulted in a positive outcome as indicated by improvements in the patients' conditions, others provide a bit more detail and emotional tone to how they cured their patients, how there were no deaths as a result of their expertise, and how they handled severe situations that involve near-death situations or convulsions. In describing their narratives of how they have helped or even saved the lives of their patients, drug vendors conveyed a sense of self-confidence in their ability to help the community. One drug vendor described a situation of an ill patient that she cured convincing her that she was very much capable as a "health provider":

> “They brought a pregnant woman, but she had malaria and I treated her. They brought her in the morning and she was very ill and I treated her. When it came to 3:00 o'clock pm, she came back on her own, walking and yet in the morning she was carried to my drug shop so from that time I realized that I can cure.”

In describing successful treatment outcomes they anchored their position in the community based on their role as a capable "health provider" and that they were indeed a necessity in the community. Two drug vendors described how their roles were important to providing health education to the community. Four drug vendors described experiences in treatment that lead

to a dire outcome; two of these illustrated the drug vendors providing a treatment for a child with malaria, in which the situation worsened and required referral, but still ultimately led to the death of the child as described by the following example:

> "One time I faced a certain scenario when I gave a child treatment and failed to improve and was referred to hospital, and unfortunately the sickness worsened and unfortunately that child died."

Although their descriptions of treatment outcomes have generally included more positive than negative ones, situations like the one above demonstrate very real situations. The next example, illustrates a drug vendor providing successive treatments with quinine followed by chloroquine that resulted in the need for referral:

> "There is a patient they brought here, I used Quinine and it failed, I changed it to Chloroquine it also failed, I continue trying with these only and it failed and the patient was taken for more treatment. I referred him."

This quote provides a realistic situation how using multiple ineffective antimalarial medicines successively could lead to a dire situation. This drug vendor did not elaborate more on the scenario with regards to whether the child survived or not; it is a chilling example of how not only was the child receiving ineffective medicines for treatment, but multiple treatment attempts ultimately delayed the entire treatment process.

The Outcome of Drug Vendors' Services Beyond the Health of Their Patients

As a result of the positive outcomes in treatment as described by the drug vendors, a second theme reflecting how the community reacts to the successful outcome emerges. What are the outcomes of the services delivered by the drug vendor that goes besides helping saving the lives of the community members? Under this theme that contributes to 15.7% of total responses, the most dominant responses (6.8%) captured the notion that drug vendors perceived their reputation improving as a result of their work in the community. The community offered drug vendors gifts in the form of harvested food items such as maize, matooke, and chicken as a token of their appreciation as reported by the drug vendors as illustrated by 3.4% of the responses. Four drug vendors mentioned establishing friendships within the community because of their needed services. Also, three drug vendors highlighted the importance of earning a source of income as a part of their services. However, 2.5% of the responses reflected situations where drug vendors complained about community members speaking negatively of the drug vendor largely as a result of an unsuccessful treatment outcome. One drug vendor even mentioned that a community member was claiming that the drug vendor sold fake medicines.

Challenges in the Community

Drug vendors expressed several challenges in the community that affected many aspects in their lives. This third theme captured 12.7% of the total responses. The notion of poverty and the lack of money in the community has been a dominant recurring theme throughout this study. Here, 7.6% of the responses reflected on how poverty affected the community in several ways. The overwhelming poverty of the community restricted access to effective medicines, full

dose treatments, preventative measures such as nets, and transportation to necessary health services. Any combinations of these mentioned restrictions brought upon by poverty exacerbated the burden of malaria and other illnesses within the community as 3.0% of the responses reported.

Also captured under the larger theme of challenges in the community, are challenges faced at health centres. One drug vendor mentioned, a sense of hostility and condescending attitude from health professionals. But the largest challenges with health centres that 1.7% of the responses indicated were related to a lack of medicines as described in the following quote:

> "[The caregivers] came back and told me that look, we have stayed there for a whole day without getting any treatment. I told him that you go and talk to the medical people there. They told me that we told them but they told us to wait because there is no medicine. So at around two o'clock in the night the child died and they brought him back in the morning. So they usually die under such circumstances."

Drug vendors were unhappy about the unsatisfactory lack of medicines at health centres because there was a constant back and forth referral of the patient resulting in the delay to receive an effective treatment. Drug vendors mentioned referring patients to health centres, yet caregivers came as a result of health centre staff referring them to the drug vendors due to a stock out of medicines. The following quote illustrates this scenario:

> "People come when they do not have money. Some come and pleads and throws you 500 shillings and tells you that "give me the syrup and I will go treat this child, that is the

> money that I have." Then I tell her that "then go to the health unit." Then [they] say that, "In the health unit, they have sent me to come and buy this syrup and they have also written for me Quinine, but it is money that I do not have." So it becomes a problem to me."

Challenges in Treatment

The third major themed captured various challenges drug vendors believed limited their ability to provide an effective treatment. This theme contributed to 21.2% of the responses. The largest point of discussion within this theme places the caregivers at fault with 12.3% of the responses addressing this. Much of the responses here revolved around caregivers' actions that resulted in delays in treatment or a child receiving an under-dose in treatment.

Delays in treatment very often lead to dire outcomes. Twelve responses mentioned faults of caregivers related to delays. Several of these responses have mention unique factors resulting in the delay of an effective treatment. One drug vendor described the parents only offering paracetamol to the child and had delayed seeking further treatment for 4 days, which resulted in the child dying soon after the parents brought the child to the drug vendor for help. Another example, finds the mother delaying treatment due to a lack of money from the husband. Three instances describe cultural beliefs as a reason for delaying treatment. The following quote provides an example of this:

> "They told her the child had things … demons. The child was having convulsions, so they remained at home doing things of home (through demonic traditional healers)."

The remaining majority of the responses related to the caregiver's fault in the child receiving an under-dose in treatment. Thirteen responses mentioned this particular fault of caregivers. The major factors resulting in a child not receiving a full dose in treatment are: 1) caregivers are sold an under-dose treatment at their own request and 2) caregivers not adhering to full dose treatment. With regards to latter, this is a quote that illustrates this:

> "They are under-dosed. Because once a parent buys only Quinine, gives the child today, tomorrow and thinks the child is very fine, so it affects my business because somebody may think you don't know how to treat."

Beyond the faults of caregiver, other less frequent challenges in treatment that drug vendors have mentioned include the prices of medicines to be prohibitively high (3.0% of responses), the lack of diagnostic capacity to accurately diagnose malaria (2.1%), certain medicines being unavailable for treatment (2.1%), the side effects that result from treatment (1.3%), and lack of training opportunities (0.4%). Select quotes have been provided in Table 3.24 to illustrate these subthemes.

Challenges Related to Business Operations

A large part of the drug vendors' discussion of their experiences in treatment revolve around challenges related to their business operations. This theme accounted for 33.2% of all responses. The sub-themes under this shares the frustrations of drug vendors on their business growth. All challenges here either directly or indirectly affect the drug vendors ability to make a living.

The issue of repayment of credit has been a considerable point of discussion with the drug vendors. When asked what the drug vendors would do when caregivers could not afford the recommended medicines, 85.3% stated that they would offer medicines on credit, which the drug vendor had a set of criteria to determine who would receive credit. However, the challenge that drug vendors believed to affect their business operations the most is related to problems with repayment of credit. One drug vendor describes how poor repayment of credit affected her ability to bring more medicine to service the community as illustrated by this quote:

> "First debts, most people do not pay their debts, because these medicines do not come for free, you have to pay before you bring."

Furthermore, continuous poor repayment of credit by multiple community members would lead to a large loss of profit for their business. One drug vendor described the cumulative poor repayment of credit adds up over the course of a year, that ultimately affected her business' ability to grow. The following quote illustrates her frustration:

> "They do not pay me properly, I give them credit... we get losses because by the end of the year when I balance out the book, I may find that I have lost a lot of money, in a year. I may have a loss of 200,000 shillings. That one also, the business does not grow..."

Failure of the business to grow as a lack of repayment of credits as describe in the mentioned quote directly relates to another sub-theme mentioned by six drug vendors. These drug vendors provided responses that underscore the challenge related to a lack of capital for

business. They describe lacking the capital to expand their stock. One drug vendor aptly describes the situation with the following quote:

> "Lack of capital to buy medicine. So when they come looking for something or a patient needs a particular medicine but when I don't have the money to buy the medicine, it negatively affects me."

Challenges with National Drug Authority (NDA) had been mentioned by 17 of the drug vendors (22.7%). Their concerns with the National Drug Authority stemmed from not being registered with the district authorities and therefore lacking a license to operate. In instances of inspection, drug vendors commonly describe their fear of having their medicines being confiscated. by NDA inspectors. Confiscation of medicines effectively takes a toll on their business as they had to re-establish much of their stock to restart their business. An example of this is illustrated in this quote:

> "National Drug Authority came and took all my stock one time and I [had to start over] again. They wanted the district license."

Medicines being out of stock was seen as a challenge that affected the drug vendors business. Community members would come requesting certain medications and 10 drug vendors (13.3%) describe situations where they were unable to offer their services because they did not have a particular medicine in stock. The following quote provides an example of this:

> "Someone coming to ask for medicines and I do not have them (medicines) in my drug shop."

Less frequent sub-themes that are captured by the larger encompassing theme of challenges affecting business operations include: quarrels with community members, medicines expiring, language barrier with clients, and theft from drug shop. Illustrative quotes from these sub-themes are provided in Table 3.24.

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
1. Role in the provision of health services to the community (n=42)			
Providing successful treatment outcomes	36	48.0	• "What I have seen that is so important in that for the time I have been here, no person has died on the way." • "People go on reducing in number in terms of falling sick in...the time I had just come" • "I was here and they brought a child from Lujche, very far; the child was convulsing. When they brought the child they had feared but when I treated her, the child got cured."
Negative outcomes experienced in treating	4	5.3	• " There is a child I treated and put a drip on him/her but the child's mother pulled out the drip and left the wound/vein open. The child led to an extensive really running out of blood. It affected me a lot..." • "There is a patient they brought here, I use Quinine and it failed, I change to Chloroquine [and] it also failed, I continue trying with these only and it failed and the patient was taken for more treatment, I referred him/her okay that one is not good on my side"
Providing advice to community	2	2.7	• "[I] advise him that when malaria is much it does not go quickly. • "I just tell them advice that giving lots of drinks to reduce [the side effects of Quinine]."
2. Outcome of drug vendors' services beyond the health of their patients (n=37)			
Improved reputation in community	16	21.3	• "I have got a lot of popularity." • " People everyone who comes praises me." • " I would get so many customers and they could welcome me..."

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
2. Outcome of drug vendors' services beyond the health of their patients (n=37) - continued from theme above			
Complaints about drug vendors from community	6	8.0	• "There are people who talk ill of you, That you treat but you don't cure all those they talk about you." • " I treated the other one and talked ill about me because many that I usually treat and sends her back when well/alive but [some might have] fallen ill, maybe falls ill from the big health unit and dies" • " There is treating someone's child and they say you are the one who killed him. They say 'I took him to that nurse that he is the one who killed my child'."
Appreciation from community	8	10.7	• "They bring me others chicken, other bring, if it is harvest time, they bring something to me." • "When I treat and she gets cured, she comes and tells me that I have cured [her]. There is something she can bring for me as she comes to appreciate [with] anything she has, [like] an egg." • " A person can come while carrying something for me, people these ends eat posho, so a person can grind flour and bring for me and say that 'thank you because you treated my person and my person got well'."
Establishing friendships with community	4	5.3	• " Through this business... I get what to eat from it, I have bought a plot, I have made friendship." • "I cooperate with people, I cooperate with the customers and they become my friends." • " I have managed now to stay in this place... with the community of this place."
Services provide a source of livelihood	3	4.0	• " Out of treating, I have also got land. I have got, let me say plots [of land]" • "Through this business... I get what to eat from it, I have bought a plot..." • "It [my business] is where I obtained money for rent and it is where I get money to buy clothes for my children and myself."

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
3. Challenges affecting community as a whole (n=29)			
Poverty of community	18	24.0	• "Prices going high, and yet people do not have money." • "What I have seen the first challenges that community people are poor, then when they are poor, they do not buy, they cannot afford a whole dose for malaria." • "The challenges I have gone through are those of poverty among the people!"
Burden of malaria	4	5.3	• "Malaria of mosquitoes has defeated our understanding. Coartem and we applied but malaria doesn't readily yield to it." • "Malaria cannot go very easy and every morning people are following sick, children are following sick morning and evening" • "When it comes to a rainy season like this one, the cases of malaria is are too high."
Challenges faced at health units	4	6.7	• "People come when they do not have money... Then I tell her that "then go to the health unit." Then says that "In the health unit, they have sent me to come and buy this syrup and they have also written for me Quinine." • "[the caregiver] have stayed [at the health centre] for a whole day without getting any treatment. I told him, 'that you go and talk to the medical people there.' They told me that we told them but they told us to wait because there is no medicine. So at around two o'clock in the night the child died and they brought him back in the morning." • "health providers... see [drug vendors] as bad"

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
3. Challenges affecting community as a whole (n=29) – continued from theme above			
Burden of other illnesses	3	4.0	• "At times a malnourished kid is brought, kid is sick and is treated that kid does not get proper treatment because of the poor feeding." • "There are patients who come with illnesses and for that this is malaria but let say typhoid and I fail how I can help this person to treat that malaria of typhoid." • "even if they come when like those children they are, they have bruises on their heads like fungal diseases... due to some syphilis, which in vernacular [we] call "Lwenyanja" (severe malnutrition)... I have always made a combination of drugs according to the experience I know and succeeded so there I call myself almost a consultant to the malaria."
4. Challenges hindering treatment (n=49)			
Faults of Caregivers impeding on treatment	29	38.7	• "the child suffering from this illness, for 4 days...the father has been only buying Panadol for him...I told him, you delayed with the child but you would have brought the child when it was still earlier." • "Others when you give them medicines they are not active in giving the medicines to the child, they give and stop, they do not complete dose." • "people don't listen to advise that you will have given them; If you tell a person to make the child sleep in a mosquito net, him an adult will be the one to sleep in the net and leaves the child without sleeping in the net."
Prices of medicine high	7	9.3	• "Where we obtain [medicines], they are now costly, prices are high." • "tablets for malaria they have hiked them and people cannot afford that money to buy the treatment, and finish a whole dose." • "In buying, medicines are too expensive and on the other side when it is on the side of selling you find that they go slow."

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
4. Challenges hindering treatment (n=49) - continued from theme above			
Lack of diagnostic capacity	5	6.7	• "I don't have the knowledge of how to get things that can help me in checking to confirm that truly what am treating is malaria." • "When someone is ill of fever/malaria there is no way I can know that this is malaria or what am treating is this type of fever/malaria." • "I would [also] like...to test for the malaria parasite but I cannot."
Medicines unavailable for treatment	5	6.7	• " Changing the drug policy and the drugs not being available on the market or in the market. Like for example Chloroquine phased away, they brought in Coartem, but in circulation is not much on the market." • "I see is that government does not allow us to have other medicines. They want us to only [sell] painkillers, they don't allow us to sell...strong antibiotics." • " Well to bring the tablets and yet the patient which are suffering from the diseases the tablets [that] can work, they are not common."
Side-effects of treating	3	4.0	• "Mostly Quinine, if you inject the bums swells." • "Chloroquine, when you use it, it itches; Quinine blocks the ears and bring dizziness." • "They [quinine injection] normally blocks the ears, [they] tell you, 'I don't hear well in the ears, I feel like something is shooting in the ears."

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
4. Challenges hindering treatment (n=49) - continued from theme above			
Problems with repayment of credit	38	50.7	• "They do not pay me properly, I give them credit... we get losses because by the end of the year when I balance out the book, I may find that I have lost a lot of money, in a year. I may have a loss of 200,000 shillings. That one also, the business does not grow..." • " First debts, most people do not pay their debts, because these medicines do not come for free, you have to pay before you bring." • "people come and take the medicine on credit and they do not pay my money back."
5. Challenges related to business operations (n=78)			
Challenges with National Drug Authority	17	22.7	• "National Drug Authority came and took all my stock one time and I [had to start over] again. They wanted the district license." • "When the National Drug Authority come when you are not registered with them, they arrive and gather medicines and go with it or sometimes they arrest you too." • "Of course when they come and find unlicensed drug dealers in town...how shall we be fighting poverty yet they are coming and impounding our drugs. I would request to at least reduce the impounding of the drugs, at least be talking to us, convincing us so that we license our drug shops."
Medicines out of stock	10	13.3	• "Sometimes [some medicines] are out of stock, those tablets are not around plus the syrups." • "Someone coming to ask for medicines and I do not have them (medicines) in my drug shop." • "[someone]... has come and wants Quinine and you tell her I do not have and he/she tells you I have walked...[to] Bubali and I thought I will find them here [at the drug shop]."

Table 3.24 - Thematic Analysis – Responses Related to Drug Vendors' Experiences in Treating Malaria in the Community			
Question: Tell me about your experiences in treating malaria in this community.			
Themes and Sub-Themes	**Respondents (n =75)**		**Select Quotes Illustrating Themes and Sub-Themes**
	Frequency	**Percent**	
5. Challenges related to business operations (n=78) - continued from theme above			
Lack of capital for business	6	8.0	• "Lack of capital to buy medicine. So when they come looking for something or a patient needs a particular medicine but when I don't have the money to buy the medicine, it negatively affects me." • "The profit margin is very small, and even the capital. You may want to increase of the stock and even the services." • "I would wish to have a big stock I don't have adequate capital to do so."
Quarrels with community members	3	4.0	• "Quarrelling, these are at times when they come in need of you and you are not there." • " Another person may want me to work according to his knowledge so when I refuse to work according to his knowledge, we get a misunderstand and at times, he quarrels." • " someone quarreling comes with little money and says that you have given her [ineffective] medicines."
Medicines expiring	1	2.7	• "Sometimes you can maybe bring drugs it can sometimes get expired you pour it away. Because now when they get expired there is no use of stocking them there."
Language barrier with clients	1	1.3	• "The language and they don't pay money."
Problems with shop owner	1	1.3	• "My first boss did not pay my money and my salary"
Theft of drugs from shop	1	1.3	• "There are some people who come and just take our medicines when they are not a drug authority that when they are thieves/thugs but taking themselves as of drug authority (con men)"
TOTAL	235[a]	316.0%[a]	-
[a] Totals for frequency and percentage of respondents greater than expected due to multiple responses.			

3.3.6 To Assess Drug Vendors' Attitudes and Beliefs about the Informal Health Support System (Health Providers from Private or Public Health Facilities)

A majority of drug vendors (82.7%) stated that they often interacted with various health professionals and health staff from private or public health facilities (see table 3.25). Of these drug vendors that interacted with health providers, 98.5% stated that their interactions with the various health providers to be helpful. The remaining drug vendors (17.3%) reported either never interacted with health professionals or rarely (1-4 times a year). Nurses from either the private or public health facilities were health providers that most drug vendors interacted with (64.5%). Public sector nurses were the most frequently mentioned health provider (43.5%). See table 3.25 below for other less frequent health providers mentioned and the frequency of visits paid to each health provider.

The purpose of discussion for 53.2% (n=62) of drug vendors involved malaria treatment. In addition to malaria treatment, 45.2% of drug vendors (n=62) discussed or consulted health providers about treatment of various illnesses common in the community. Other less frequent responses listed in table 3.26 were either related to other aspects of treatment, personal visits, or information regarding upgrading education or obtaining licensing for their shop.

Table 3.25 -Types of Health Providers Drug Vendors Interacted with

Question: Who do you regularly talk with at the nearest private or public health facility?

Types of Health Providers	Responses (n=77)		Respondents (n=62)[b]		Frequency of Interactions		
					Several times a week: 1-7 visits/week	Several times a month: 1-3 visits/month)	"Often" (unspecified amount of time)
	Frequency	Percent	Frequency	Percent	Freq.	Freq.	Freq.
Nurses (public)	27	32.9	27	43.5	11	5	11
Nurses (unspecified)	10	12.2	10	16.1	6	3	1
Doctors (public)	6	7.3	6	9.7	2	1	3
Doctors (unspecified)	6	7.3	6	9.7	2	2	2
Unspecified health provider	6	7.3	6	9.7	3	-	3
Unspecified Health provider	3	3.7	3	4.8	1	-	2
Doctors (private)	4	4.9	4	6.5	-	-	4
Midwife (public)	4	4.9	4	6.5	3	-	1
Nurses (private)	3	3.7	3	4.8	-	-	3
Clinical Officer (public)	2	2.4	2	3.2	2	-	-
Nursing assistant (public)	2	2.4	2	3.2	2	-	-
Nursing Assistant (unspecified)	2	2.4	2	3.2	-	-	2
Health/Medical Assistant (unspecified)	2	2.4	1	1.6	1	1	-
Clinical Officers (private)	1	1.2	1	1.6	-	-	1
Clinical Officers (unspecified)	1	1.2	1	1.6	1	-	-
Dental assistant (public)	1	1.2	1	1.6	-	1	-
Midwife (unspecified)	1	1.2	1	1.6	-	-	1
Theatre Attendants (unspecified)	1	1.2	1	1.6	1	-	-
TOTAL	82	100.0	>62[a]	124.2[a]	35	13	34

[a] Totals for frequency and percent for respondents were greater than expected due to multiple responses provided.

[b] 13 respondents stated they did not interact with health providers often or at all, those who did interact with health providers often 98.5% found them to be helpful.

Table 3.26 - Purpose of Discussion with Health Providers				
Question : What is the common purpose of your discussion with the health providers?				
Cause	**Responses (n=88)**		**Respondents (n=62)**	
	Freq.	**Percent**	**Freq.**	**Percent**
Discussions/consultation about malaria treatment	33	37.5	33	53.2
Discussion/consultation on illnesses in community	28	31.8	28	45.2
Discussion about specific medicines for illnesses	5	5.7	5	8.1
Discussion/consultation of complicated cases	5	5.7	5	8.1
Discussion about availability of new medicines	4	4.5	4	6.5
Discussion on licensing and upgrading education	4	4.5	4	6.5
Personal visits	4	4.5	4	6.5
Availability of learning opportunities	3	3.4	3	4.8
Discussions about patients referred by drug vendor	2	2.3	2	3.2
TOTAL	88	100.0	>62[a]	141.9[a]
[a] Totals for frequency and percentage of respondents were greater than expected as a result of multiple responses provided				

Chapter 4: Discussion

Overview

It has long been recognized, by WHO[43] and by literature on the topic, that efforts towards improving the case management of malaria must engage the private sector. However, this study is exceptional and pioneering in that it concentrates on the unlicensed, unregulated vendors that make up an 'informal' and previously neglected segment of the private sector.[41] This study finds that unregulated vendors play a significant role in the case-management of malaria and leads up to a recommendation for a community intervention aimed at elevating their level of professional knowledge and skills. These recommendations arise from and are supported by the Discussion following, which reviews the study findings in the context of existing literature on the issue of malaria management in Africa.

In the proceeding chapter, I have presented my findings on unregulated drug vendors with respect to the 6 principal research objectives of the study. The Discussion will cover those aspects of unregulated vendors that are critical to the malaria-management of malaria in young children, in the context of existing literature surrounding the topic. These aspects cover the importance of unregulated vendors, their education, their experiences, their knowledge base, their practice skills and skill deficiencies, and their malpractices. In addition to these critical aspects related to malaria-management, aspects related to their involvement in future community programs, for example, their interests in participating in future training and their informal support network of health providers, are also discussed.

4.1 Census Findings

In order to have a more complete picture of the situation as it regards malaria case-management in Uganda, it was necessary to make an assessment of the health system infrastructure for this. The health system infrastructure has two broad branches: formal and informal. The formal service provider branch encompasses all government operated health facilities (hospital and health centres), privately run hospitals and health clinics and licensed retail drug outlets. The informal health service provider branch includes unlicensed and unregulated drug outlets, namely drug shops, mobile vendors, market stall vendors, and general-goods shops that also sell medications. Since there are no government records on the informal sector, this study undertook its own census, and its findings have been presented in the results section.

Rutebemberwa found licensed drug shops to be one of the more common formal providers in rural areas.[33] In contrast, our on-the-ground census found that there were only 2 licensed clinics and 18 licensed drug shops in the study area. It is common to find unlicensed drug shops many rural areas in Uganda.[13] In the study area, the unregulated vendors outnumbered regulated vendors by a ratio of 88:18, approximately five to one. This finding constitutes the key rationale for this study, arguing that for much of the population, the unregulated sector is the primary source of drug purchase, and therefore merits consideration in place in public health programs and interventions.

It is critical to keep in mind that these vendors are important not simply on account of their numbers, but also for another other: they also act as physicians, being the only person on the

scene who can and does diagnose, prescribe and are the primary dispensers of antimalarial medicines in the community. [35,38,100-10537] It is important that they have adequate, if basic, skills as pharmacists and para-physicians. Hence, this study pays due attention to their education, training and skill level, and makes recommendations for elevation of the same.

4.2 The Educational Level of Unregulated Drug Vendors

Tawfik et al[40] have reported that most of the informal private providers of medications were nursing assistants/aides. My study had similar findings. It was reported that 70.7% of the respondents had their highest level of formal education at the post-secondary education program level, but not necessarily to have graduated. However, only about 48% of respondents made the claim, although un-validated, that they had some sort of formal health related training (e.g. nursing assistant/aide, nurses, clinical officers, etc.). Of these 48.0%, roughly a third claimed to be trained as nursing assistants.

It is noted that even if a person is a certified nursing assistant/aide, he or she does not meet the licensing requirement for operating Class C drug shops, the lowest category, which in itself does not permit dispensing of antimalarial drugs. Even the unregulated vendors who do have some sort of formal health related training, the majority are unqualified nursing assistants/aides that do not met the licensing requirements for operating a Class C dispensing shop. By formal government standards, their level of training do not qualify them to dispense to customers on what drug and dosage is appropriate. The typical unregulated vendor does not have the general education requisite for making a proper judgment as to which drug and dosage are proper for selling to a particular patient.

These deficiencies in education may in part contribute to the phenomenon that the vendors give incorrect diagnoses, incorrectly dispensing medicines for the patients, and in general have inadequate skills as medicine dispensers as described in the next section.

4.3 Practice Skills and Skill Deficiencies of Vendors

Our study has shown that most vendors have inadequate knowledge and skills in their professional field. Worse, many have the wrong knowledge, and rely on it. Let us consider an example pertaining to prescription skills and the requisite knowledge. Chloroquine (CQ) is now banned by the Uganda government as, on account of resistance to it by the malaria parasites, it has a cure rate of a mere 18.4% for 14-day follow-up. Yet our study shows that 28% of the vendors continue to dispense it. The reason, our qualitative investigations reveal, is that the vendors genuinely believe that it still works. Again, we asked questions as to what “malaria medicines” are. In response, many vendors listed several medicines that are not antimalarial, including antibiotics, antipyretics, iron supplements and other nutritional supplements. Less than a third (29.3%) of subjects recognized that ACT is the best remedy --- a worrisome statistic.

In the matter of diagnostic skills, only 47.0% of drug vendors were able to identify 3 or more of the bench marks indicators of uncomplicated malaria in children 5 and under provided by the Ugandan Clinical Guideline (high body temperature, vomiting, loss of appetite, and weakness/lethargy. Only 21.3% enumerated all four signs/symptoms. A mere 10.7% of drug vendors were able to state at least three of the 7 benchmark signs/symptoms of severe malaria (changes to behaviour, confusion or drowsiness, altered level of consciousness or coma,

convulsions, difficulty in breathing, severe anaemia, hyperpyrexia, and severe vomiting). Also, among other disturbing phenomena, the responses of subjects indicated that they could not easily distinguish between uncomplicated and severe malaria.

Incorrect dispensing of non-antimalarial medicines has been document in the literature across SSA.[42, 47] Studies in Nigeria, have also documented medicine sellers confusing antipyretics with antimalarials.[88,89] Our study finds that 12.0% of drug vendors did not recommend any antimalarial medicines . Children receiving treatment from this group receive medicines that do not cure malaria. Medicines in this group range from antipyretics to antibiotics. Incorrect use of medicines may stem from an uncertainty of whether a febrile illness is malaria. Providing incorrect medicines results in misuse and wastage of funds and resources by clients and society. This malpractice may stem from drug vendors resorting to presumptive treatment based in poor knowledge on signs/symptoms and lack of diagnostic capacity.

Hildenwall et al[90] discuss the local illness concept in Eastern Uganda, in relation to pneumonia, and describe how caregivers often confuse it with other febrile illnesses, including malaria. This local concept of illness also extends to drug vendors, likely due to a lack of diagnostic capabilities to differentiate various febrile illnesses within the community (for example, as typhoid, yellow fever and pneumonia). Our qualitative inquiries have determined that these vendors have no diagnostic tools other than a thermometer and stethoscope. They demonstrate and inadequate knowledge base of signs/symptoms and make presumptions --- often illogical and unwarranted --- based solely on their personal experience with patients. They see, in a patient, fever and other overlapping symptoms common to other febrile illnesses

in the community and cannot make a correct diagnosis as to what the malady is, but may assume it to be malaria. Thus, when these vendors diagnose and dispense incorrect medicines, their minds are largely informed by hunch, intuition and presumptions based on their past personal experience with patients, but not on objectively arrived at medical knowledge.

Looking ahead to the next section, on malpractices, it is found that malpractices of vendors is driven in part by their belief in themselves in having the appropriate skills and knowledge, their belief in their own contribution to the health and well-being of the community and their desire for a successful business as it is their source of income. However, the poor skill level of vendors is an important cause of and factor in many of their malpractices, and any program to combat malaria in Uganda must address this matter of the skill of vendors as pharmacists and para-physicians.

4.4 Malpractices and Poor Practices of Vendors

4.4.1 Phenomenon of Not Using ACT as a First-Line Remedy

The World Health Organization and all SSA governments hold that ACTs should be the first-line treatment for uncomplicated malaria, and Ugandan government policy is consistent with this, recommending artemether-lumefantrine as the first-line medicine. However, this study finds that in Butaleja district only 9.3% of unregulated vendors always recommended an ACT for children.

To compound matters in this study, only 26.7% of drug vendors stated they stocked an ACT (either AL, DHA-PPQ, or AS-AQ), and only 4.0% of drug vendors stated that ACT was the most

frequently sold medicine in their business. Furthermore, only 6.7% of drug vendors consistently and accurately adhered to treatment guidelines by recommending an ACT. Fink et al[24] undertook a study in 6 eastern Districts in Uganda (that included 2 neighboring Districts to the north of Butaleja) on the sales pattern of malaria drugs before ACTs were subsidized for private retail drug outlets by the government in 2011. This study by Fink et al[24] as part of its larger objective was to promote and facilitate the sale of subsidized ACTs in Class C drug shops. A baseline study was conducted to determine the ACT sales before an intervention promoting subsidized ACTs was implemented. There are no comparable studies related to unregulated drug vendors with regards to ACT sales; hence, findings from this study, although examining licensed drug shops, was used as a basis for comparison. But it should be noted that their study had a considerably small sample size (n=4). Base-line findings from Fink et al's[24] study reported that only 32.5% of licensed drug shops stocked ACTs. In my study only 26.7% of the unregulated vendors state that they stock ACTs. Despite the differences between sample size and licensure, the figures are close, which indicates limited awareness of subsidized ACTs.

4.4.2 The Inappropriate Usage of Quinine

According to prevailing medical wisdom and the national guidelines, ACTs have far better cure rates than quinine.[73] Studies in Uganda have reported that the 28-day follow-up cure-rate of quinine is 64%, compared to the high 90% cure-rates of ACTs. In fact, Yeka et al argue for replacing quinine with ACTs even for second-line treatment, since ACTs are well tolerated, highly efficacious, and are able to reduce malaria transmissibility through curtailing gametocyte carriage.[77] As such, quinine should be administered to a patient only as a second-line resort,

only if he or she shows contra-indications to ACT. [23,74-76] In addition, quinine has a 7 days treatment duration compared to the 3 day dosing regimen of artemether-lumefantrine[73], which is a drawback due to potential non-adherence due to a longer dosing regimen.

In spite of the authoritative view from Uganda malaria treatment policies and WHO that quinine should be a second-line recourse only, it is widely recommended and sold by vendors as a primary remedy. The literature relates that oral quinine continues to be used as a treatment for uncomplicated malaria.[74,80] In particular, Cohen et al.'s more recent study, covering the Soroti District of Eastern Uganda, finds that quinine was the most commonly sold anti-malarial medicine in the *licensed* Class C drug shops.[81] Our study corroborates these findings, in the sense that there is a similar picture in the unregulated sector. Our finding is that oral quinine is the most recommended anti-malarial medicine (61.3%), and it sold by more than half of drug vendors (54.7%).

In our study, 10.7% of our respondents stated they sometimes recommended an ACT and sometimes the second-line medicine oral quinine. Our qualitative methods have revealed that these vendors often recommend and sell quinine as a primary remedy, simply because it is in stock and needs to be sold, or because they did not have ACT's in stock. Equally problematic are those drug vendors who recommend and sell quinine as the sole option for the treatment of malaria, and they comprise an astonishing 28.0% of all unregulated vendors. This improper use of quinine is harmful to the end-user for the reasons given in the preceding paragraph.

This malpractice is made worse by the fact that the vendors usually impose quinine as a mono-therapy upon their clients, in opposition to WHO advisories to combine quinine with

doxycycline, clindamycin, or tetracycline so as to shorten the treatment course, cut down the disease period and limit reinfection.[74]

4.4.3 Improper Usage of Injection-Administered Quinine

Quinine therapy as a whole entails significant danger from side effects (e.g. dizziness, tinnitus, blurred vision, etc), but these side effects are multiplied when quinine is administered by injection into a patient's body. For instance, if the caregiver pumps in the quinine too quickly while doing an intravenous injection, this could result in hypotension and venous thrombosis.[74] Similarly, an intramuscular injection could be followed by paralysis and abscesses. The administration of quinine injection is a complicated process that involves proper training, experience, time, careful attention to dosing, and a sanitary environment. All these are lacking in the vendors under study much like what has been described in the literature regarding drug shop attendants.[35,97,99] Yet 53.3% of them stock injectable quinine even though sale and administration of injectable medicines at Class C drug shops in Uganda is strictly forbidden.[99] One research assistant discovered that several drug shops had informal rooms for injections, and we heard that quinine was often injected in such rooms.

4.4.4 Dispensing of Incorrect and Non-Guideline Antimalarials

Some anti-malarial medicines are deemed to be incorrect because either *P. falciparum* of the region have developed resistance to them, rendering the medicines ineffective, or their use as a monotherapy compromises an effective treatment. These drugs include: chloroquine, sulphadoxine-pyrimethamine, primaquine, artemether (artemisinin mono-therapy), and

injection-form quinine. Approximately 39.9% of vendors engage in recommending incorrect anti-malarial medicines that are not included in the Uganda National Treatment Guidelines for the treatment of uncomplicated malaria. Particularly deserving attention is that roughly half of this 39.9% recommended chloroquine, which was still alarmingly high considering it had been phased out since 2004, yet still earned a notable spot in the limited list of antimalarial medicines mentioned by the drug vendors. Furthermore, 12.0% percent of respondents recommend and dispense incorrect medications exclusively, and do not sell ACTs and quinine, further demonstrating problematic dispensing practices.

4.4.5 Engagement in Irrational Poly-pharmacy

Polypharmacy is a commonly described practice in developing countries in both public and private sectors.[91-93] It is the practice of "mixing of medicines," and sometimes adding unwarranted medications to the drug set for a patient. This study found that, for malaria, unregulated Ugandan vendors add the following medications in conjunction with antimalarial medicines: antipyretics (especially paracetamol), antibiotics, cough and cold preparations, antidiarrhoeals, anticonvulsants (especially diazepam), antibiotics (24% of vendors dispensed cotrimoxazole, amoxicillin, ampicillin, penicillin and metronidazole in conjunction with ACT). Our study finds that 50.7% of drug vendors engage in some form of poly-pharmacy when dealing with malaria. Although it should be noted that antipyretics or anticonvulsants is not irrational since these have a place for managing fever or convulsions, respectively. Out of the different classes of medicines, antibiotics were the most problematic in irrational polypharmacy. The immediate shortcoming of dispensing antibiotics for an incorrect illness is

the potential development of antimicrobial resistance, which could render many medicines no longer effective against infectious disease that are prevalent in the community.

4.4.6 Influences from Caregivers

In the literature, one of the reasons often cited as to why caregivers seek out treatment or advice from drug shops is that drug shops attendants/owners are often responsive to their client's demand.[35,106,107] Our findings corroborate this notion of responsiveness to client demands. Approximately 81.0% of drug vendors responded with a straight forward 'yes' that they would sell what caregivers requested of them. Quinine, Artemether-Lumefantrine and Chloroquine were among the top three antimalarial medicines reported by drug vendors (58.9%, 27.4% and 20.5%, respectively) to be requested by caregivers. Quinine and chloroquine has already been discussed in earlier sections as to why they are inferior medicines compared to ACTs. As such, caregivers requesting less effective medicines compounded by drug vendors' responsiveness to client demands compromises an effective treatment received by a child suffering from malaria.

Drug vendors selling a sub-optimal therapeutic dose is a commonly described situation in the literature.[35] Caregiver's inability to afford medicines recommended by the drug vendor can lead to a child receiving an under-dose therapy. Twenty-four percent of drug vendors stated they would sell what the caregiver could afford even if it is the incomplete course for treatment (e.g. purchasing tablets separately). Two major problems arise from providing children: 1) the patient does not receive the correct dosage to clear the parasites from the body and effectively

curing the malaria; and 2) parasites can potentially develop resistant to the under-dose medicine given, thus rendering the antimalarial medicine less effective for future use.

4.4.7 Experiences as a "Health Provider" that Influences Practices

Qualitative inquiry allowed us to understand how their experiences as a "health provider" in treatment of malaria may have influenced their practices. The local community refers to drug vendors as "musawo" which translates to "health provider" or a rough translation for a doctor. Thematic analysis of the interview data identified five major themes that emerged when drug vendors were asked to describe their experiences in treating malaria: 1) their role in provision of health services to the community, 2) the outcome of their services beyond the health of the patients, 3) challenges within the community, 4) challenges hindering treatment, and 5) challenges related to business operations. The first two themes delved into the experiences with treatment that establishes the drug vendors' sense of altruism to help the community but also building a social proximity to clients and neighbours to become integrated into the community, similar to what Chandler et al describes.[111] But it is the themes related to challenges that particularly influences drug vendor practices.

Two specific challenges that emerged from the five major themes mentioned above that are worthwhile to discuss are 1) faults of caregivers that impede on treatment and 2) lack of diagnostic capacity. Both of these have potential influences to their practices and deserve attention in the Discussion.

Approximately 40% of drug vendors identified that caregivers of children play a part in the mis-management of malaria. They point out negligent parents that delay treatment, provide incomplete doses, and avoid using mosquito nets. This finding is important in that, although my study identifies flaws in drug vendor practices, caregivers of children are also held accountable in demanding effective medicines, providing treatment in a timely manner, and help prevent malaria. Lack of diagnostic capacity is a challenge that forces drug vendors to The Recommendation section speaks to some of these points as well as the latter two challenges identified by drug vendors.

WHO encourages parasitological confirmation for diagnosis of malaria.[9] Drug vendors rely solely on presumptive treatment for malaria, since accurate microscopy testing is limited to higher level health centres. In addition, treatment itself has been used a used as a form of 'diagnosis' for drug vendors where a trial and error approach leads to a diagnosis.[111] Issues raised with presumptive treatment concern over-diagnosis of malaria, overtreatment with antimalarial medicines to those with nonmalarial illnesses, which limits the effectiveness of the medicines, and wastage of limited global funding and drug supplies that could be better targeted for those who need it.[111] Although only a small fraction of drug vendors described this as a challenge (6.7%) it is worthwhile for discussion.[111] In the recent years, there has been an increasing amount of literature researching the feasibility of rapid diagnostic testing (RDT) in Uganda.[111,114-118] RDTs now makes it possible to make diagnostic confirmations even in the informal private sector making a major leap forward in improving case-management in the community, especially alongside increased ACT coverage.

4.4.8 Reflection on Malpractices

It is evident from our survey findings, related above, that the practices of the informal drug retail sector are not in accordance with the national malaria treatment guidelines of Uganda and the WHO. Moreover, as a result of their malpractices, young children are not getting the correct medication for malaria management. These children are exposed to health risks and side effects, for example when they ingest antibiotics in conjunction with ACT's, or receive quinine injections. Their knowledge base on cause and prevention, also critical parts of malaria management, have misconceptions that hinder effect management. In addition, influences from caregivers and various challenges within the community play a part in limiting an effective management of malaria. As such, a program to address these malpractices would be worthwhile.

4.5 Misconceptions in Knowledge and Belief about Cause and Prevention of Malaria

All drug vendors reported that, to their knowledge, mosquitoes are the vector of malaria, but 38.7% mentioned that there exist other vectors and causes, and this indicates that they harbor misconceptions. The responses of drinking dirty or unboiled water and general uncleanliness as causes were amongst the chief misconceptions (9.1% and 5.6% of total responses, respectively). Although many misconceptions were less frequent responses, they do suggest a confusion of malaria and other febrile illnesses. This confusion is further carried over to drug vendors' knowledge on prevention.

Several misconceptions were reported by 54.3% of drug vendors even though a majority (88.6%) provided responses involving limiting human-mosquito contact. Reported preventative measures such as improving cleanliness, sanitation, or hygiene, drinking boiled and clean water, providing quality food, and providing medicines for treatment seem to, again, suggest a confusion of malaria with other illnesses.

Both findings on knowledge on cause and prevention indicate a limited capacity in differentiating between different febrile illnesses within the community, and thus renders their treatment practices flawed. Enhancement to such knowledge area in malaria management is important and is further explored in the Recommendations section.

4.6 Informal Health Support System

The various health professionals and staff at public or private health facilities seem to have established an informal health support system that recognizes the role of drug vendors. Drug vendors reported to refer patients quite frequently when the illness is beyond their abilities and inversely public health providers, as reported by drug vendors, send patients to purchase drugs after writing prescriptions in informal referral books. The findings showed that drug vendors often interacted with those at public health facilities the most. This is likely due to the fact that there are only two private clinics in the study area.

Between private and public sectors, nurses were reported by 64.5% of drug vendors that interacted with health providers frequently. Doctors are under shortage in Butaleja with figures stating that there is one doctor for every 100,000 people[36], which suggest why doctors are not the most frequently visited health professionals. Since drug vendors stated that they commonly

interacted with nurses most often, nurses could be used most effectively to pass along information to drug vendors in a peer-to-peer education format which will be discuss in the Recommendations.

Their purpose of discussion during their visits with various health providers as reported by the drug vendors often involved discussions on malaria treatment (53.2%) or treatment of other illnesses within the community (45.2%). This finding demonstrates the various health providers in the community, especially nurses, provide an informal support network for drug vendors to consult and learn about treatment. Such a network can be leveraged and further discussion is made in the Recommendations.

4.7 Interest in Future Training

Most of the subjects brought up the topic, and said that they desired formal though brief training, so as to improve their skills, success rate in healing of patient, business bottom line, and standing in the community. Out of 75 subjects, only one said that he had no interest, and other 74 were emphatic in stating that they desired training, and would definitely take it, if it were offered and available in the district.

Drug vendors offered several suggestions as to what they preferred as means to learn more about malaria. A large proportion (89.3%) mentioned short-training sessions (e.g. seminars or workshops) as a means to learn more about malaria. Almost all interventions as reviewed by Goodman et al have implemented a educational component in the form of workshops. It is an important finding that drug vendors also welcome this form of training as it seems to be the most-cost efficient means to provide training to groups of people.

Radios has been mentioned by approximately a quarter of the respondents as a preferred source to learn more about malaria. Radios, however, are limited in that messages are restricted to broadcast times. Any use of radios to disseminate malaria-related messages should be during predictable hours where drug vendors are not interrupted by the daily activities of life.

4.8 Options for Alleviation of the Situation

It is evident from this Discussion that while unregulated vendors play an important role in the community and in the case-management of malaria, there are serious problems and there is room for improvement. However, any program requires funds, and funds are always scarce. The most viable options are "small push – big yield" ones, and this study proposes that a targeted, practical training program for the unregulated vendors is possible, affordable and will yield quick and definite results. Such a program is likely to lead to an atmosphere that will be conducive to reconsiderations to polices related to licensing of the vendors, bringing them into the formal sector, and making them more responsible. The following section, titled "Recommendations," will describe this option more fully.

4.9 Recommendations

This paper makes only two recommendations. The primary one is for the establishment of a program for training of the unlicensed, unregulated vendors of malaria medication. Given that the responses to our interviews, and other data collected in the course of our qualitative investigations have inspired this recommendation and furthermore inform all aspects of the design of the proposed program, the program design is presented in some detail. The secondary recommendation is for a program for the basic education of the general public

(including caregivers) of Uganda as to which drugs and brands they should use for malaria medication. This program is described very briefly, while the program for vendors is described in great detail, since it is more in line with the focus of this project, i.e. the unregulated vendors.

4.9.1 Educational Program for Caregivers

It has transpired from the Results and Discussion that not all caregivers of children five and under are fully cognizant of effective medicines for malaria. The findings show caregivers are just as important in the overall case-management of malaria as they have an influence on drug vendor practices. As such, a program address such deficiencies at the caregiver-side through education on the key elements related to malaria management will have an impact on malaria outcomes in the community. The main focus of the education should focus on medication. First, the program shall inform the public that the first-line ACTs are the recommended antimalarial medicine and is currently subsidized to improve affordability. Second, the program shall familiarize the public with the brand names and labels for the reliable varieties of ACT's that are available in Uganda. The education can be delivered by leaflets, short radio spots, and by personnel who shall visit the villages and speak to the public in schools, public places such as community centers, and village meetings.

4.9.2 Training Program for Unregulated Drug Vendors

The intent of the training will be to elevate the diagnostic and drug dispensing abilities of the vendors. Almost all drug vendors have stated an interesting in participating in future training

opportunities. As such future community management programs would not have a lack of trainee participation. In the next few sections, further recommendations regarding the additional participants, delivery, trainers, content, and desired and incidental outcomes of the program will follow.

Additional Participants

Various individual participants who occupy health provider roles can take part in this program For instance, local doctors and nurses interact well with the vendors, and they may join in as teachers and advisors, either as volunteers or as paid participants. Public or private nurses, in particular, have the greatest potential to help train drug vendors, since it has been identified in my study that they were the health provider drug vendors most often interacted with. Outside of the recommended training program, such nurses can continually be advisors to drug vendors in the community provided that these nurses are able to pass on reliable information. This promotes the inclusion of nurses in such training programs, so they too, can take part in training, become aware of important up-to-date information on malaria management, and hopefully pass on relevant information to their network of drug vendor colleagues that often seek them for help.

Delivery of the Program

The education and training should take place on the spot, in the district. The vendors are busy earning a living and serving their clients, hence they cannot be away for long, and travel to a distant location. Hotels or other rented accommodation add to costs of limited funding. The vendors should be able to live at home, or with local people that they know, during the training.

The locale of the training, ideally, should be a room or hall in the district hospital. The hospital already has some infrastructure, like an instruction theater, screens, and apparatus for displaying slides. Moreover, if nurses are to be enlisted as trainers and demonstrators, they will be conveniently nearby. There is the advantage that malaria patients will be nearby, so that the trainers can take the trainees to the wards to see patients, and give practical views, demonstrations and examples of what they are talking about. Finally, the health authorities are likely to allow use of the facilities free of charge, since this program shares their overall goal of promoting public health.

Similar training and orientation programs, carried out in East Africa, have found that long sessions of a week or so do not work well with people of low education and rural outlook, and that it is better to work in multiple short training sessions.[40,49] Our study confirmed that this would be appropriate for this program, insofar as 89.3% of the subject drug vendors said they preferred to learn in multiple short training sessions as workshops or seminars.

The duration should reflect travel time to and from the chosen location in one day, so they will be able to carry on business as usual. This preference of theirs for short training sessions is a match with the financial constraints that such a project will face, for stays of a week or so for training, in the district capital, will entail costly hotel and meal expenses.

The prospective trainees, as represented by the subjects of our study, stressed that they were not fully comfortable with reading materials, and would learn better if they had lectures accompanied by a lot of visuals, in paper illustrations, slides and videos. The training and equipment should include small booklets to re-read and refer to, but be heavy in lectures that

are rich in visual images (say, of a blood vessel affected by malarial parasites, or a patient with chills and fever, the temperature being displayed) delivered by slides and videos on a big screen. Print materials that they can re-read and refer to should give the basics, such as the symptoms for malaria and other febrile diseases, and markers that distinguish between these various diseases. Also, they should --- among other things --- give full specifics as to the dosage and ingestion regimes of the various medications presently in use, and recommended by national health guidelines.

The drug vendors are not proficient in English, so the bulk of the messages should be conveyed in Lunyole, which is the common language in Butaleja District. However, since drug names and many scientific terms (such as “protozoa”) have no African language equivalents, there will be some English in the lessons and booklets.

Content of the Education and Training

1) The education should focus, as far as possible, on malaria, and touch on other diseases only if they might be confused with or mistaken for malaria. That said, the training should encompass the local febrile diseases that are commonly confused with malaria, a review of the symptom set for each disease, instruction in how to distinguish between them, and in particular in how to recognize malaria and distinguish it from the similar diseases and conditions (such as convulsions).

2) The program should focus on specific and concrete aspects that are immediate to the diagnosis and cure of malaria, and avoid (so far as possible) --- general health and fundamental biological issues such as the role of perspiration in life, the role of blood, or the brain’s use of

oxygen. That said, the trainers should improve the trainees' knowledge in basic health sciences, where their lack of such knowledge is impacting their malaria practice.

3) As to the specifics of malaria, the education should review the cure rates for the specific drugs (especially ACTs), so as to demonstrate which drugs are efficacious and which are not, and to remove misconceptions. In addition, awareness of subsidized ACTs available in the private retail sector should be mentioned. Earlier, in the Discussion, we mentioned that some vendors are dispensing chloroquine (CQ), though it now has a cure rate of only 18.4%. Drug vendors need to appreciate what this statistic means and how it translates into real life situations. Some of the vendors have the misconception that it is still an effective drug, and this kind of wrong notion must be addressed.

4) All the malpractices and poor practices enumerated in the Discussion section should be addressed.

5) Vendors should be made aware of range of incorrect medicines that they are dispensing, and made aware of the negative consequences to the patients and to society.

6) In order to educate the trainees about the symptom set in a vivid way, the visuals should establish a clear association between a bio-phenomenon within malaria and the symptom that it produces. For example, in the phenomenon of sequestration, malarial parasites invade and change the cells on the surfaces of the blood vessels of several organs, and this obstructs the microcirculation in these organs, crippling their functioning. This brings about many alarming symptoms, including anemia, respiratory distress and acute renal failure. The education may

show a color slide of an affected organ, with the change in color of the invaded blood vessel surfaces, and immediately follow it with a video image of a patient (really affected by this sequestration) who is visibly anemic, has respiratory distress and urinates a tiny amount of fluid that is of an abnormal color.

Certification

Successful trainees should receive a certificate upon completion. This will give each trainee a sense of pride, inspire justified confidence in their clients, and hopefully give him/her some courage and confidence towards applying for a drug license, and ending his/her present unlicensed, unregulated status.

Anticipated Obstacles

Many of the subject vendors expressed a degree of fear of the National Drug Authority (NDA), the body that, among other things, issues vendor licenses. They may fear that if they go to a training session, NDA personnel will take the opportunity to identify and list them with ease, and later prosecute or otherwise act against them.

4.10 Directions for Future Studies

After review of all the findings and interpretations made from them, it emerges that there are areas of practical interest and social significance that have not been sufficiently researched. Among them, three are closely related to the present study on unregulated vendors whose practice includes malaria management. One concerns the fact that the vendors are unregulated, and why. Another concern relates to the use of rapid diagnostic testing (RDT) for

malaria by vendors (licensed and unlicensed) in Uganda. Lastly, one concerns the availability of subsidized ACTs

4.10.1 Regulation and Non-Regulation

It has been noted, in this study, that in Butaleja District, the non-regulated vendors outnumber the regulated vendors by a factor of about 5:1. This means that in places, mainly rural, the majority of vendors are in the informal sector, live in fear of the authorities, and are fearful of availing themselves of public resources that may be or become available, such as basic pharmacy training. Since the regulated and unregulated vendors both have shops, premises, stocks, clienteles and in some cases employees, it has to be asked what is hindering the unregulated vendors from obtaining licenses. Are the difficulties and qualifications really so immense? Do the government officials carry out onerous inspections of the licensed shops, and do these inspections get in the way of profits? If it is a matter of getting education and qualifications, can the owner-operators of the unlicensed shops hire someone with these qualifications? Above all, can this problem be solved by way of relatively minor, affordable and doable changes? This is an area on which no literature could be located by this study, and it may constitute a promising field for inquiry. Further it can help promote discussions on policies related to their licensing, for example, their qualifications and costs of licensing.

4.10.2 Rapid Diagnostic Testing (RDT) for Malaria

Accessible RDT's would represent a major leap forward in improving the case-management of malaria in the country. Fortunately, in recent years, literature on the feasibility of RDT in

Uganda has emerged.[111,114-118] However, these articles and studies have covered only the licensed, registered drug retailers. Since the unlicensed, unregulated vendors constitute a large proportion of the providers, a study concerning the desirability and possibility of equipping them with RDT apparatus is called for, and may well lead to practical implementation of this idea. It is further remarked that such a study would likely cover new ground, since the unregulated vendors may have educational background and professional skills lower than that of the regulated ones, and will pose different challenges and call for different solutions as regards their ability to use RDT's.

4.10.3 Subsidized Over-the-Counter ACTs for Malaria Treatment

There are currently no studies on unregulated drug vendors examining the role of ACTs as over-the-counter medicine. Fink et al[24] undertook a study on the sales pattern of subsidized ACTs in licensed drug shops in 6 Districts in Uganda. ACTs were not considered an over-the-counter medicine at the time of their study and; therefore, could not be sold in Class C drug shops. However, reclassification of ACTs in Uganda to an OTC medicine was already underway and Class C shops in their study site were granted permission to sell ACT. Speaking to the District Health Officer in Butaleja District indicated to us that ACTs were not yet reclassified as an OTC medicine. Future studies should pay attention to the fact that ACTs will be both subsidized and allowed to be in Class C drug shops in due time.

With unregulated drug vendors being a first point of access to malaria medications in the community, it is sensible to understand treatment practices in the face of increased access to subsidized ACTs and its reclassification to an OTC medicine. Much like future studies suggested

for RDTs in the previous paragraphs, differences between licensed and unlicensed drug vendors will pose different challenges and call for different solutions with respect to each group.

4.11 Limitations

The current study has a strength that contributes to its validity, in that the sample of 75 respondents amounted to perspectives that spanned the district. As such, selection bias and the probability that the sample is not representative are both low. Also, due to the big-proportion nature of the sample, the perspectives collected and issues/aspects that emerged span a wide range, a range that occupies much of the entire spectrum of perspectives, issues and aspects. However, there are limitations, and we review them below.

First, the cross-sectional design of the study had interviews that were conducted at one point of the year, in the months of late-July and mid-September that fall in the months of peak rainfall. In view of the fact that malaria has seasonal variations and impacts, there is some possibility that had the interviews been conducted during several periods over the entire year, the study would have derived different results. Second, since this study is confined to a sample taken from only one district, generalizability to other regions of Uganda, particularly outside of the eastern districts would be limited. Therefore, due caution should be exercised in generalizing the results to Uganda and larger territories and populations such as East Africa. Third, since purposive sampling was used for selection of participants at the village level, the survey was not sufficiently randomized. However, an effort was made to recruit all unregulated drug vendors at the parishes that were selected in this study in order to collect a wide range of perspectives and to reach data saturation. Fourth, the study relies on responses from unregulated drug vendors. There are many factors that may have worked to lead them to skew their answers.

They have a pecuniary interest in prescribing and selling drugs, and are certainly not an unbiased group. In addition, they fear the authorities, are shy of admitting anything that suggests that they have a low level of education and knowledge, and are also shy of admitting to conduct that is unprofessional or unethical, such as selling quinine in place of the more appropriate ACT simply because it is in stock and must be sold else they will lose money. As such, reporting bias is a sizable limitation of this study, and future studies may opt to employ mystery shoppers to get around this problem. Fifth, in retrospect, the interviews and follow-up questions failed to capture enough specific, detailed data on some aspects of the vendors' practices. In particular, the study did not probe deeply into the advice and recommendations given by the vendors regarding manufacturer, brand, dosage form and dosing regimen. This may have affected some findings and conclusions. Finally, the study did not delve deeply at the special age group of children under 4 months of age or under 5 kg in body weight. This particular group calls for the use of quinine as opposed to ACTs. Conclusions drawn from our study did not specifically address this vulnerable population.

Chapter 5: Conclusion

This study was undertaken with the objective of assessing the knowledge, professional skills and practices of the unregulated drug vendors of Uganda, in the matter of malaria management for young children, with particular focus on the most practically significant aspect of the topic: the vendors' case management of malaria in young children. This objective has been realized, in that the study has obtained and interpreted a substantial body of data on the topic. The information derived reveals that the vendors are a respected, integral part of their communities with a sincere desire to serve and heal their clients. It also transpired that for many rural communities, the drug vendors are the doctor and pharmacist of first resort. As such, any deficiencies in their professional ability and practice have negative impacts on the children who have malaria, and the data shows that there are deficiencies. For instance, only 26.7% of drug vendors stocked ACTs and even far fewer (6.7%) correctly and consistently recommended an ACT when asked about their recommendations. In addition, 54.7% of the vendors in this study sample dispense quinine as the first-line remedy instead of ACTs, in violation of Uganda government guidelines, even though quinine is markedly less efficacious. Again, development of resistance to Chloroquine has been widely documented, and it now has a success rate of only 18.4%, yet 18.7 % of vendors in our study sample continue to recommend and sell it. From specific findings, the study has arrived at a broad finding that the vendors do not have adequate qualifications, training, scientific knowledge regarding malaria and knowledge of the success rates in the drug mix currently available. Recommendations towards a 'supply-side' program that will address these deficiencies of vendors, in the interest of the

malaria-infected children, will be worthwhile to explore. Given that out of 75 subjects, 74 subjects expressed willingness to enroll for training, such a program would not suffer for lack of trainees.

The study survey also found that unregulated vendors are influenced by the wishes of the clients, when they sell drugs. If the parent of an infected child is insistent upon buying, say an antipyretic or antibiotic, and states that he/she believes that it cures malaria, many vendors will sell it without much objection, though the drug is in fact not an antimalarial. However, it does show that children would benefit if their parents and the entire population received some basic information and education as to which drugs (such as ACTs) and brands are most effective for malaria. Then, they would demand these and get them from the vendors. Findings such as this one argue for a 'demand-side' program to educate the buyers and their peers, the general public.

While there have been research studies on the regulated vendors of Uganda, this is the first on the large population of unregulated vendors, a group with a significant impact upon young children affected by malaria. It is hoped that since this study has brought to light serious deficiencies in this neglected group, and indicated the large impact of these deficiencies, this work will spark more investigations into this important area, and help to initiate alleviative programs.

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Appendices

Appendix A: Interview Guide

Semi-Structured Interview with Unregulated Drug Vendors in Butaleja District

1. What different variety of illnesses do you treat here in your shop? Do you have a particular specialty (which illness do you believe you treat best), why do you believe this? What do people commonly come here for?

2. How many different varieties of western **malaria** medicines do you sell? What is each brand used for? Which brands sell the most? Why.

3. Where do you obtain your western **medicines** from (source)? Why do you go there? How often?

4. What do you think causes malaria in children five and under? Is it preventable? How can malaria be prevented?

5. Can you tell me the common signs/ symptoms of uncomplicated malaria in children five and under? What is the one main sign of malaria?

6. How do you personally decide if a child has malaria? Are you aware of other way(s) to diagnose malaria?

7. In your opinion, which is the best option to treat malaria in children five and under? Why? Which is the worst? Why? Are these in stock today?

8. How do you decide which **malaria** medicines to stock in your shop?

9. Which **malaria** medicine is sold most in your shop for children five and under? Which is the most common form?

10. What **malaria** medicines do you normally recommend for children five and under? What is the most common medicine? What is the most common form?

11. What is the **average** cost of the **malaria** medicine that you recommend?

12. If caregivers cannot afford the **malaria** medicine you have recommended for their children five and under, what usually happens?

13. Which **malaria** medicines do caregivers normally ask for their children five and under who have malaria? Why? Do you always sell them what they request? Why? What is the most common **malaria** medicine that you sell to them?

14. Under what circumstance would you not feel comfortable recommending a **malaria** medicine for a child five and under? What do you then tell the caregiver?

15. What happens if the fever continues after you have recommended a western **malaria** medicine? What do you do for severe cases? How do you know that a child is experiencing severe malaria?

16. What information if any do you provide to caregivers when selling them **malaria** medicines for their children? Do you provide the same/ different type of information for different **malaria** medicines, explain?

17. How, where, and when did you learn about treating children five and under with fever? How, where, and when did you learn about treating children five and under with malaria?

18. Can you tell me your preferred source to learn more about how to treat malaria? (probe about others: radio, TV, drama, local area workshops, etc) Further probes: a) Which sources are not ideal for learning about malaria; b) which preferred sources are easily accessible; c) Which preferred sources are **not** easily accessible and why?

19. If you were offered a training course in how to treat malaria, would this interest you? Why would you be interested in a training course being offered to you? How long can you attend the training for?

20. How regularly do you talk with the nearest health facility (private, public)? Nurses? Doctors? What is the common purpose of your discussions? Do you find them to be helpful to you, please explain? (Think back to your last interaction and please share the situation or example)

21. How many other vendors/drug shops like yours exist here in this village? How similar and different are these from your shop? How do caregivers decide where to go to obtain malaria medicine?

22. Tell me about your experience as a drug vendor when it comes to treating malaria in your community (probe)? (Example of one probe: What are the biggest problems and challenges that you face as a drug vendor in the treatment of malaria?

23. How would you describe your relationship with caregivers of this community (probe)?

REFLECTION:

To be written at the end of the transcription booklet.

1) Describe the setting
2) Discuss the Interview Dynamic
3) What went well?
4) What was challenging?

Appendix B: Demographics Sheet

DEMOGRAPHICS AND LOCATION **Interviewer:** _____

Date/ Time of Interview: _____ / _____ Others present during Interview? _____

Sub-County: _____Parish: _____Village: _____

Store hours: Hrs per day: __Time Open: _____Days per week: _____Vancouver, BC, Canada _____

Hours per day the vendor spends at the store: _____ Affiliation with this sto Tel: _____ Fax: _____
OTHER ____

How long has vendor worked at this store: _____ Number of other staff working at the store: _____

Type of Structure (Circle): Drug Shop; Grocery Store; Market Stall; Mobile Vendor; Petrol Station

What does the Shop sell (Drugs only; Drugs plus other goods: food, clothing, auto parts, Other: _____)

Vendor's other jobs: _____

Vendor's gender: 1. MALE 2. FEMALE

Level of education attained by vendor (circle below) and date (year) when highest level completed:

0. No education 1. Primary incomplete YEAR: _____ 2. Primary complete YEAR: _____	3. Secondary incomplete YEAR: _____ 4. Secondary complete YEAR: _____ 5. Post Secondary (technical) YEAR: _____	6. Post Secondary University YEAR: _____ 90. Don't know

Appendix C: Consent Form

Consent Form for Drug Vendor Interviews.
Study - Reducing malaria related child mortality in Uganda: defining a sustainable community self-management program

Principal Investigator

Dr. _____, Associate Professor
_____, University of British Columbia, Canada,

Co-Investigators

Dr. _____, Makerere University, Uganda
Dr. _____, Simon Fraser University, Canada
Dr. _____, Simon Fraser University, Canada
Dr. _____, University of Victoria, Canada
_____, Makerere University, Uganda

Introduction (Purpose and Procedure)

Hullo I am …… The Universities of British Columbia and Makerere

are conducting a study to understand behaviors of caregivers with respect to malaria management in young children under five years of age in one district of Uganda. You have been identified as one of the drug vendors in this District who can give us useful information for this purpose. We are interested in your personal views, experiences and practice with regard to management of malaria in your community for children under five years of age. Please feel free to raise any issues that may be of concern to you. The discussions will be either in English or Lunyole according to your choice and will take a friendly conversation in which you will be free to express your experiences and what is important to you. The information you will give us will help in improving in management and care of malaria cases among children less than fives in the district. Your views will be taken in confidence and will not be identified with you as an individual. Since the information you are about to give is very important to this study, I will request you to allow us record the discussions with a digital recorder and on paper, but you will not be identified by name on the tape. If you are willing to participate, we will ask that you allow the study team members to spend some time with you and conduct a personal survey interview

lasting approximately 1 hour.

Your **participation in this study is voluntary**; that means you are free not to respond to any of the questions that you may not be comfortable with. If you consent to participate you are guaranteed that **your name and personal identifiers will not appear anywhere** in the data or in the final report. Instead you will be assigned a number. The signed consent form will be kept separate from the data to protect your identity. Only members of the research team will have access to the consent form and study data. After all the data have been gathered from digital recording, the recordings will be erased. The recorders and transcribed data will be kept in a locked filing cabinet at the research office in Butaleja and later in a locked filing cabinet at the University of British Columbia in Canada.

The short-term **benefit** to you will be that you will be informed of the most recent government recommendations for treating malaria in children less than five years of age. In the long-term your input will help Canadian and Ugandan researchers, scholars, and leaders understand vulnerabilities caregivers may be facing when caring for malaria in your children less than five years of age. This information will help us to plan more an appropriate, practical and sustainable community-based interventions for your community of Butaleja to improve malaria care in children less than five years of age.

There are no known **risks** associated with participating in this study. There are no sensitive questions involved in the survey interview, focus group or case study.

The research has been approved by The Institutional Review Committee of CHDC. A report of the findings will be disseminated or fed back to the community when the study is completed.

Contact for Information

In case you have questions regarding your rights as a research participant, contact Dr. , Chairperson of the Child Health and Development Centre (CHDC) ethical committee on Telephone number_____or the secretariat of Uganda National Council for Science and Technology, Nasser Road, Kampala, on Tel. _____ . If you have any questions about this study you may contact _____ in Vancouver at the University of British Columbia at the following phone number: _____or via e-mail at: _____ and by mail: _____

Canadian Contact for Concerns About Rights of Research Participants

If you have any questions as a research subject you may contact the University of British Columbia Office of Research Services at _____ .

Consent for Participation and Withdrawal

Your consent in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time with no consequence. You are in no way waiving your legal rights if you chose to sign this form. If you choose to participate and are able to sign your name, please do so below, indicating that this form has been read by you or to you by the research assistant. Your signature also indicates you have received a copy of this consent form for your own records and that you consent to participate in this study.

_____

NAME (please print first and last name)
(The signature of a witness is not required for behavioural research)

_____

SIGNATURE

_____

DATE