COMPARATIVE STUDY OF MALARIA RISK FACTORS AND ACCESS TO HEALTHCARE SERVICES BY BATWA AND NON-BATWA COMMUNITIES IN KANUNGU DISTRICT SOUTHWESTERN UGANDA

BY

DIDACUS B.NAMANYA

2010-MPH-RL-AUG-019

A Dissertation Presented to the Institute of Health Policy and Management in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Public Health of International Health Sciences University

DECEMBER 2013

DECLARATION

I hereby declare that I have read the rules of International Health Sciences University on dissertation writing including plagiarism and hereby state that this work is my own.

It has not been submitted to any other university for another degree or qualification either in full or partially. Throughout the work, I have acknowledged all sources used.

Name of Researcher: DIDACUS BAMBAIHA NAMANYA

Signature: ……..Date:…….....

Supervisor: PROF. DAVID NDUNGUTSE MAJWEJWE

Signature……Date:……..

DEDICATION

This research work is dedicated to my family; wife Jovita, children Jacob, Maria, Anthony and Gabriella for their encouragement and bearing with my absence while I pursued this course and to the memory our son Mark (RIP). This work is also dedicated all Batwa and non-Batwa who have been affected by malaria.

ACKNOWLEDGEMENT

I wish to acknowledge with gratitude the support and contribution of different people who helped me in many ways to complete this MPH course and the research component.

Let me start with my supervisor Professor David Ndungutse for his technical guidance, and all the invaluable support he provided, from the start to the end of this research work. I also add all the IHSU staff especially Ms Ritah Nantongo for the regular reminders and follow-ups.

I am very grateful to all the Batwa and non-Batwa household heads, FGD participants and key informants who provided very valuable data for this study. I appreciate the support given to me by the health facility in-charges in the Bwindi area. I cannot forget to mention the research assistants who included Kesande Charity, Asasira Grace, Judith Natukunda and Tumuhimbise Ismael who worked very hard to collect the data. To these I add Asha Kalidash and Richard Nuwargira who assisted in data entry and analysis plus Denis Nuwagaba for his unwavering encouragement.

My appreciation also goes to workplace colleagues at Ministry of Health for their encouragement and material support particularly Dr. Francis Runumi and Dr George Bagambisa. To the IHACC team especially Dr Shuaib Lwasa, Dr Lea B. Ford and Emma Oloku, *asante sana*.

Finally I wish to sincerely acknowledge the support and understanding of my dear wife Jovita Ahaisibwe Namanya that made it possible for me to pursue and complete this course. Special thanks go to Jacinta Kobusingye for her support and being a special member of our family. For all those whose names are not mentioned but helped me in one way or another to come this far, may God the Almighty reward you abundantly.

DBN

List of Tables

List of Figures

List of Abbreviations

ACTs	Artemisinin-based Combination Therapies (ACTs)
BCC	Behaviour Change Communication
BCH	Bwindi Community Hospital
BDP	Batwa Development Programme
CDC	Centres for Disease Control
CDR	Crude Death Rate
EMMF	Episcopal Medical Mission Foundation
FGD	Focus Group Discussion
GIS	Geographic Information Systems
GPS	Global Positioning System
HC	Health Centre
HMIS	Health Management and Information System
IEC	Information, Education and Communication
IHSU	International Health Sciences University and
IRS	Indoor Residual Spraying
IPTp	Intermittent Preventive Treatment during pregnancy
ITN(s)	Insecticide Treated Net(s)
IVM	Integrated Vector Management
KF	Kellerman Foundation
LLIN	Long Lasting Insecticide Treated Nets
MDG	Millennium Development Goals
MOH	Ministry of Health
NGO	Non-Governmental Organisation
OPD	Outpatient Department
PAHO	Pan American Health Organisation
PNFP	Private-not-for-profit
RDT	Rapid Diagnostic Test (for confirming malaria)
UBOS	Uganda Bureau of Statistics
VHT	Village Health Team(s)
UBOS	Uganda Bureau of Statistics
UHSSIP	Uganda Health Sector Strategic and Investment Plan
UNFPA	United Nations Fund for Population Activities
UOBDU	United Organization of Batwa Development in Uganda
WHO	World Health Organization

Contents

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Introduction

This study focused on risk factors for contracting malaria and access to health centre/hospital-based healthcare services by making a comparison of the Batwa indigenous people and their non-Batwa neighbours in Kanungu district. The researcher investigated how the two independent variables namely: risk factors for contracting malaria and health seeking behaviour of the two population groups impinged on the dependent variable: access to health centre/hospital-based case management of malaria. This chapter presents the following sections: a background to the study which sets the context to the problem under study, statement of the problem, objectives of the study, research questions, significance of the study, conceptual framework, scope of the study, and operational definitions of the key terms/concepts used.

The whole dissertation is made up of six chapters in chronological order as follows:

Chapter One: Introduction and Background to the Study

Chapter Two: Literature Review,

Chapter Three: Methodology

Chapter Four: Presentation of Findings

Chapter Five: Discussion of Findings

Chapter Six: Conclusions and Recommendations of the Study.

1.2 Background to the study

Malaria remains a major public health threat to more than 600 million Africans and its timely management on onset of symptoms is recognised as critical to achieving Millennium Development Goals (MDGs). The greatest burden of malaria in Africa occurs in the endemic regions where the disease pathogen is continuously present in the community (Gover-Kopec *et al*, 2006).

Malaria is caused by five species of parasites of the genus *Plasmodium* that affect humans. These are: P. Falciparum, P. Vivax, P. Ovale, P. Malariae and P. Knowlesi. Malaria due to P. Falciparum is the most deadly, and it predominates in Africa. P. Vivax is less dangerous but more widespread, and the other three species are found much less frequently. Malaria is transmitted to people by the bite of infected female mosquitoes of more than 30 anopheline species. An estimated 3.3 billion people were at risk of malaria in 2010, although of all geographical regions, populations living in sub Saharan Africa have the highest risk of acquiring malaria. In 2010, 81% of cases and 91% of deaths were estimated to have occurred in the WHO African Region, with children and pregnant women being most severely affected (WHO 2011:1).

In Uganda, malaria remains one of the major causes of morbidity and mortality. (MOH 2010a:72). Clinically diagnosed malaria accounts for 30-50% of outpatient visits at health facilities, 15-20% of all hospital admission, and up to 20.9% of all hospital deaths. Also 27.2% of inpatient deaths among children under five years of age are attributed to clinical malaria. A significant percentage of deaths occur at home and are not reported by the health facility-based Health Management Information System (HMIS) (UBOS, 2010, MOH 2011a, MOH 2011b). Malaria is a major public health problem and the most frequently reported disease at both public and private health facilities in Uganda (MOH, 2011a:6). This study explicitly made a comparison of malaria risk factors and access to health centre/hospital-based malaria related healthcare services among Batwa and their neighbouring non-Batwa in Kanungu district of Southwestern Uganda.

Why the Batwa?

The focus on malaria is more critical for marginalized communities like the Batwa[1] indigenous peoples in a remote rural setting like Kanungu district in South Western Uganda. The Batwa, otherwise known as pygmies, are estimated to have a population of between 70,000 - 87,000 living in Rwanda, Burundi, Uganda and Democratic Republic of Congo. The Batwa are believed to be closely related with the Bambuti of Mt. Rwenzori. They have been mostly hunters and fruit gathers, living in mountainous forests and some in Savannah forest or lake environments (UNFPA, 2008). According to Kidd and Zaninka (2008) approximately 6,700 Batwa live within Uganda, with approximately half living in south-western region of Uganda. The Batwa in this region are former inhabitants of the Bwindi, Mugahinga and Echuya forest where they lived since time immemorial in coexistence with the environment and in full reliance on the forest for their physical, economic, spiritual, and social sustenance.

In Kanungu district the Batwa population was estimated to be 531 comprising of 261 males and 270 females settled in 10 communities in different locations. The communities included: Mpungu, Kihembe, Karehe, Mukongoro, Nkwenda, Kitariro, Rurangara, Kebiremu, Mubikuto and Byumba (Namara, 2007). They are one of the marginalised ethnic groups in Uganda who lost access to their traditional homelands and resource base in the Bwindi Impenetrable Forest which was gazetted as a National Park in 1992 by the Government of Uganda without giving them alternative homes or sources of livelihoods. They were displaced into settlements along the edges of the forest without provision for adequate shelter, food sources or effective access to education and health care (Birungi, 2010). Massie, (2010) observed significant morbidity among the Batwa communities but there was an overwhelming lack of understanding by outsiders with regard to what the Batwa believe about specific illnesses and what they can do to prevent them.

There appears to be little work conducted to compare risk factors for contracting malaria between the Batwa and their neighbouring non-Batwa in the region, with majority of existing

[1] '*Twa*' is the root of the word for which '*Mutwa*' is singular and '*Batwa*' is plural.

surveys by Bwindi Community Hospital (BCH) focusing on general health status of the population without delving into specific risk factors and how they affect the Batwa and their non-Batwa neighbours. This study aimed at making an in-depth comparison among the two groups of people to identify and bridge gaps in knowledge with regard to how the Batwa and non-Batwa are exposed to malaria risk and access health centre/hospital based malaria health care services.

According to Gulliford *et al*. (2001), access to care is a key consideration in the organization and delivery of health services. MOH (2010a) states that every Ugandan should have access to basic health services according to need irrespective of ability to pay or geographical location. However there remains a significant inequality in access to healthcare services especially for malaria which is a major cause of morbidity and mortality. Moreover, access to health care remains an important concern for contemporary health care decision makers (Gulliford *et al*, 2001 *ibid*.). Identifying indigenous peoples at high risk of malaria morbidity and mortality and making them the focus of the control programme is recognised as an important factor in achieving the goals of the global malaria strategy and by implication national and local efforts. (WHO, 1997)

PAHO (2007) noted that in Central America technical collaboration between the governments marginalised indigenous peoples and international NGOs like PAHO and United Nation Environment Programme (UNEP) contributed to the restoration of individual and collective decision-making power of community members regarding their health and other factors which have impacts on their human development.

Kanungu District:

Kanungu district has a population of 241,800 people, 2 hospitals (1 government, 1 NGO), 2 health sub-districts at a level of HCIVs, 9 health centre IIIs, and 34 health centre IIs (MOH, 2011d). In terms of human resources for health, the district had a total of 280 health workers compared to the required 585 hence translating into a staff deficit of 47.86% (MOH, 2010b).

The district is located over 450 km from Kampala Uganda's capital city and is approximately 5 hours by road. The district does not have any all-weather tarmac road, with the main road network comprised of murram roads which are prone to landslides and blockages due to heavy rains in the steep landscape characterised by sharp undulating hills and gorges. A number of studies have been conducted in Kanungu district particularly by Bwindi Community Hospital that demonstrated high morbidity and mortality in Mpungu and Kayonza sub counties which contain majority of Batwa.

For example one such report showed a total of 1,323 deaths 12 months prior to the survey translating into a crude death rate of 31.8 deaths per 1000 people. Deeper analysis of the causes of death revealed that malaria accounted for 37% of the deaths (BCH (2009:21). However, the report did not show Batwa and non-Batwa specific death rates even if it indicated that there were 535 Batwa people in the surveyed area representing only 1% of the total population in the two sub counties. The Batwa therefore were disproportionately carrying a heavier mortality burden than the other groups.

According to MoH (2010), the government's stand on vulnerable and marginalised people is to subsidise PNFPs and its training institutions and a few private hospitals that should in turn reduce user fees which enables the poor access services. In addition, the health policy urges all stakeholders to respect promotive health cultures and traditions of all the people of Uganda.

The current study systematically compared malaria risk factors and access factors to health care services by Batwa and non-Batwa in the communities in order to understand the main health needs of the different population groups. In other words, the study was interested in finding out what sets Batwa apart from the rest of the groups in the communities in terms of malaria risk factors and service uptake given their marginalized status.

1.3 Statement of the problem

The Batwa access to healthcare is limited, and a few available statistics indicate that their health situation is below the national average. For example a study of Uganda Batwa recorded 40% mortality rates for children younger than 5 years. These rates were 1.8 to 2.4 times higher than in the neighbouring non-Batwa villages (Ohenjo *et al*, 2006). Related to this, Episcopal Medical Mission Foundation, EMMF (1999) observed the lack of safe drinking water, latrines, schools, clinics and access to government healthcare facilities as major problems faced by the Batwa. The same survey also established that child mortality for Batwa was 41% while for non-Batwa it was 17% and infant mortality rate for Batwa was 21% and for non-Batwa 5% EMMF (1999). From the same survey the reasons for the high mortality from individual interviews, indicated that malaria, and other infectious diseases are the primary causes of death.
Ohenjo *et al*, (2006) also identified major causes of childhood death among indigenous communities to include malaria and measles. In World Health Organisation's malaria control programme, only limited data were available on the status of the indigenous peoples, although some for example in the Amazon region and in several Asian countries, may be high-risk groups. (WHO, 1997)

A study by Bwindi Community Hospital (BCH) in 2009 further showed that malaria remained a major cause of death in Kayonza and Mpungu sub-counties, accounting for 37% of the total deaths. The survey which collected information on deaths in the 12 months prior to the survey found a total of 1,323 deaths to have taken place. With a population of 41,629 this translated into a crude death rate (CDR) of 31.8 deaths per 1,000 in the sub-counties of Kayonza and Mpungu in Kanungu district. BCH (2009:21). This was much higher compared to the national CDR for Uganda of 14 deaths per 1,000 people at the time.

Another study by Berrang-Ford *et al* (2012) revealed that without exception, all Batwa households in Mukongoro and Kihembe settlements identified malaria as a top health concern. Similarly, BCH (2009:24) also showed striking health inequalities between the Batwa and Bakiga ethnic groups. For example the report showed that Batwa were less likely to be protected

against malaria, less likely to access safe delivery, less likely to be using family planning and potentially had malnutrition. However the report fell short of identifying the underlying factors for this health state. Against this background, it became pertinent to investigate these factors especially in relation to malaria.

The year 2013 marked 21 years since the Batwa in Kanungu district were removed from their forest habitat. The situation described above is seemingly compounded by the Batwa poor health seeking behavior as a result of marginalization and stigmatization by non-Batwa communities. This study compared risk factors for contracting malaria among Batwa and their non-Batwa neighbouring communities.

1.4 General Objective of the study

The overall objective of the study was to compare burden of risk factors of contracting malaria and access to health centre/hospital-based care among Batwa and non-Batwa in Kanungu district.

1.4.1 Specific objectives

1. To investigate and compare the burden of risk factors of contracting malaria among the Batwa and non-Batwa in Kanungu district.

2. To investigate and compare health seeking behaviors of the Batwa and non-Batwa in relation to their first action when they suspected having malaria in Kanungu district.

3. To evaluate factors that influence access to health centre/hospital-based case management for malaria among the Batwa and no-Batwa groups in Kanungu district.

1.5 Research questions

1. What is the comparative burden of malaria risk factors among Batwa and non-Batwa?

2. How do Batwa and non-Batwa compare in terms of their health seeking behaviors related to their first action when they suspected having malaria?

3. What factors influence access to health centre/hospital-based case management for malaria among Batwa and non-Batwa?

1.6 Significance of the study

Available literature indicated that the Batwa compared to non-Batwa communities had poorer health status indicators than their neighbouring ethnic groups (Ohenjo *et al*, 2006, Kidd and Zaninka 2008, Berrang-Ford *et al*, 2012). It was critical to investigate the underlying factors for this gap. This study aimed at identifying risk factors to contracting malaria, comparing health seeking behaviors with a view to uncovering the factors that impinge access to health centre/hospital-based case management for malaria.

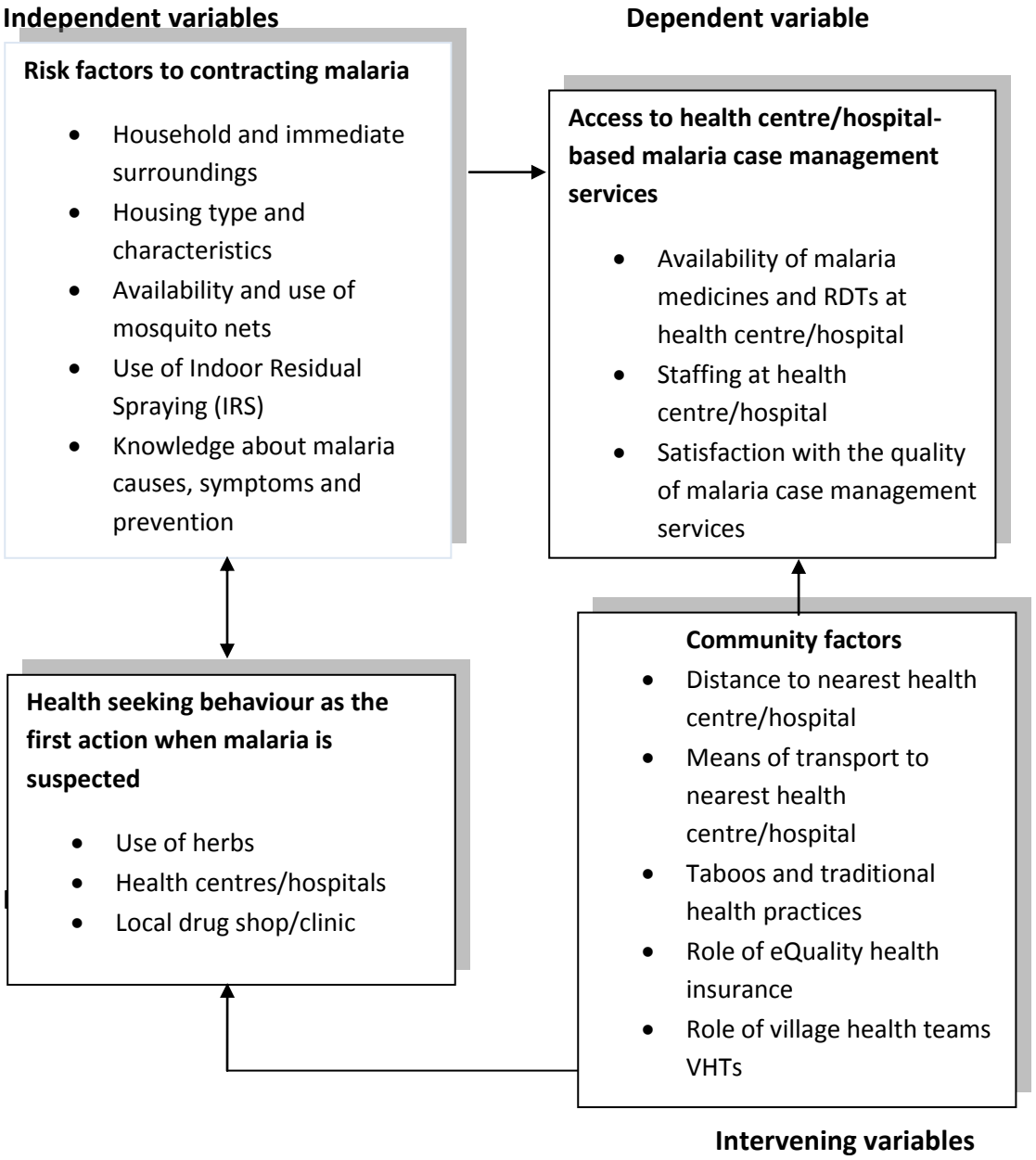
The findings of this study will prove handy in the control and management of malaria for district health managers and other stakeholders in developing strategies to improve the health status of the Batwa and non Batwa communities. Moreover Ohenjo et al. (2006) indicates that indigenous health in Africa is not widely researched and publications are sparse. In view of this, the findings will contribute to the health knowledge about the Batwa and more importantly about malaria as one the most serious public health problem in Uganda.

It is also anticipated that the findings will inform policy especially towards minority indigenous communities like the Batwa pygmies. Moreover the reviewed literature revealed that most health policies focus on general populations and lack focus on marginalized remotely located and vulnerable communities like the Batwa.

1.7 Conceptual framework

In terms of broader explanation, this study's independent variables were: risk factors to contracting malaria and health seeking behaviour and the dependent variable was access to health centre/hospital-based malaria case management.

Figure 1: Conceptual Framework showing the study's independent and dependent variables



Intervening/moderating variables associated with community factors were: distance to the nearest health centre/hospital, means of transport to the nearest health centre/hospital,

taboos and traditional health practices, role *eQuality* insurance (a form of community health insurance operated around Bwindi Community Hospital) and role of Village Health Teams (VHTs). In this visual interplay, the malaria risk factors delineated above were assumed to have created and sustained gaps in access to health centre/hospital-based malaria case management among the Batwa and non-Batwa population groups as an ultimate outcome as the illustrative mapping of this conceptual model above showed.

1.8 Scope of the study

The study's theme hinged on risk factors of contracting malaria and access to health centre/hospital-based case management of malaria among Batwa and non-Batwa, taking Kanungu district as a specific study area given its higher number of Batwa settlements in South West Uganda and cognizant of the fact that malaria is a major cause of morbidity and mortality in the district. Regarding the geographical boundary for the study, this study was conducted in 10 Batwa settlements and their immediate neighbouring non-Batwa communities in the sub counties of: Butogota Town Council, Kirima, Kanyantorogo, Kayonza and Mpungu.

In terms of the periodical component, this study investigated the period between 2012 and 2013. This scope was chosen so that the research would be easily manageable as it not so broad in terms of data and time.

1.9 Operational definitions of the key terms/concepts used

Access to health centre/hospital-based care: In this study access to health care means an individual who is infected/ affected by malaria physically reaching a designated health care centre/hospital where services based on the national health standard are offered in a formal setting.

Risk factor: This is an aspect of personal behaviour, practice, lifestyle, or an environmental exposure which is known to be associated with contracting malaria.

Health seeking behaviour: according to this study was defined as a state in which a person in stable health is actively seeking ways to alter his or her personal habits or environment in order to move toward a higher level of health especially at/around the onset of malaria symptoms.
It includes the decisions to seek assistance from qualified health workers at existing health care centres/hospitals. Malaria case management involving self-medication using herbs, consulting traditional practitioner/herbalists or consulting local drug shop/clinic in this study were not considered the desirable malaria case management practices.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The literature review covered key areas of the study as illustrated in the conceptual framework. The review begins with examining malaria as a public health concern, and winds around key study variables identified such as the risk factors for contracting malaria showcasing mosquitoes as a vector for malaria transmission, health seeking behaviour associated with what people do when they get malaria as well as the factors which influence access to health centre/hospital-based malaria case management.

2.2 Malaria as a public health concern

Malaria remains a major cause of morbidity and mortality in many tropical countries. According to the *World Malaria Report (2012)* which summarizes data received from 104 malaria-endemic countries and territories for 2011, ninety-nine of these countries had on-going malaria transmission. WHO latest estimates show that there were about 219 million cases of malaria in 2010 (with an uncertainty range of 154 million to 289 million) and an estimated 660,000 deaths (with an uncertainty range of 490,000 to 836,000). Africa is the most affected continent where about 90% of all malaria deaths occurred. Most deaths occurred among children living in Africa where a child died every minute from malaria. On a positive note, between 2000 and 2010, malaria mortality rates fell by 26% around the world. In the WHO African Region, the decrease was 33%. During this period, an estimated 1.1 million malaria deaths were averted globally, primarily as a result of a scale-up of interventions (WHO, 2012d, and WHO, 2012e).

The country profile for Uganda in the *World Malaria Report (2012)* indicated that the country falls within areas of high malaria transmission with a reported annual incidence of malaria due to all species being ≥ 1 per 1,000 of the population. The malaria epidemiological profile of

Uganda shows that out of a total population of over 34.5 million, 31.1 million (90%) are at high transmission risk of ≥ 1 case per 1,000 of population, while only 3.4 million (10%) are at low transmission risk of 0 – 1 case per 1,000 population (WHO, 2013).

Communicable diseases including malaria, HIV/AIDS and tuberculosis (TB) account for over half of the total burden of disease and are leading causes of ill health and mortality. MOH (2010a:72-73) also acknowledged that malaria remained one of the major causes of morbidity and mortality in Uganda. According to the Uganda National Household Survey (2009/10), collected information on the health status of household members for a 30 days recall period and the findings revealed that malaria/fever remained the most prevalent illness, despite the decline reported by respondents (UBOS, 2010a:50) On a positive note, the current Uganda Health Sector Strategic and Investment Plan (UHSSIP, 2010) also indicates that progress has been made in terms of seeking treatment within 24 hours after the onset of fever as well as coverage of Indoor Residual Spraying(IRS), Insecticide Treated Nets (ITN) and availability of anti–malarial medicines in health facilities at all levels. However, the report shows that three major challenges still face malaria control and management; namely: inadequate procurement and delayed delivery of malaria commodities especially Artemisinin-based combination therapies (ACTs), inadequate trained health workers in health facilities; and weak laboratory infrastructure for malaria diagnosis.

Furthermore, in Uganda malaria is noteworthy for the burden it places on both individuals and households. The illness exerts a high economic toll from the losses in productivity that results from ill-health and death (UBOS, 2010). Clinically diagnosed malaria is the leading cause of morbidity and mortality, accounting for 30-50% of out-patient visits at health facilities, 15-20% of all hospital admissions and up to 20.9% of all hospital deaths (UBOS, 2010b, MOH, 2011a).

In Kanungu district malaria accounted for 53.3% of all out-patient department attendances (Kanungu District, 2007) Bearing this in mind, it is important to consider the issues related to malaria risk factors and access to health centre/hospital-based malaria case management in the area. This is more crucial in indigenous communities like the Batwa who appear to be highly

vulnerable. According to Berrang-Ford *et al*. (2012), Batwa community members in Kanungu district have consistently identified poor health status as one of their greatest challenges. Healthcare professionals concurred that despite recent improvements, the Batwa faced a significantly higher burden of disease than that of other population groups in the rest of the district. This is in spite of the application of malaria prevention measures ranging from promotion of long lasting insecticide treated nets (LLINs), indoor residual spraying (IRS) and integrated vector management (IVM). In such context, Gunawardena *et al*. (1998) called for a re-examination of the principles of transmission on a micro-epidemiologic scale to identify risk factors and to formulate interventions that may have to be applied in a more focused manner.

2.3 Malaria risk factors

A "risk factor" has been defined as "an aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic, on the basis of which epidemiologic evidence is known to be associated with health-related condition(s) considered important to prevent a disease infection (Last, 1986). One of the difficulties associated with achieving the reduction in the malaria incidence is that a combination of many diverse factors contributes to the maintenance of its transmission (Gunawardena *et al*, 1998). According to Winskill *et al*, (2011), in order to specifically tailor and improve prevention measures targeted against the disease, it is important to obtain detailed knowledge of factors associated with increased risk of malaria. Identification of the specific risk factors in a locality may provide support for existing preventative measures or the introduction of new ones and can indicate areas in which prevention activities are currently under-utilized.

MOH (2011a) showed that there was stable transmission of malaria in 95% of the country. In the rest of the country particularly in the highlands of southwestern Uganda like in Kanungu district, and the Eastern highlands, the transmission of malaria was not stable and epidemics

were common. Furthermore, all people living in Uganda were at risk of being infected with malaria parasites and suffering from malaria; but those who had little or no immunity to malaria were more vulnerable than other people.

2.3.1 Mosquitoes as vectors for malaria

Malaria is transmitted among humans by female mosquitoes of the genus *Anopheles.* Female mosquitoes take blood meals to carry out egg production, and such blood meals are the link between the human and the mosquito hosts in the parasite life cycle (CDC, 2013).

According to Cox (2010), the idea that malaria fevers were caused by *miasmas* rising from swamps persisted and it was widely held that the word malaria comes from the Italian *mal'aria* meaning spoiled air although this has been disputed. With the discovery of bacteria by Antoni van Leeuwenhoek in 1676, and the incrimination of microorganisms as causes of infectious diseases plus the development of the germ theory by Louis Pasteur and Robert Kochi in 1878-1879, the search for the cause of malaria intensified. Scientific studies only became possible after the discovery of the parasites themselves by Charles Louis Alphonse Laveran in 1880 and the incrimination of mosquitoes as the vectors, first for avian malaria by Ronald Ross in 1897 and then for human malaria by Italian scientists Giovanni Batista and others between 1898 and 1900.

Furthermore, WHO (2013) indicates that there are about 3,500 mosquito species and those that transmit malaria all belong to a sub-set called the *Anopheles*. Approximately 40 *Anopheles* species are able to transmit malaria well enough to cause significant human illness and death.

To be effective at transmitting malaria between people, mosquito specie needs to have a number of characteristics including:

- Abundance - the specie needs to exist in numbers high enough to ensure individuals encounter an infectious human to pick up the malaria parasite,

- Longevity - individual mosquitoes need to survive long enough after feeding on infected blood to allow the parasite time to develop and travel to the mosquito's salivary glands ready to infect the next person bitten,

- Capacity – each mosquito needs to be able to carry enough malaria parasites in the salivary glands to ensure the parasite is transmitted to the next human,

- Contact with humans – the species need to prefer to feed on humans rather than other animals, and be able to survive and breed in places close to homes, and be able to find people (usually by entering their houses).

Cox (2010) further reported that the discovery of the role of mosquitoes in the transmission of malaria to humans provided malariologists with a new weapon against this ancient disease. In a classical experiment, Grassi dispatched 112 volunteers to the Capaccio Plains, a malarious area in Italy, protected them from mosquito bites between dusk and dawn and found that only five succumbed to the disease compared with 415 unprotected volunteers who all contracted malaria. Over the next decades, methods to prevent mosquito biting by avoidance, screening and mosquito proofing of dwellings units and anti-mosquito measures such as by the use of oils and lavivorous fish and draining mosquito habitats became commonplace (Bruce-Chwatt, 1988).

More importantly, for this study, is that four species out of the five malaria parasites exist in Uganda, with *P. falciparum* being the most prevalent (95%), followed by *P. Malariae* (2%), *P. Vivax* (2%) and *P. Ovale* (< 1%) (MOH, 2011). The existence of malaria parasites and the mosquitoes intrinsically exposes the population to malaria risk.

2.3.2 Malaria risk related to household and immediate surroundings

Existing literature has identified malaria risk factors to be associated with the immediate environment for example the proximity of dwelling units to mosquito breeding sites. Pullan *et*

al. (2010) in a study in eastern Uganda to determine micro-geographic and socio-economic factors that influence the risk of malaria infection in selected villages found that infection risk was strongly associated with proximity of households to rice-growing areas, emphasizing how this habitat may provide optimal breeding and resting sites for mosquitoes. In another study in northern Kenya, it was found out that proximity to swamps and forests increased vector density and were strongly associated with malaria incidence (Ernst *et al*, 2006).

WHO (2006) also noted that malaria transmission is very much influenced by the local ecological situation of each village, nearby river, swamp, backwater and human ways of life – both on a small scale (near pits from which soil is taken for brick making, footprints in marshy ground, etc.) as well as a large scale (small or large dams, rice fields). Another study in Northern Tanzania by Mazigo *et al*, (2010) discovered that stagnant water was mentioned by almost 2/3 of respondents to be the main area for mosquito breeding.

Other studies like Joshi and Banjara, (2008) in Napal reported that some respondents considered dirty environment and staying with malaria patient as the cause of malaria transmission. On the other hand in Ghana, Appiah-Darkwah and Badu-Nyarko (2011) found that a significant number of male respondents (49.3%) and female respondents (41.2%) believed malaria was caused by unclean environment. Other causes which were stated only by the females included: drinking of bad water, eating oily foods, being exposed to heat or sunlight and excessive tiredness. Joshi and Banjara (2008), further revealed malaria risk to be associated with the household environment whereby breeding places were identified by respondents to include; stagnant water, rotten things, animal sheds, dark corners of the house and bushes.

2.2.3 Housing type and characteristics and malaria risk

The type of housing units can also be associated with the risk of contracting malaria. According to Lindsay *et al*. (2002), better housing is one of the factors that reduced malaria infection risk in regions that used to be endemic and modifications of houses was used to protect against

malaria in Italy, Greece, Panama and USA in the early 20th Century. Reiter *et al*. (2003) stated that alongside lifestyle and local habits, housing conditions play a role in modulating exposure of populations to mosquitoes and vector-borne diseases.

According to MOH (2011a) poor households are also more exposed to malaria because of poor quality housing prone to mosquito entry and these have less means for preventive or corrective action. With over 38% of the population living below the poverty line, many Ugandans are vulnerable to malaria (UBOS, 2010). Ghebreyesus *et al.* (2004) indicated that housing design may affect an individual's exposure to malaria parasites and consequent infection. Greater exposure to outdoors (lack of windows or screens) may increase contact between an individual and the mosquito vector.

Similarly, the presence of particular structural features that limit contact with mosquito vectors are likely to reduce infection. Housing that places individuals at increased risk of malaria infection are used more by those in the lower socio-economic strata than those in the higher socio-economic strata. In Ethiopia, Ghebreyesus *et al* (2004), found housing construction features, such as wall construction, to be significantly associated with malaria risk. For example the presence of open windows and a gap between the roof and wall may be an important factor in the transmission of malaria, serving as a major route by which mosquitoes enter the house.

In Sri Lanka, Gunawardena *et al* (1998) discovered that the malaria incidence rates in the populations resident in good and properly constructed houses differed significantly being 0.51 and 1.27 infections per person respectively. In this case, the risk of malaria was 2.5 fold higher in inhabitants living in poorly constructed houses than those living in houses of good construction.

2.3.4 Availability and use of mosquito nets and malaria risk

All mosquito nets act as a physical barrier, preventing access by vector mosquitoes and thus providing personal protection against malaria to the individual(s) using the nets. Pyrethroid insecticides, which are used to treat nets, have an excito-repellent effect that adds a chemical barrier to the physical one, further reducing human-vector contact and increasing the protective efficacy of the mosquito nets. Most commonly, the insecticide kills the malaria vectors that come into contact with the ITN. By reducing the vector population in this way, ITNs, when used by a majority of the target population, provide protection for all people in the community, including those who do not themselves sleep under nets (Binka *et al,* 1998, Hawley *et al*, 2003).

A study by Killeen *et al* (2007) showed that relatively modest coverage (around 60%) of all adults and children can achieve equitable community-wide benefits. ITNs thus work in this case as a vector control intervention for reducing malaria transmission. ITNs have been shown to avert around 50% of malaria cases, making protective efficacy significantly higher than that of untreated nets which, under ideal conditions (such as those found in research settings), usually provide about half the protection of nets treated with an effective insecticide (Clarke *et al*, 2001).

In “real life” situations, the protective efficacy of untreated nets is significantly compromised by their poor physical condition. Currently, most mosquito nets are made of polyester and rarely last longer than 2-3 years under field situations. However, new technologies and materials such as polyethylene have been developed to produce nets that are stronger and longer-lasting (WHO, 2004).

2.3.5 Use of Indoor Residual Spraying and malaria risk

Another approach for malaria risk reduction is the use of IRS. According to WHO (2012), IRS remained a powerful vector control tool for reducing and interrupting malaria transmission. In 2011, 80 countries including 38 in the WHO African Region, recommended IRS for malaria

control. The application of IRS has been thoroughly standardized and there are clear specifications for suitable equipment and insecticides (WHO, 2006). In 2011, 153 million people were protected by indoor residual spraying (IRS) around the world, or 5% of the total global population at risk. In the WHO African Region, 77 million people, or 11% of the population at risk were protected through IRS in 2011 (WHO, 2012e).

In Uganda, in 2012, the percentage of households with IRS increased from 6.2% in 2006 to 7.2% in 2011 (MOH, 2012a). In terms of effectiveness of IRS in reducing malaria risk, Bukirwa *et al* (2009) in a study in Kanungu district reported a significant and consistent decrease in the proportion of patients diagnosed with clinical malaria. Similarly, in northern Uganda at Palabek sub county HCIII which was fully occupied by patients' majority of them with severe malaria cases, was empty one month after IRS in the area according to USAID, (2010:16).

2.3.6 Knowledge about malaria causes, symptoms and prevention and malaria risk

Appiah-Darkwah and Badu-Nyarko (2011) observed that people in different societies hold variety of beliefs about the causes and transmission of malaria that vary according to cultural, educational and economic factors and have direct consequences for both preventive and treatment seeking behaviour as well as for activities to control malaria. The authors further argued that, whether it is intentional or not, human behaviour affects health-promoting and disease-preventing activities in some instances, increasing risk and in others reducing it.

In many African cultures diseases are known basically by symptoms which they exhibit. A study by Osunwole (2007), revealed that majority of respondents in the study indicated that malaria manifests in the following ways: general weakness of the body, profuse sweating, itching of the body, pain in the joints, cold and loss of appetite, and high body temperature.

One of the declarations made by WHO at the ministerial conference in 1992 was that drug resistance which comes as a result of poor knowledge, attitudes and practices of the disease and usage of drugs is one of the major threats to prevention and treatment (Gilles *et al,* 1993). In this sense lack of knowledge can be viewed as a risk factor for contracting malaria. It is therefore important to study knowledge of the population at risk about malaria causes, symptoms and prevention strategies. For example in a study in Northern Tanzania, Mazigo *et al* (2010) found out that despite good knowledge of malaria symptoms and signs, anaemia and convulsions were poorly associated with the disease. This lack of clear knowledge on anaemia and convulsions which are associated with malaria in children could lead to delay in seeking appropriate care from health facilities.

To emphasize the importance of knowledge in reducing risks to contracting malaria, Appiah-Darkwah and Badu-Nyarko (2011) argued that if people have the knowledge and belief that malaria is caused by mosquito bite, they are more likely to perceive it as preventable. On the other hand if they do not know the causes they are less likely to perceive it as not.

In a study by Mazigo *et al* (2010), the majority of the respondents reported to seek treatment for malaria from health facilities (hospital/dispensaries/health centers). Home treatment or self-treatment was also practiced by many families. Allopathic practitioners (i.e. medical doctors) and traditional healers were also consulted frequently for malaria treatment. Education level did not influence significantly the type of treatment respondents would select for malaria treatment.

2.4 Access to health centre/hospital-based malaria control and management

Inadequate healthcare is also an important risk factor for malaria. For example in Uganda, all public health facilities are seriously compromised by limited resources. In the case of malaria, the situation has improved somewhat in recent years with significant increase in international investment in malaria control and elimination. However, resources remain inadequate, and

there is fear that they will decrease. This decrease may be driven by global economic circumstances, donor fatigue, and also misplaced appreciation of the new malaria elimination agenda. It is the responsibility of governments to alleviate the burden of malaria as effectively and efficiently as possible. In this regard, in 2001, at a special summit in Abuja Nigeria, African heads of states and governments committed to allocating at least 15% of their annual government budgets to the health sector. Yet, more than a decade since the Abuja declaration, many countries still lag behind the target. In Eastern Africa for example, only Rwanda has reached the 15% target; Uganda is close at 11.5%, while Kenya allocated less than 6%. There is a persisting significant reliance on external sources to finance healthcare expenditure across African countries, making their health systems vulnerable to unpredictable and unexplained resource swings (Govender*, et al.* 2008)

WHO, (2012a) indicated that, to date, efforts at malaria control in highly endemic areas of Africa have focused on scaling-up proven existing malaria control interventions such as long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS) with insecticides, intermittent preventive treatment during pregnancy (IPTp), diagnostic testing, and treatment of confirmed uncomplicated malaria using ACTs. WHO (2011) also stressed that malaria was an entirely preventable and treatable disease, provided that currently recommended interventions were properly implemented. Murray *et al* (2012) showed that the malaria mortality burden was larger than previously estimated, especially in adults and that there was a rapid decrease in malaria mortality in Africa because of the scaling up of control activities supported by international donors. Donor support, however, needs to be increased if malaria elimination and eradication and broader health and development goals are to be met.

The goal of malaria control in Uganda is to control and prevent malaria morbidity and mortality, as well as to minimize social effects and economic losses attributable to malaria. In order to achieve this, the malaria control programme endeavours to go to national scale with a package of effective and appropriate malaria control interventions, attaining high coverage and promoting positive behaviour change (MOH, 2008:48)

In Uganda, the mainstay of malaria intervention strategies are; prompt case management, using ACTs, LLINs, IRS efficacious insecticides and IPT in pregnant women. Epidemic preparedness and response, information, education, communication (IEC) and behaviour change communication (BCC), monitoring and evaluation, research and health systems strengthening are part of the strategy (MOH, 2010a:109). However, MOH (2011a) showed that the interventions have not been done in an integrated manner and sometimes with irregular implementation. Thus, the previous strategic planning and implementation efforts in the country have been insufficient in reducing transmission. Activities and resources for control were applied and remained available at national level, with vertical implementation and inadequate distribution across the country.

The current malaria strategic plan advocates, in addition to the above measures, integrated vector management (IVM) because vector control is a critical element of malaria control programs. New scientific knowledge about the ecology and behaviour of mosquitoes and their natural predators has improved the precision of vector control methods in general, and can permit better use of more environmentally friendly vector control methods in the IVM framework (www.who.int/heli).

Over the years, Uganda has seen a progressive scale up of malaria control interventions in the last decade, most especially in the use of ACTs in the public sector, ITN distribution, and in some districts, IRS. To ensure accessibility and affordability, ACTs have also been extended to the private sector at a highly subsidized cost. It is important to note that this expansion has been made possible by the increased commitment to malaria control by government, in-country malaria stakeholders and bilateral and multilateral partners (MOH, 2011c).

2.4.1 Staffing and human resources for health

Generally, staffing and human resources for health are one of the critical and pivotal inputs in the health system especially for malaria control and management. According to MOH (2008a) and MOH et al (2012), Uganda is experiencing human resources for health crisis. The human

resources are still short both in numbers and skills mix to effectively respond to the health needs in Uganda. There also problems related to low motivation, labor migration and retention of professional workers (MOH, 2010:253)

Although the production of health workforce has improved with four medical schools in the country, there is an alarming doctor to population ratio of 1:24,725 and a nurse/midwife to population ratio of 1:11,000. The WHO recommended norm of doctor to population ratio is 1:800. Uganda's health worker to population ratio is 1:1,298 as compared to the WHO standard of 1:439(MOH, 2010:253). Besides, there is inequitable distribution of health workers among districts, between rural and urban areas and between public and private providers. Nearly 70 per cent of medical doctors and dentists, 80 per cent of pharmacists and 40 per cent of nurses and midwives, are in urban areas serving 13 per cent of the population (MOH, 2010)

2.4.2 Satisfaction with health services

User satisfaction is accepted as one of the major indicators of good quality services (MoH, 2008). Literature search did not come up with user satisfaction specific to malaria case management at health facilities and hospitals. However, Jitta et al (2008) in a study to establish the level of users' satisfaction and understand client experiences found out that the levels of satisfaction with access to services in selected districts in Uganda stood at 66%. In terms of waiting time, only 46% of exiting patients were satisfied, and lower levels were noted in rural areas than urban, in government(40%) than in private (56%) and in outpatient than inpatient.

2.5 The situation of indigenous communities with regard to access to healthcare

Access to health centre/hospital-based malaria case management is a critical factor in the overall reduction of risk in a given population. In this context, WHO (2006) stated that the first and often most important step-down factor that reduces efficacy is the complex constellation of factors governing access. Access is basically the point of contact between the intervention

and the household. IRS and ITNs have to be delivered to the households or the householder may have to go somewhere to obtain them. Access is often determined by operational dimensions such as geographic access, physical access, temporal access (seasonal, or time of day/week), and socioeconomic access.

Concerning access to healthcare, the Batwa and non-Batwa communities in Kanungu district have access to the formal healthcare system in different forms. The main healthcare providers in the district (like in the rest of the country) are the public health facilities, followed by the private-not-for-profit (PNFP) facilities and then private clinics. Generally, services in the public facilities are free, while in the PNFP facilities they are subsidized. In the private clinics the cost depends on demand. For the Batwa, BCH founded in 2003 by Scott and Carol Kellerman is of great importance. It began as an outreach clinic under a tree targeting the Batwa, and has grown into a 112-bed Hospital providing health care and health education services to a population of over 100,000 people in the area. The Hospital began as a special mission to help the Batwa pygmies who were displaced from the Bwindi Impenetrable Forest after it was made a National Park in 1993. Since leaving the forest many Batwa have lived in extreme poverty and are affected by the health issues that poverty brings (www.bwindihospital.com).

Like many indigenous communities across the world, the Batwa face serious challenges related to access to healthcare services. According to WHO (2007), there are an estimated 370 million indigenous peoples living in more than 70 countries worldwide. They represent a rich diversity of cultures, religions, traditions, languages and histories; yet continue to be among the world's most marginalized population groups. The health status of indigenous peoples varies significantly from that of non-indigenous population groups in countries all over the world. Bodker (2008) added that low levels of identification of indigenous people in national vital statistics and administrative data collections constituted a global barrier to the development of accurate indigenous health information which in turn hindered public health response.

Many studies including (Ohenjo *et al* (2006), Berrang-Ford *et al* (2012), Mohankumar (2009), BCH (2009), indicated that generally indigenous communities were marginalized and

experienced low health status. For example Mohankumar, (2009) showed that indigenous populations were routinely marginalized and deprived of their access to fundamental resources and inferior health outcomes among indigenous communities could in part be attributed to inadequate access to healthcare facilities and medical services. Ohenjo *et al* (2006) reported that in much of rural central Africa, primary healthcare services were absent, functioned only in a rudimentary way, or had been destroyed during conflict. Even where healthcare facilities existed, many pygmy people (like Batwa) did not use them because they could not pay for consultations and medicines or did not have the documents and identity cards needed to travel or obtain hospital treatment or were subjected to humiliating and discriminatory treatment.

WHO and Pan American Health Organization (PAHO, 2007), particularly noted that, indigenous populations in 8 South American countries were seriously affected by malaria. The indigenous communities advanced many reasons among which the following seemed to draw a clear analogy to those of the Batwa scenario. They stated that:

> "Community members used to know how to treat and cure diseases; now, it would seem that: diseases are stronger—we apply less our traditional knowledge, we need new knowledge. Because we are poor, we are unable to feed or educate ourselves well. When someone is weak, any disease becomes more serious and tends to aggravate without required care. Sometimes health centres are far too distant; sometimes there is no money to go to a health centre or to buy medicines. Sometimes, when you finally reach the health centre, it is closed, the health staff are rude, they do not understand or respect the culture of our people, they do not understand what happens because they do not speak our indigenous language". (WHO and PAHO (2007:14).

Similarly, Gulliford *et al*, (2001) identified four factors that may influence access to healthcare:

- If services are available, in terms of an adequate supply of services, then a population may 'have access' to healthcare.
- The extent to which a population 'gains access' to healthcare also depends on financial, organizational and social or cultural barriers that limit utilization. Thus utilization is

dependent on the affordability, physical accessibility and acceptability of the services and not merely the adequacy of supply.

- The services available must be relevant and effective if the population is to 'gain access to satisfactory health outcomes'
- The availability of services, and barriers to utilization, has to be evaluated in the context of differing perspectives, health needs and the material and cultural settings of diverse groups in society."

The *WHO 2012 World Malaria Report* gave a striking summary of the complex interaction between risk factor for contracting malaria and access to malaria prevention and case management by stating that:

"Behind the statistics and graphs lies a great and needless tragedy: malaria - an entirely preventable and treatable disease, still takes the life of an African child every minute. The most vulnerable communities in the world continue to lack sufficient access to long-lasting insecticidal nets, indoor residual spraying, diagnostic testing, and Artemisinin-based combination therapies. Unfortunately, only modest increases in access to these interventions were observed between 2010 and 2011; the first such plateauing in the past 5 years".

2.6 Health seeking behaviour when malaria is suspected

Existing literature indicates that Batwa people generally depend on forest for most of their livelihoods. Begewitz (2009) reported that when a mutwa has slight malaria symptoms they treat themselves with herbs; either by their own knowledge or with the help of a family member while others get the herbs from the herbalist. The Batwa said that they consult their family, neighbours or friends when they suspect malaria symptoms. In Kisoro district Begewitz (2009) found out that because Batwa work for non-Batwa, they also get information from them on what to do concerning malaria. Either they can ask for advice, money for treatment or extra work to earn money for treatment.

The Batwa health seeking behaviour seems to be strongly influenced by their beliefs and culture on their environment. For example, UNFPA (2008) noted that Batwa believe that the forest is the source of all abundance and they have a wide range of specialized skills and knowledge necessary for their forest-based livelihoods including an incomparable knowledge of plants and animals, and skills in medicine, music, dance and crafts.

In general MoH (2010:7) reported that approximately 60% of Uganda's populations seek care from traditional and complementary medicine practitioners (e.g. herbalists, traditional bone setters, traditional birth attendants, hydro-therapists, spiritualists and traditional dentists) before and after visiting the formal sector.

2.7 Summary of the Literature Review

The reviewed literature showed that although malaria was an ancient disease, it is still a public health concern especially in tropical countries like Uganda and specifically among indigenous marginalized communities such as the Batwa.

As seen, there was quite a bountiful array of literature regarding risk factors for contracting malaria, associated health seeking behaviours and factors that influence access to health centre/hospital-based malaria case management services. However the bases underlying the variations of the risk factors among the indigenous people and their neighbours remained largely unexplored and without a particularistic focus in relation to malaria risk and access to health services. This created focal, scope, context, geographical and methodological gaps that this study set out to bridge. Therefore, in relation to what other scholars and researchers put forward, this study set out to investigate and compare malaria risk factors among the Batwa and their neighbouring non-Batwa given the Batwa's displaced and marginalized status after they lost their traditional homes in the forests and were now resettled at the periphery of the forests with a completely new socioeconomic set up. This study population is therefore unique and quite different from most of the reviewed studies, hence an additive framework in view of expanding the frontiers of knowledge.

Furthermore, the uniqueness of the study population given their rural remote location with generally low economic indicators meant that overcoming physical barriers (specifically distance to the nearest health centre/hospital and the means of transportation available) to reach their desired health care options as opposed to mere quality of care issues became an important area of inquiry to access of malaria health care services.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the study design, sources of data, study area, study population, sample size determination and techniques used, study variables, sampling procedures, data collection techniques and tools, data analysis and dissemination, quality control, ethical issues, and limitations of the study.

3.2 Study design

In this study's context, a descriptive cross-sectional study design was adopted and utilized. A descriptive cross-sectional study design employs both quantitative and qualitative methods of data collection to study a phenomenon at a given point in time which is not expected to remain static through the period of interest. The essence of this design was to investigate and draw comparison between risk factors for contracting malaria among Batwa and non-Batwa population groups in Kanungu district at a given point in time (Utwin, 1994; Sarantakos, 1998). A descriptive cross-sectional design was chosen because of the following reasons:

- Essentially because of the descriptive nature of this study, it required a comprehensive linkage of risk factors for contracting malaria in respect of the two population groups, the distribution of the burden of risk among the Batwa and non-Batwa, and what factors influence the access to health centre/hospital-based care for malaria cases. Studying these phenomena required a cross sectional descriptive approach because it utilizes different groups of people who differ in the variable of interest, but share other characteristics such as socioeconomic status, and educational background.

- Besides, this study's time frame was anchored within a limited periodical scope that required a cross sectional survey which explores the relationship between different variables at that particular point in time. However, this study acknowledged the relevance

of other research designs such as longitudinal survey method which would have also been appropriate say in measuring how the risks factors for contracting malaria and access to health centre/hospital-based care among the two population groups have changed overtime. But, longitudinal studies are longer in time scope and require three, five, and ten to fifteen years to complete (Amin, 2005, Sarantakos, 1998, Berg, 2004). Yet, such a time frame was not suitable or envisaged by this study.

3.3 Description of Study area

The study area was Kanungu district in South Western Uganda that was curved out of Rukungiri district. Kanungu was granted district status in 2000 and it was opened in 2001. The district borders Rukungiri in the east, the Democratic Republic of Congo in the west, Kabale and Kisoro districts in the south. Geographically, the district lies roughly between 29◦ 30' and 30◦East of Greenwich and 1◦ and 0◦ south of the Equator. Because of its mixed highland and lowland landscapes Kanungu experiences savannah and equatorial climate characterized by heavy rainfall ranging between 900 and 1200mm per annum (Ministry of Water and Environment, 2007). The study was conducted in the 4 sub counties of Kanyantorogo, Kayonza, Kirima, Mpungu and Butogota Town Council where the 10 Batwa settlements and immediate non-Batwa communities are located (Refer to Appendix: H (a) Location of Kanungu district and Batwa settlements and H (b) Location of health facilities).

The physical environment in the area favours multiplication of mosquitoes which are the vectors for malaria parasites and malaria is a serious health problem in the area.

3.4 Sources of data and data collection methods used

The study utilized multiple data sources and data collection methods as outlined in Table 1 below;

Table 1: Showing sources of primary and secondary data sources

Sample category	Data sources	Method/tool used to collect data	Type of data
Batwa	Household heads	Interviewing/questionnaire	Quantitative & Qualitative
Non-Batwa	Household heads	Interviewing/questionnaire	Quantitative& Qualitative
Health facilities	In-charges	Interviewing/questionnaire GPS Mapping	Quantitative & Qualitative
FGD	Participants	FGD/Guide	Qualitative
Resource persons	Key informants	Interviewing/ KI Guide	Qualitative
Sampled households	Observations	Observation Check list	Qualitative & Qualitative
Relevant literature	Secondary documents	Documentary Review	Qualitative

Interviewing and structured questionnaire: This was the main data collection method for the study's 260 household heads and 6 health facility in-charges. In all, 260 interviews for household heads (both Batwa and non-Batwa) were conducted.

Focus Group Discussion (FGD): Further to the above, 40 participants were brought together at a common meeting venue into 4 FGDs. This technique allowed for a structured discussion among study elements a semi-structured guide. Men, women and youths (both Batwa and non-Batwa) of different age and background elicited responses and discussions which were recorded verbatim according to the various themes identified in the guide.

Key informant interviews: The study also conducted 13 key informant interviews. These were conducted with some Batwa and non-Batwa elders, district health managers, health workers and village health team members.

Observation: Supplemental to the above were observations made on environmental risk factors for contracting malaria on the sampled households using a check list.

Documentary Review: A review of relevant documents was also done for example the Health Sector Performance Reports, Malaria Control Strategic Plans, National Malaria Control Policy,

web-based sources, and other reports by organizations working with the Batwa such as the Kellerman Foundation, Bwindi Community Hospital and Kanungu District Work Plans.

Mapping: In addition a handheld global positioning system (GPS) was used to capture geographical location of the key features like Batwa settlement and health facilities. These features were used to generate maps using Esri ArcGIS Geographical Information System software.

3.5 Study population

The study's target population was 260 households comprised of 129 Batwa and 131 non-Batwa households immediate neighbouring 10 Batwa settlements in Kanungu district. The Batwa were found in 10 settlements in the sub counties of Kayonza, Butogota TC, Mpungu, Kirima and Kanyantorogo where they were resettled about 21 years ago when they were removed from their natural habitat in Bwindi Impenetrable Forest.

3.6 Sample size estimation

The Sample categories and how they were selected are summarized Table 2 below:

Table 2: Showing the Sample categories and how they were selected

Sample Category	Sample size selected	Method of estimation
Batwa	129 Households	Census
Non- Batwa	131 Households	Simple random Sampling with replacement criteria
Health Facilities	6	Purposive
Key informants	13	Snowball
Focus Group Discussion participants	4 groups of 10 participants each.	Purposively selected according to age, sex, settlement
Households	260 household surroundings	Direct observation of all sampled households using a check list

Given that the number of Batwa households (129) was small, the researcher included all of them hence a census methodology for this category. For comparison purposes, a sample of 131

non-Batwa households in the neighbouring villages was selected using simple random sampling with replacement criteria.

To analyze factors related to access, 6 health facilities (3 public and 3 PNFP) registered in Kanungu district and whose catchment area covered the Batwa settlements were purposively selected.

Furthermore, 13 key informants (including acting District Health officer, hospital operations manager and administrator, Batwa NGO coordinator and health field staff) who were considered relevant to the study were selected using the snow-bowl technique. This was operationalized using Kanungu District Local Government Health Department, Bwindi Community Hospital and BDP as entry points. The researcher obtained names and locations of knowledgeable and experienced Batwa and non-Batwa of different sex, age and varied backgrounds who were later traced and requested to participate in the study (Refer to Appendix E: List of key informants).

As regards FGD, 4 groups consisting of 10 participants each were organized in Kebiremu and Kitahurira Batwa settlements and those for non-Batwa in Buhoma and Bikuto. Finally using direct observation technique, the researcher collected contextual data on environmental malaria risk factors in and around the households (Refer to Appendix F: Observation Check List).

3.7 Sampling techniques

Census method: a complete sample using the census method was used to cover all Batwa households in the 10 settlements totaling 129.

Simple random sampling (with replacement criteria): This was used to select 131 non-Batwa households. This technique involved getting a list of all non-Batwa households in the immediate vicinity of each Batwa settlement from the Local Council (LC I) chairperson. These households were assigned numbers and these numbers were written on small pieces of paper. Simple

random sampling using a lottery was then applied. All the pieces of paper were put in a box and the box was shaken vigorously to ensure randomization. Then the required pieces were picked with replacement to represent the number of non-Batwa households in the villages for this study. In the end 131 non-Batwa households were selected to participate in this study.

Purposive Sampling: This method was used to select both FGD participants and health facilities. FGD participants were purposively selected according to age, sex, and settlement. Pre-existing health facilities in the study area namely 3 health centre II, 2 Health Centre III, and 1 Hospital which are predominantly accessed by the Batwa in the district were selected for this study.

Snowball technique: This technique was utilized to identify and select resource persons knowledgeable in the study problem but who were unknown to the researcher. It was operationalized using the personnel from the district health department and BDP associates who enjoyed the trust and confidence of Batwa and non-Batwa elders and community members.

3.8 Study variables

Variables for this study comprised of independent and dependent as described below:

3.8.1 Independent variables covering objective 1 and 2

The study's two independent variables were: 1) risk factors for contracting malaria and, 2) health seeking behaviour related to their first action when they suspected having malaria, while the dependent variable was access to health centre/hospital-based malaria case management.

The study focused on two independent variables: First, malaria risk factors with its dimensions being: household and immediate environment, housing type and characteristics, availability and use of mosquito nets, knowledge about malaria causes, symptoms and prevention and use of Indoor Residual Spraying (IRS). Secondly, health seeking behaviour with its dimensions being: use of herbs, health centre/hospitals and local drug shop/clinics.

3.8.2 Dependent variables covering objective 3

On the other hand, the dependent variable for this study was access to health centre/hospital-based malaria case management with its dimensions being: availability of malaria medicines and RDTs, staffing at the health centre/hospital and satisfaction with the quality of malaria case management services.

3.8.3 Intervening variables/community factors

The study's main variables were assumed to be affected by the following community factors: distance to the nearest health centre/hospital, means of transport to the nearest health centre/hospital, taboos and traditional health practices, role of eQuality health insurance, and role of village health teams (VHTs).

It was assumed that the malaria risk factors delineated above created and sustained gaps in access to health centre/hospital-based malaria case management among the Batwa and non-Batwa population groups as an ultimate outcome which this study investigated.

3.9 Measurement of variables

Access to health centre/hospital-based malaria case management was the main variable of interest in the study. It means an individual who is infected/ affected by malaria physically reaching a designated health care centre/hospital where services based on the national health standard are offered in a formal setting.

This was measured by 1) the proportion of health facilities reporting availability of malaria medicines and RDTs; 2) the proportion of health facilities reporting adequate staff capacity as per recommended staffing at each level; 3) the proportion of two population groups reporting satisfaction with the quality of malaria case management services.

Access to health centre/hospital-based malaria case management is assumed to be affected by two factors – **1**) risk factors to contracting malaria, and **2**) health seeking behaviour at the onset of suspected malaria.

1) Risk factors for contracting malaria refers to an aspect of personal behaviour, practice, lifestyle, or an environmental exposure which is known to be associated with contracting malaria. This was measured by **1**) the proportion of Batwa and non-Batwa households with environments likely to favour the multiplication of mosquitoes as vectors for malaria; **2**) the proportion of Batwa and non-Batwa respondents living in houses with characteristics likely to increase expose them to mosquitoes as vectors of malaria; **3**) the proportion of Batwa and non-Batwa households reporting presence and use of mosquito nets; **4**) the proportion of Batwa and non-Batwa respondents who state correctly a cause, a symptom and mention a prevention strategy for malaria; **5**) the proportion of Batwa and non-Batwa respondents reporting use of indoor residual spraying in their dwelling units.
2) Health seeking behaviour at the onset of suspected malaria which is defined as a state in which a person in stable health is actively seeking ways to alter his or her personal habits or environment in order to move toward a higher level of health especially at/around the onset of malaria symptoms. It includes the decisions to seek assistance from qualified health workers at existing health care centres/hospitals. It was measured by: **1**) the proportion of Batwa and non-Batwa respondents who reported using herbs for self-medication as their first action when they suspected having malaria; **2**) the proportion of Batwa and non-Batwa respondents who reported visiting public or private not-for-profit health centre/hospital as their first action when they suspected having malaria; **3**) the proportion of Batwa and non-Batwa respondents who reported visiting a local drug shop/clinic as their first action when they suspected having malaria.

3) On the other hand, the above study variables were assumed to be affected by intervening variables/community factors namely: (distance) which were measured by **1**) the proportion of Batwa and non-Batwa respondents residing within 0-5km and 6-10km radius of the nearest health centre/hospital; (means of transportation) which was measured by **2**) the proportion of Batwa and non-Batwa respondents using motorized and non-motorized means of transport to the nearest health centre/hospital for malaria case management; (taboos and traditional health practices) which was measured by **3**) the proportion of Batwa and non-Batwa who reported consulting traditional practitioners as their first action when they suspected having malaria; (role of eQuality health insurance) **4**) established through key informant interviews and FGDs, (role of VHTs) **5**) established through key informant interviews and FGDs.

Using data outputs from the above data measurements in Excel and SPSS programs, descriptive statistical tables were generated and later statistical measures such as chi-square, correlations and inferences among variables using significance values was discerned and analyzed. Analysis and presentation of data revolved around the comparison between the two population groups to show the proportions of Batwa and non-Batwa responses per study item using univariate and bi-variate tables (cross tabulation) to portray the relationships. Thematic content analysis was used to analyze qualitative data from FGDs, key informant interviews and secondary sources of data were also acknowledged.

3.10 Procedure for Data collection

An introductory letter was obtained from the IHSU after approval of the proposal which was presented to Kanungu District Local Government to enable the researcher access research communities in the study area. The researcher used the above clearances to gain the trust of the Batwa supported Program called BDP which helped to contact chairpersons of Batwa settlements and Local Council chairpersons of non-Batwa to coordinate research activities in and around the Batwa settlements.

Four (4) research assistants were identified and trained in the use of the research tools and ethical conduct. A pre-test of research tools was done using dummy samples of Batwa and Non-Batwa households around the settlements. Having obtained the study respondents, objectives and purpose of the study were explained and verbal consent obtained before participation. Each respondent reserved right to terminate participation at any time. No pressure or inducements of any kind was applied. Complete confidentiality was guaranteed.

3.11 Data analysis

To establish the strength of the relationship between variable interplay, clean, coded quantitative data from respondents were run into the SPSS (statistical package for social scientists) and Ms Excel programs from which simple descriptive statistics such as frequencies, percentages, means, and correlations were generated and analyzed. Simple cross and frequency tables were used to present quantitative data while qualitative data sets drawn and elicited from key informants were summarized into field notes from where generalized expressions, verbatim illustrations and explanations were analyzed under each variable in the conceptual framework as developed from objectives.

3.12 Quality control issues: Reliability and Validity

In order to ensure that the tools used were reliable and returned valid findings, the researcher employed various strategies.

- **Reliability:**

The extent to which results are consistent over time and are an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be

reliable (Joppe 2000). Embodied in this citation is the idea of replicability or repeatability of results or observations.

Kirk and Miller (1986) identify three types of reliability referred to in research and these relate to: (1) the degree to which a measurement, given repeatedly, remains the same (2) the stability of a measurement over time; and (3) the similarity of measurements within a given time period. In this particular study a questionnaire was administered. Charles (1995) postulates that consistency with which questionnaire [test] items are answered or individual's scores remain relatively the same can be determined through the test-retest method at two different times. This attribute of the instrument is actually referred to as stability. If we are dealing with a stable measure, then the results should be similar. A high degree of stability indicates a high degree of reliability, which means the results are and can be repeatable.

Against this background, the strategy used to ensure reliability was pilot-testing of the research tools. This was aimed at attaining this level of quality. Through pre-testing, the researcher was able to arrive at appropriate wording, format, length, and sequencing of the questions.

- **Validity:**

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are (Joppe 2000). The concept of validity is described by a wide range of terms in qualitative studies. This concept is not a single, fixed or universal concept, but rather a contingent construct, inescapably grounded in the processes and intentions of particular research methodologies and projects (Winter, 2000).

In contrast, Maxwell (1992) observed that the degree to which an account is believed to be generalizable is a factor that clearly distinguishes quantitative and qualitative research approaches. Patton (2001) advocated the use of triangulation by stating "triangulation strengthens a study by combining methods. This can mean using several kinds of methods or data, including using both quantitative and qualitative approaches". This study's data collection

techniques were triangulated (questionnaire, interview schedule, documentary analysis, direct observation and FGD) to improve the content validity index.

Engaging multiple methods such as the use of questionnaires and in-depth interviews, FGDS and direct observations led to more valid, reliable data sets.

3.13 Plan for dissemination

Once the final dissertation has been examined and passed by IHSU a copy of the thesis will be deposited in the university library for other students and researchers to access. Also a policy brief will be generated from the report and shared with the Malaria Control Programme and Planning Department of the Ministry of Health which is in charge of policy development to consider some of the recommendations. The report and policy brief will be shared on IHSU and Ministry of Health websites for wider access. From a different angle the researcher will share the soft copies of the findings with Kanungu district, Batwa Development Program and Bwindi Community Hospital that deal directly with both the Batwa and non-Batwa in their daily operations.

3.14 Ethical issues

While conducting this research high ethical standards were maintained. The research was approved by IHSU research and ethics committee, and thereby followed the laid down ethical requirements. During data collection the research team complied with principles which aim at protecting the dignity and privacy of every individual who in the course of the research was requested to provide personal or other information about himself/herself or others.

Before an individual participated, he/she was notified of the objectives, purpose and methods to be applied to collect and use the data and their right to abstain or participate in the research was ensured. Participation was voluntary. After the explanation a verbal consent was obtained.

The information obtained was treated with utmost confidentiality. For example the identity of individuals from whom information has been obtained was kept strictly confidential. After the above explanation a verbal consent was obtained before the respondent started answering.

3.15 Limitations of the study

It would have been better to interview each adult individual in the Batwa and non-Batwa households. However this study only interviewed the head of the household. This may have left out some important views about malaria risk factors, health seeking behaviour and access to healthcare in the area. Similarly only hospital and health facility in-charges were interviewed. This also may have limited the extent of the findings. However the findings are still very useful in identifying malaria risk factors at household and health facility levels.

CHAPTER 4: PRESENTATION OF FINDINGS

4.1 Introduction

This chapter presents the findings that were generated from the analysis of data obtained from 129 Batwa and 131 non-Batwa household heads in the 10 settlements. Also included in the findings are views of 13 key informants, participants of 4 FGDs and the analysis of the health facility data which was obtained from 6 health facilities that serve the population of the Batwa and non-Batwa in the study area.

This chapter relates to the 3 objectives of the study namely:

1. To investigate and compare the burden of risk factors of contracting malaria among the Batwa and non-Batwa in Kanungu district.
2. To investigate and compare health seeking behaviours of the Batwa and non-Batwa in relation to their first action when they suspected having malaria in Kanungu district.
3. To evaluate factors that influence access to health centre/hospital-based case management for malaria among the Batwa and no-Batwa groups in Kanungu district.

The chapter is organized in four main sections. The first section presents and analyses the demographic characteristics of the respondents. The second section presents and analyzes the risk factors for contracting malaria. The third section presents and analyses health seeking behaviour of the respondents as the first action when malaria is suspected. The fourth section presents and analyses access to health centre/hospital-based malaria case management for both Batwa and non-Batwa.

4.2 Demographic characteristics of the respondents

Respondent's background information shown in Table 3 focused on their sex, age, and highest level of educational attainment because the researcher assumed these to have an influence on study variables namely health seeking behaviour and access of the respondents. The significance of this relationship was further given credence using cross-tabulation and chi-square tests.

Table 3: showing the respondents' demographic characteristics

Population group/ Variable		Batwa		Non-Batwa	
	Aspect	**f**	**%**	**f**	**%**
Sex	Male	75	58.1	66	50.4
	Female	54	41.9	65	49.6
	Total	**129**	**100.0**	**131**	**100.0**
Age	≤ 23 years	10	7.8	22	24.8
	24-35	48	37.2	45	34.4
	36-47	35	27.1	33	25.2
	48-59	17	13.2	21	16.0
	60 years +	19	14.7	10	7.6
	Total	**129**	**100.0**	**131**	**100.0**
Educational attainment	Never been to school	85	65.9	18	13.7
	Primary	41	31.8	76	58.0
	Secondary	3	2.3	23	17.6
	Tertiary	0	0	14	10.7
	Total	**129**	**100.0**		**100.0**

Key: f = frequency in this and all other tables

With regard to sex, among the Batwa, male respondents made up the majority with 58.1% (n=75) while the females accounted for 41.9% (n=54) while among the non-Batwa male and female respondents were 50.4% (n=66) and females 49.6% (n=65) respectively.

With regard to age, among both population groups, the majority of respondents fell in the age category of 24-35 years with Batwa accounting for 37.2% (n=48) compared to non-Batwa who accounted for 34.4% (n=45).

In terms of highest level of educational attainment, wide disparity existed between the Batwa and non-Batwa. For example no Mutwa (0%, n=0) had attained tertiary level education compared to 10.7% (n=14) among the non-Batwa, while 2.3% (n=3) of Batwa compared to 17.6% (n=23) of non-Batwa had attained secondary level of education.

4.3 Findings under Objective 1: To investigate and compare the burden of risk factors of contracting malaria among the Batwa and non-Batwa in Kanungu district.

In this study, risk factors for contracting malaria was defined as aspects of personal behaviour, practice, lifestyle, or an environmental exposure which is known to be associated with contracting malaria. This was measured by five indicators and findings per indicator are presented below;

4.3.1 The proportion of Batwa and non-Batwa households with environments likely to favour the multiplication of mosquitoes as vectors for malaria

This section presents malaria risks associated with household surroundings and environment. Under this sub theme, the researcher probed malaria risk burden related to immediate household environments and the finding are summarized in the Table 4 below;

Table 4: Showing a comparative environmental malaria risk burden among the Batwa and non-Batwa households

Household environmental risk factors	Batwa				Non-Batwa			
	Yes		No		Yes		No	
	f	%	f	%	f	%	f	%
Presence of bushes around household	43	33.3	86	66.7	10	7.6	121	92.4
Presence of broken utensils, bottles, rubbish	60	46.5	69	53.5	50	38.2	81	61.8
Presence of stagnant water around home	30	23.3	99	76.7	42	32.1	89	67.9
Presence of pits	18	13.9	111	86.1	46	35.1	85	64.9
Location near stream/swamp	35	27.1	94	72.9	14	10.7	117	89.7

Regarding the presence of bushes around the household, striking disparities emerged with 33.3% (n=43) of Batwa compared to 7.6% (n=10) of the non-Batwa.

Regarding the presence of broken utensils, bottles and rubbish around the household, both population groups had noticeable amounts with Batwa having a higher margin at 46.5% (n=60) compared to non-Batwa with 38.2% (n=50).

Regarding the presence of stagnant water around the household, non-Batwa had a higher proportion of household at 32.1% (42) while the Batwa had fewer households at 23.3% (n=30).

Regarding the presence of pits around the household a noticeably higher number of non-Batwa households at 35.1% (n=46) had pits compared to only 13.9% (n=18) among Batwa households.

Regarding household's proximity or location near stream or swamps, a noticeably higher number of Batwa households were near the above environments accounting for 27.1% (n=35) compared to 10.7% (n=14) among the non-Batwa.

4.3.2 The proportion of Batwa and non-Batwa respondents living in houses with characteristics likely to increase exposure to mosquitoes as vectors of malaria;

The study identified a set of housing characteristic to describe and group housing types likely to present a higher risk of exposure to mosquitoes. These characteristics were partly based on the housing study by Gunawardena *et al* (1998).

4.3.2.1 Housing type

According to this study, a Permanent house comprised of brick walls, iron roof, cemented floor with windows and shutters; a semi-permanent house was made up of mud and wattle walls, iron roof with windows and shutters, while a temporary housing unit was made up of either dry plant materials using curved poles and having no proper windows and shutters. The findings are in Table 5 below:

Table 5: Showing the proportional distribution of housing types among Batwa and non-Batwa

Category	**Batwa**		**Non-Batwa**	
House type	**f**	**%**	**f**	**%**
Permanent	1	0.8	20	15.6
Semi-permanent	113	87.6	103	78.6
Temporary	15	11.6	8	6.1

In terms of housing type among the two population groups, with regard to permanent housing, the Batwa had only 1 household classified as permanent representing 0.8% (n=1) compared to 15.6% (n=20) among non-Batwa. Generally, majority of households among both population groups had semi-permanent houses at 87.6% (n=113) and 78.6% (n=103) among Batwa and non-Batwa respectively. However in terms of housing units classified as temporary, a higher proportion of Batwa 11.6% (n=15) compared to 6.1% (n=8) resided in temporary houses.

The predominance of temporary housing units among the Batwa was further confirmed by a FGD Mutwa participant, who observed that:

"Our houses would not last very long because the wooden poles are prone to termites and rats. We urge BDP to consider constructing for us permanent houses with bricks and cement that last longer than the wooden and mud ones".

Photographic portrayal of the above different types of houses from field observations is presented hereunder in Figure 2, and Figure 3.

Figure 2: Showing a typical Batwa semi permanent house (left) and a permanent house (right) owned by a non Batwa

Figure 3: Showing an example of a temporary Mutwa house in Rurangara settlement

4.3.2.2 Housing characteristics:

The researcher compared specific housing characteristics among the two population groups so as to assess the level of exposure among them. Observations were made in regard to presence of windows, presence of window screens, and presence of cracks and openings in the walls. The findings are presented in Table 6 below:

Table 6: Showing the proportional distribution of housing characteristics among Batwa and non-Batwa households

Housing characteristics	Batwa				Non-Batwa			
	Yes		No		Yes		No	
	f	%	f	%	f	%	f	%
Presence of windows	92	71.3	37	28.7	123	93.9	8	6.1
Presence of window screens	0	0	129	100.0	6	4.6	125	95.4
Presence of cracks and openings in the walls	109	84.5	20	15.5	34	25.9	97	74.1

The aggregate picture according to housing characteristics with regard to presence of windows showed both population groups had houses with windows although Batwa stood below the non-Batwa at 71.3% (=92) compared to non-Batwa at 93.9% (n=123).

The striking finding was with regard to presence of window screens where 100.0% (n=129) Batwa had no window screens compared to 4.6% (n=6) among the non-Batwa. Regarding the presence of cracks and openings in the walls, Batwa housing units exhibited higher presence at 84.5% (n=109) compared to 25.9% (n=34) among non-Batwa. A pictorial portrayal of the cracks and openings is shown in Figure 4.

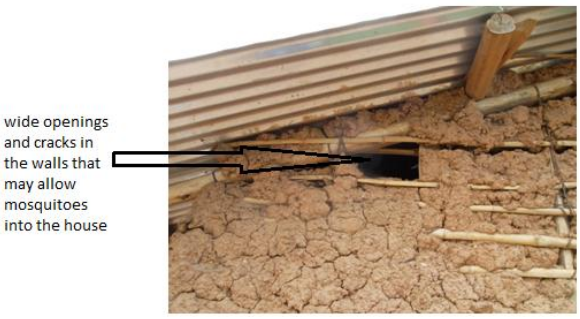


Figure 4: showing the presence of openings and cracks in the walls as taken from Karehe Batwa settlement

4.3.3 The proportion of Batwa and non-Batwa households reporting presence and use of mosquito nets;

Presence of mosquito nets:

The researcher also compared Batwa and non-Batwa households with regard to presence and use of mosquito nets. The presence and use of mosquito nets was established using a two-pronged approach. First, presence was established using the number of households reporting owning at least one mosquito net, while usage was established by the number of household heads reporting sleeping under a mosquito net of any type on the night before the study. The findings are presented hereunder:

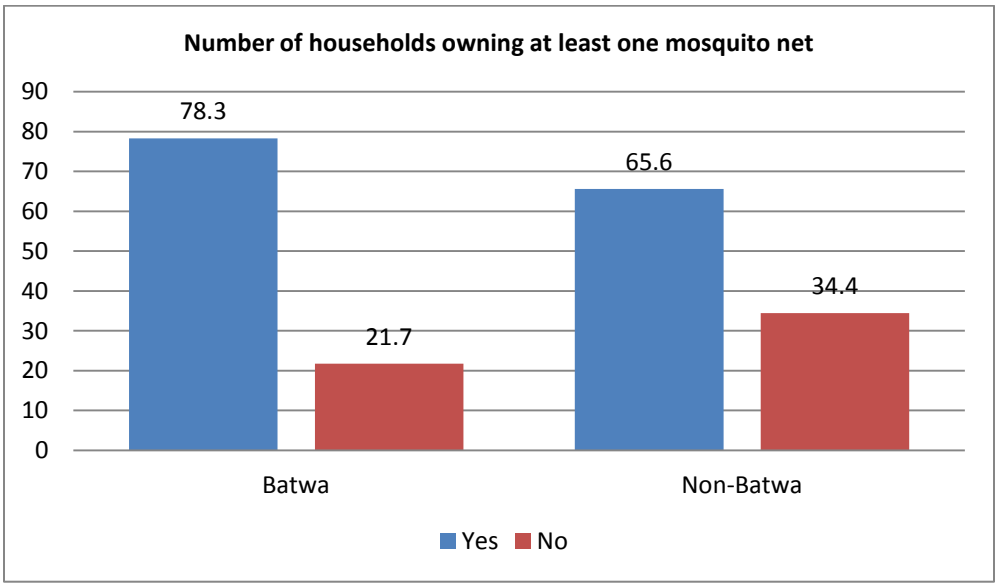


Figure 5: Showing a graphical presentation of the proportional distribution of the number of households reporting owning at least 1 mosquito net

From the above graph, the number of Batwa households owning at least 1 mosquito net was higher at 78.3% (n=101) compared to 65.6% 9 (n=86) among the non-Batwa.

Use of mosquito nets:

With regard to usage the researcher asked respondents whether they had slept under a mosquito net of any type on the night before the study. The results are presented below;

Table 7: Showing respondent's self-reported usage of mosquito nets on the night before the study

Category	Batwa				Non-Batwa			
	Yes		No		Yes		No	
	f	%	f	%	f	%	F	%
Self reported usage of mosquito nets	41	31.8	88	68.2	60	45.8	71	54.2

The proportion of Batwa household heads reporting sleeping under a mosquito net of any type was less at 31.8% (n=41) compared to non-Batwa at 45.8% (n=60) in spite of Batwa proportion of mosquito net ownership being higher than non-Batwa (ref. Figure 5)

It was important to find out why some respondents had not slept under a mosquito net. A male Mutwa respondent in Kitariro replied that:

"We have only 2 mosquito nets in the house and we have given them to the children. When we get more we can also sleep under them".

A non-Batwa female respondent in Byumba who reported she had not slept under a mosquito net indicated that:

"I have tried to sleep under a mosquito net before…but whenever I do, I feel uncomfortable. I tend to feel warm and sweat. I have resorted not to use the nets".

From various discussions, it was clear that those who owned the mosquito nets were more likely to use them in both the Batwa and non-Batwa. This implied that ownership of mosquito nets was critical in reducing the risk to malaria.

4.3.4 The proportion of Batwa and non-Batwa respondents who stated correctly a cause, a symptom and mentioned a prevention measure for malaria.

Under this sub theme, the researcher also probed for knowledge among respondents about the causes, symptoms and prevention of malaria.

4.3.4.1 Respondents' knowledge about causes of malaria:

Aggregated responses of all mentioned causes of malaria according to respondents are presented in the table below:

Table 8: Showing respondents' knowledge about causes of malaria

Respondents' responses on causes of malaria	Batwa		Non-Batwa	
	f	%	f	%
Mosquito bites	90	35.3	97	39.5
Drinking dirty water	80	31.4	58	23.7
Eating certain foods (mangoes, fresh maize)	21	8.2	31	12.7
Staying out in the rain	50	19.6	48	19.6
Stagnant water	14	5.5	11	4.5
Total responses	**255**	**100.0**	**245**	**100.0**

The findings concerning respondents' responses on the causes of malaria showed that mosquito bites was the largest perceived cause of malaria with 35.3% (n=90) of Batwa responses and 39.5% (n=97) of non-Batwa attributing malaria to mosquito bites. In one of the FGDs held in Mukongoro, one Mutwa participant clearly linked malaria to mosquito bites stating that:

"Malaria is a result of mosquitoes. It is common when there is a lot of rain and many mosquitoes which bite us at night".

However, a good percentage of both Batwa and non-Batwa attributed malaria to drinking dirty water with 31.4% (n=80) of Batwa responses compared to 23.7% (n=58) of non-Batwa.

Eating certain foods specifically fresh mangoes and fresh maize was also reported to be associated with causing malaria with 8.2% (n=21) of Batwa responses compared to 12.7% (n=31) of non-Batwa attributing it to this cause.

Staying out in the rain was also associated with causing malaria with 19.6% (n=50) of Batwa responses compared to a similar 19.6% (n=48) of non-Batwa.

Malaria was also attributed to stagnant water around the household with 5.5% (n=14) of Batwa responses compared to 4.5% (n=11) of non-Batwa responses mentioning this as the cause for malaria.

4.3.4.2 Knowledge of respondents on symptoms of malaria

The researcher next probed respondents' knowledge regarding major malaria symptoms. Each respondent was asked to mention one major malaria symptom among people suspected to have malaria and the findings are presented Table 9 below:

Table 9: Showing major malaria symptoms according to respondents:

Respondents' responses on major symptoms of malaria	**Batwa**		**Non-Batwa**	
	f	**%**	**f**	**%**
Fever	100	77.5	113	86.3
Weakness	17	13.2	11	8.4
Headache	12	9.3	7	5.3
Total	**129**	**100.0**	**131**	**100.0**

What came out clearly was that among both population groups, fever was mentioned as the primary and major symptom of malaria with 77.5% (n=100) among Batwa compared to 86.3% (n=113) among non-Batwa.

This was followed by weakness or tiredness also mentioned by both population groups which accounted for 13.2% (n=17) among Batwa compared to 8.4% (n=11) among non-Batwa respectively.

Headache was also mentioned by 9.3% (n=12) among Batwa compared to 5.3% (n=7) among non-Batwa respectively.

4.3.4.3 Respondents' knowledge about malaria prevention measures

The researcher next probed respondents' knowledge on the desired prevention measures using a set of close-ended response items, where respondents were asked to choose one major prevention measure of their preference. The findings are shown in Table 10;

Table 10: Showing respondents' knowledge on a major malaria prevention measures

Respondents' responses on major prevention measure	**Batwa**		**Non-Batwa**	
	f	**%**	**f**	**%**
Sleeping under mosquito net	95	73.6	107	81.7
Spraying of walls with insecticide	9	7.0	5	3.8
Clearing bushes around the house	8	6.2	9	6.9
Ensuring no stagnant water around the house	17	13.2	10	7.6
Total	**129**	**100.0**	**131**	**100.0**

From the Table above, respondents were able to mention major prevention measures with majority of both population groups believing that sleeping under a mosquito net could prevent malaria at 73.6% (n=95) among Batwa compared to 81.7% (n=107) and non-Batwa. This was followed by ensuring no stagnant water around the house which accounted for 13.2% (n=17) among the Batwa compared to 7.6% (n=10) among the non-Batwa.

Spraying of walls with insecticide accounted for 7.0% (n=9) compared to 3.8% (n=5) among Batwa and non-Batwa respectively. Whereas clearing bushes around the house accounted for 6.2% (n=8) compared to 6.9% (n=9) among the Batwa and non-Batwa respectively.

4.3.5 The proportion of Batwa and non-Batwa respondents reporting use of indoor residual spraying (IRS) in their dwelling units.

Under this item, the researcher investigated the usage of IRS. Respondents were asked if they could recall their houses being sprayed to control mosquitoes in the past 12 months before the study. The findings are summarized in Table 11 below;

Table 11: Showing reported IRS by respondent's households in 12 months prior to the study

Self-reported usage of IRS	Batwa		Non-Batwa	
	f	%	f	%
Yes	7	5.4	10	7.6
No	114	88.4	121	92.4
Non responses	8	6.2	0	0.0
Total	129	100.0	131	100.0

The findings revealed minimal usage of IRS as a malaria prevention measure among both population groups with 5.4% (n=7) compared to 7.6% (n=10) among the Batwa and non-Batwa respectively.

4.4 Findings under Objective 2: To investigate and compare health seeking behaviours of the Batwa and non-Batwa in relation to their first action when they suspected having malaria

Under this objective, the researcher intended to determine the respondents' health seeking behaviour in relation to their first action when malaria was suspected. This was measured using 3 indicators namely:

1) The proportion of Batwa and non-Batwa respondents who reported using herbs for self-medication as their first action when they suspected having malaria;

2) The proportion of Batwa and non-Batwa respondents who reported visiting public or private not-for-profit health centre/hospital as their first action when they suspected having malaria;

3) The proportion of Batwa and non-Batwa respondents who reported visiting a local drug shop/clinic as their first action when they suspected having malaria. Findings on each of the four indicators are presented in the underlying Table 12;

Table 12: Showing the respondents' health seeking behaviours in relation to the first action taken when malaria is suspected

Health seeking behaviour at onset of suspected malaria	Batwa		Non-Batwa	
	f	%	f	%
1) Self-medication with herbs	39	30.2	14	10.7
2) Went to nearest health centre/hospital	27	20.9	41	31.3
3) Went to drug shop/clinic	7	5.4	34	25.9
4) Consult traditional practitioner	29	22.5	9	6.9
Non responses	29	22.4	33	25.2
Total	**129**	**100.0**	**131**	**100.0**

f= frequency

According to above Table, indicator 1 which describes respondents' tendency to use herbs for self medication revealed majority of the Batwa 30.2% (n=39) compared to only 10.7% (n=14) among non-Batwa used this option.

This was followed by respondents who out of taboos and traditional practices sought help from traditional practitioners or healers with majority of Batwa 22.5% (n=29) compared to a mere 6.9% (n=9) among non-Batwa taking this option, showing a wide variation in health seeking behaviour between the two population groups.

Regarding respondents who went to the nearest health centre/hospital, as the desired health care option, more non-Batwa 31.3% (n=41) compared to 20.9% (n=27) among Batwa used this option, again showing a clear variation in health seeking behaviour among both population groups.

Another indicator of health seeking behaviour related to respondents who went to a local drug shop/clinic as their first action at the onset of suspected malaria. The findings revealed that a significantly higher number of non-Batwa respondents 25.9% (n=34) compared to only 5.4% (n=7) among Batwa used this option.

However there was also a high non response rate with some respondents preferring not to answer this question which accounted for 22.4% (n=29) and 25.2% (n=33) among Batwa and non-Batwa respectively.

In order to validate the extent of the relationship between specific socio-background characteristics and respondents' health seeking behaviour when malaria was suspected; the researcher cross-tabulated the level of education and one's first action, findings of which are shown in the following Tables 13 and 14. For example, the level of education among both population groups was associated with distinct treatment options, although there could be other factors.

Table 13: Showing Relationship between education and first health action taken when malaria was suspected among Batwa

Level of education	**First action taken when malaria is suspected (Batwa)**					**Total**
		Used herbs	Traditional practitioner	Health centre/hospital	Local drug shop/clinic	
Never been to school	Count % of Total	20 19.6%	18 17.6%	21 20.6%	3 2.9%	62 60.8%
Primary	Count % of Total	17 16.6%	10 9.8%	6 5.9%	4 3.9%	37 36.2%
Secondary	Count % of Total	2 2.0%	1 1.0%	0 0.0%	0 0.0%	3 3.0%
Tertiary	Count % of Total	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Total	Count % of Total	39 38.2%	29 28.4%	27 26.5%	7 6.8%	102 100.0%

Among the Batwa with lower educational attainment such as those who had never been to school and those at primary level, there was a high usage of herbs and traditional practitioners with both combined accounting for 37.2% (n=37) compared to 20.6% (n=21) for the health centres/hospitals.

In general the majority of Batwa had never been to school or of primary school level and they largely engaged in self medication with herbs and consulted traditional practitioners; with both health seeking options accounting for 63.6%. Comparatively, the majority of non-Batwa had primary and secondary education and their common first action when malaria was suspected was to go to health centres/hospital or local drug shops/clinics. This finding suggests lack of out of pocket expenditure for Batwa compared to non-Batwa.

Table 14: Showing the Relationship between education and first health action taken when malaria was suspected among non Batwa

Level of education	First action taken when malaria is suspected (Non-Batwa)					Total
		Used herbs	Traditional practitioner	Health centre/hospital	Local drug shop/clinic	
Never been to school	Count % of Total	7 7.1%	4 4.1%	6 6.1%	1 1.0%	18 18.4%
Primary	Count % of Total	3 3.1%	3 3.1%	25 25.5%	20 20.4%	51 52.0%
Secondary	Count % of Total	2 2.0%	1 1.0%	2 2.0%	10 10.2%	15 15.3%
Tertiary	Count % of Total	2 2.0%	1 1.0%	8 8.2%	3 3.1%	15 15.3%
Total	Count % of Total	14 14.2%	9 9.2%	41 41.8%	34 34.7%	98 100.0%

On the other hand the majority of non-Batwa (25.5%) who had attained primary education went to health centre/hospitals as their first action and another sizeable proportion of 20.4% sought treatment from the local drug shop or clinic.

4.5 Findings under Objective 3: To evaluate factors that influence access to health centre/hospital-based case management for malaria among the Batwa and no-Batwa groups.

In this study, access to health care was defined as an individual who is infected/ affected by malaria physically reaching a designated health care centre/hospital where services based on the national health standard are offered in a formal setting. This was measured using three indicators namely;

1) The proportion of health facilities reporting availability of malaria medicines and RDTs;

2) The proportion of health facilities reporting adequate staff capacity as per recommended staffing at each level;

3) The proportion of both population groups reporting satisfaction with the quality of malaria case management services.

4.5.1The proportion of health facilities reporting availability of malaria medicines (ACTs) and RDTs

This was used in measuring the health centre/hospital readiness in delivering quality malaria case management. It is important to ensure that malaria medicines are available at health facilities for people who are sick at all times.

During this study an assessment was made of the availability of both pediatric and adult ACTs for malaria treatment at the health facilities as the first line treatment for malaria according to the current national guidelines for malaria management. Furthermore, the study sought to establish availability of RDTs that are used to make proper diagnosis. The results are presented in the Table 15 below;

Table 15: Showing the availability of ACTS and RDTs at health centres/hospital according to Health facility in-charges

Health facility studied	Availability of pediatric ACTs	Availability of adult ACTs	Availability of RDTs
Bwindi Community Hospital	Yes	Yes	Yes
Kayonza HC III	Yes	Yes	Yes
Kayonza Tea Factory HC II	Yes	Yes	No
Kihembe HC II	Yes	Yes	Yes
Byumba HC II	Yes	Yes	Yes
Kanyashogye HC II	Yes	Yes	Yes

The results indicated that pediatric and adult ACTs were available in all the facilities at the time of the study. Regarding availability of RDTs, only Kayonza Tea Factory HCII reported a stock out

at the time of the study lasting almost 3 weeks which was reportedly hampering confirmation of suspected malaria cases and the health workers had resorted to clinical diagnosis.

Figure 6: Showing an example of Malaria Rapid Diagnostic Test found in the field

4.5.2 The proportion of health facilities reporting adequate staff capacity as per recommended staffing at each level.

The researcher considered adequate staffing at the health facility to be a critical factor in the provision of effective malaria case management. Table 16 and Table 17 summarise recommended against existing staff and the specific cadres essential for management of malaria cases at the health centres and hospital under this study.

Table 16: Showing recommended and current staffing levels at the health facilities

Category	Bwindi Community Hospital	Kayonza Health Centre III	Kayonza TF Health Centre III	Kihembe Health Centre II	Byumba Health Centre II	Kanyashogye Health Centre II
Recommended staffing	190	19	19	9	9	9
Current staffing	121 (63.7%)	9 (47.4%)	11 (57.9%)	4 (44.4%)	7 (77.8%)	7 (77.8%)
Staffing gap	36.3%	52.6%	42.1%	55.6%	22.2%	22.2%

Results in Table 16 revealed that none of the health facilities had the recommended staffing levels as per the Ministry of Health guidelines which state that a hospital should have 190 staff,

HCIII 19 staff and HCII 9 staff (MOH, 2011d). All the health facilities had human resource gaps with the highest at 55.6% (Kihembe HCIII) and 22.2% at Byumba HCII and Kanyashogye HCII as the lowest.

Concerning availability of staff, the findings revealed that technical capacity of health centres to confirm malaria was hampered by the absence of certain cadres of medical workers. In Byumba and Kanyashongye HCIIs, nurses, only oriented in the use of RDTs, were doing malaria diagnosis. This was the case in 2 out of the 6 health facilities as shown in the Table 17 below;

Table 17: Showing availability of specific health cadres essential for malaria management

Category	Bwindi Community Hospital	Kayonza Health Centre III	Kayonza TF Health Centre II	Kihembe Health Centre II	Byumba Health Centre II	Kanyashogye Health Centre II
Laboratory technician/ technologist	2	1	2	1	0	0
Microscopist	2	0	0	1	0	0
Medical officer	4	0	0	0	0	0
Clinical officers	5	1	1	0	0	0
Nurses (All)	56	5	7	2	3	2

Figure 7: Showing a mutwa mother with a sick child getting treatment at a health centre at Kitariro

Laboratory personnel such as microscopists and technicians, who are deemed critical in confirmation of malaria cases, a key step in its management, were particularly lacking. Treatment of malaria without confirmation leads to wastage of malaria medicines and sometimes may lead to complication of other conditions.

4.5.3 The proportion of both population groups reporting satisfaction with the quality of malaria case management services.

Under this indicator, the researcher investigated: 1) waiting time at the health centre/hospital in terms of service obtained under 1 hour of arrival at the health facility or above 1 hour to 3 hours; and 2) satisfaction with malaria case management services at the health facility.

4.5.3.1 Waiting time at the health facility

The researcher used 'waiting time' as a measure of quality of malaria case management at the health facility since normally when patients go to a health facility, their expectation is that they should be attended to immediately. Usually this does not happen unless it is an emergency. Against this background, respondents were asked to estimate the time they waited before being attended to the last time they visited a health facility when malaria was suspected. Results are shown in Table 18 below;

Table 18: Showing the time spent at the health facility/hospital before being attended to according to respondents

Time in hours spent at the health facility before being attended to	Batwa		Non-Batwa	
	f	%	f	%
< 1 hour	59	45.7	65	49.6
> 1 hour – 3 hours	54	41.9	44	33.6
Non responses	16	12.4	22	16.8
Total	**129**	**100.0**	**131**	**100.0**

f= frequency

Results show that a sizeable proportion of both Batwa and non-Batwa respondents did not wait long, they spent less than one hour with 45.7% (n=59) and 49.6% (n=65) of each

respectively, whereas 41.9% (n=54) among Batwa compared to 33.6% (n=44) among non-Batwa spent above 1 hour to 3 hours at the health facility before being attended to. Generally, there was no significant difference in terms of waiting time between the Batwa and non-Batwa.

4.5.3.2 Satisfaction with malaria case management services

It is generally believed that if patients are satisfied with a certain service, they will use that service more. This applies to health services too. In this study a question was asked whether the respondents were satisfied with malaria case management services given to them at the health facility when they last visited with malaria. Findings are presented in Table 19. Satisfaction levels among Batwa and non-Batwa were all above average, with 52.7% (n=68) and 60.3% (n=79) respectively.

Table 19: showing respondents' satisfaction with malaria case management services at health facilities

Whether satisfied or not	Batwa		Non-Batwa	
	f	%	f	%
Yes	68	52.7	79	60.3
No	45	34.8	38	29.0
Non responses	16	12.5	14	10.7
Total	**129**	**100.0**	**131**	**100.0**

4.6 Intervening variables/community factors

In this study, intervening or moderating variables were: 1) distance to the nearest health centre/hospital which was measured by the proportion of Batwa and non-Batwa respondents residing within 0-5km and 6-10km radius of the nearest health centre/hospital; 2) means of transport to the nearest health centre/hospital which was measured by the proportion of Batwa and non-Batwa respondents using motorized and non-motorized means of transport to the nearest health centre/hospital for malaria case management; 3) taboos and traditional

health practices which was measured by the proportion of Batwa and non-Batwa who reported consulting traditional practitioners as their first action when they suspected having malaria; 4) role *eQuality* insurance (a form of health insurance operated around Bwindi by Bwindi Community Hospital) and 5) role of Village Health Teams both of which were established through key informant interviews and FGDs as presented below.

4.6.1 Distance to the nearest health centre/hospital and how it affected access to malaria health care;

Respondents were asked to estimate the distance in kilometers to the nearest health centre/hospital. The responses received were grouped in 2 classes of 0-5km and 6-10 km. None of the households in this study reported being more than 10km from the nearest health facility. The results are summarized in Table 20 below;

Table 20: Showing the proportional distribution according to distance to the nearest health centre/hospital

Distance to the nearest health centre/hospital	Batwa		Non-Batwa	
	f	%	f	%
0 – 5 km	121	93.8	116	88.6
6- 10 km	8	6.2	15	11.4
Total	**129**	**100.0**	**131**	**100.0**

It was clear from the findings that majority of Batwa 93.8% (n=121) and non-Batwa 88.6% (n=116) households were located within 5 kilometers of the nearest health facility. Only 6.2% and 11.4% of the Batwa and non-Batwa households respectively lived between 6-10 kilometers.

Furthermore, in order to validate the extent of the relationship between specific socio-background characteristics and respondents' health seeking behaviour when malaria was suspected; the researcher cross-tabulated distance to the nearest health centre/hospital and one's first action, findings of which are shown in the following Tables 21 and 22.

Table 21: Showing relationship between distance to nearest health facility and first health action taken when malaria was suspected among Batwa

Distance (km)	First action taken when malaria is suspected (Batwa)					Total
		Used herbs	Traditional practitioner	Health centre/hospital	Local drug shop/clinic	
0 – 5	Count % of Total	28 27.5%	16 15.7%	21 20.6%	3 2.9%	68 66.78%
6 – 10	Count % of Total	11 10.7%	13 12.7%	6 5.9%	4 3.9%	34 33.3%
Total	Count % of Total	39 38.2%	29 28.4%	27 26.5%	7 6.9%	102 100.0%

As regards the cross-tabulation of distance and first action taken when malaria is suspected, generally the health seeking behaviour among Batwa respondents is skewed towards using herbs and traditional practitioners irrespective of distance while on the other hand among the non-Batwa the health seeking behaviour is skewed toward health centres and hospitals.

Table 22: Showing Relationship between distance to nearest health facility and first health action taken when malaria was suspected among non-Batwa

Distance (km)	First action taken when malaria is suspected (non-Batwa)					Total
		Used herbs	Traditional practitioner	Health centre/hospital	Local drug shop/clinic	
0 – 5	Count % of Total	8 8.2%	2 2.0%	33 33.7%	12 12.2%	55 56.1%
6 – 10	Count % of Total	6 6.1%	2 7.2%	8 8.2%	22 22.4%	43 43.9%
Total	Count % of Total	14 14.3%	9 9.2%	41 41.9%	34 34.6%	102 100.0%

4.6.2 Chi square test on whether distance influences Batwa and non-Batwa to use heath centres/hospital

The researcher further calculated a chi square statistic for both population groups **(Refer to Appendix I)** to establish whether distance influenced the Batwa and non-Batwa choice of either health centres/hospital or use of herbs and traditional practioners. Results showed that, for the Batwa with df = 1, Chi square = 1.54 and $p<0.05$, there was no statistically significant relationship between distance and using the health centres/hospitals. Comparatively, for the

non-Batwa with df= 1, Chi square = 9.14 and $p<0.05$ there was a significant relationship between distance and using the health centres/hospitals.

4.6.3 Means of transport used to nearest health centre/hospital

The study also sought to establish the proportion of Batwa and non-Batwa respondents using motorized and non-motorized means of transport to the nearest health centre/hospital for malaria case management. This was because in terms of speed, motorized means (namely *boda boda* and motor vehicles) of transport were considered faster to reach health centre compared to non-motorized means such as walking or bicycles and using a community stretcher. The findings are presented in the Table 23 below;

Table 23: Showing respondents' means of transport used to reach the nearest health centre/hospital

Means of transport used to the nearest health centre/hospital	Batwa		Non-Batwa	
	f	%	f	%
Non-motorized (walking, bicycle, and community stretcher)	108	83.7	97	74.0
Motorized (*boda boda,* motor vehicles e.g. car or pick-up trucks)	21	16.3	31	23.7
Non responses	0	0	3	2.3
Total	**129**	**100.0**	**131**	**100.0**

Among both population groups, majority reported using non-motorized means of transport with Batwa reporting a higher percentage of 83.7% (n=108) compared to 74.0% ((n=97) of non-Batwa. Use of motorized transport was also common accounting for 23.7% (n=31) among non-Batwa and 16.3% (n=21) among Batwa showing that more non-Batwa used this option. This reflects economic status of the different population groups.

4.6.4 Taboos and traditional health practices related to malaria case management

- **Taboos and beliefs associated with malaria**

Respondents were asked whether there were any taboos and traditional health practices and beliefs associated with malaria.

Generally among the Batwa and non-Batwa, malaria was not associated with taboos and traditional practices. However, complicated malaria which presented with convulsions and uncoordinated speech was reportedly believed to be due to evil spirits. One non-Mutwa respondent in Bikuuto confessed that:

"When my child was sick with malaria and she started shaking and talking things which were uncoordinated, I suspected she was bewitched. I consulted a traditional healer who gave me some herbal medicine to rub in her head and some to drink. I also continued administering to her the medicine from the health facility. She eventually healed"

Related to taboos associated with malaria one of the key informants who had worked with Batwa and non-Batwa for over ten years said that:

"Severe malaria with convulsions locally called ebiyaga or ebihungu is associated with evil spirits"

The Batwa largely believed that most of the diseases could be cured through traditional means. Malaria was therefore not an exception. The Batwa had strong beliefs that herbs from the forests could cure all their ailments. As regards malaria, the Batwa just like their non-Batwa neighbours normally use *Omubirizi;* a locally available herb believed to have medicinal elements that treat malaria. It normally acted as some kind of first line treatment. The leaves of this shrub were mixed with water and squeezed to produce a bitter-tasting concoction that was consumed at least twice a day. The non-Batwa equally trusted traditional herbs in the treatment of many ailments including malaria. However, because of the long exposure to western health centre-based treatment, the attachment to traditional herbs appeared to be steadily getting eroded.

One strong shared common practice among Batwa and non-Batwa was that whenever malaria was suspected, the first action was to use traditional herbs for treatment. It was only when the condition did not improve that they normally sought treatment from a health facility. In this regard, one Mutwa in a FGD reported that:

"I prefer the herbs to tablets from the health facilities and clinics. When I feel I have malaria, I go to the nearby bushes and get the herbs, boil them, squeeze out the liquid and take. I usually get better 3 to 4 days after".

- **Traditional health practices related to malaria**

Concerning traditional health seeking practices, findings in Table 12, showed that majority of Batwa 22.5% (n=29) compared to a mere 6.9% (n=9) among non-Batwa consulted traditional practitioners as their first action when malaria was suspected. Taking this option, showed a wide variation in health seeking behaviour between the two population groups.

4.6.4 Role of eQuality community health insurance scheme

Another important factor that had generally influenced access to healthcare in the area of study was the establishment of eQuality community health insurance scheme. The scheme was started by Bwindi Community Hospital in 2010 in collaboration with International Medical Group covering members both Batwa and non-Batwa in the Bwindi area. Most people joined and paid 6000 Uganda Shillings through the *Bataka* Groups (local community groups). This enables them access OPD, in-patient and some surgery services by paying another 1,000 Uganda shillings at each visit. The Batwa have particularly been very vigilant in this scheme. Namanya (2013) observed that membership in a collective insurance program promoted community access to health centre based care. The Batwa in Kanungu were keen to ensure that each person had a valid insurance card, and in turn, this had improved health seeking behaviour as illustrated in the following photographs (Figure 8).

Figure 8: Showing an ambulance of Bwindi Community Hospital with eQuality insurance scheme and a member's card

4.6.6 Role of Village Health Teams (VHTs)

According to MOH (2010a), the VHT strategy aims to ensure that every village in Uganda has VHT members who work together to mobilise individuals and households for better health. VHT members are community volunteers who are selected by communities to provide accurate health information, mobilise communities and provide a linkage to health services. In the area of study, VHTs members who included both Batwa and non-Batwa, were trained and were able to supervise the treatment of uncomplicated malaria. VHTs are required to refer all severe cases of malaria to the health centres for immediate treatment.

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 Introduction

This chapter presents the discussion of the study findings. The areas discussed fell under the thematic areas related to three study objectives. These included; risk factors for contracting malaria, health seeking behaviour related to first action taken when malaria is suspected, and access to health centre/hospital-based malaria case management, among the Batwa and non-Batwa. Following below is a detailed discussion of each section.

5.2 Risk factors to contracting malaria among Batwa and non-Batwa

The researcher made a comparison among the two population groups of specific risk factors to contracting malaria. Risk factors were related to household surroundings and environment, housing type and characteristics, availability and use of mosquito nets, use of IRS, and knowledge of causes, symptoms and prevention measure of malaria.

5.2.1 Household and immediate surroundings

With regard to households' immediate environment, the findings revealed that more Batwa households were exposed to malaria than non-Batwa. Batwa performed poorly on 3 out 5 household environmental risk factors, namely; a higher proportion of Batwa households had bushes around the home, had more households with broken utensils, bottles and rubbish around dwelling units, and more Batwa households were located in close proximity to or near streams or swamps, which all exposed them to more risk compared to non-Batwa. On the other hand, exposure to malaria risk among non-Batwa was related to presence of pits and stagnant water around the home. Therefore the findings proved that the Batwa population was more vulnerable in terms of the specific household environment factors.

5.2.2 Housing type and characteristics

Further, the study made a comparison of malaria risk burden with regard to housing type and characteristics. The findings showed that majority of households among both population groups had semi-permanent houses at 87.6% (n=113) and 78.6% (n=103) among Batwa and non-Batwa respectively. However in terms of housing units classified as temporary, a higher proportion of Batwa 11.6% (n=15) compared to 6.1% (n=8) resided in temporary houses. These results proved that Batwa compared to non-Batwa had higher risk since they lived in more semi-permanent and temporary housing units. This is consistent with other studies as Gunawardena *et al (1998)* found out that poorly constructed houses imposed a significantly higher malaria risk on their inhabitants compared to better built houses. These houses therefore were exposed to more mosquito entry and were characterized by less means of preventive actions (MOH, 2005b).

Housing and built environments have a profound impact on human health. However with regard to finer details of finishing the houses to make them more protective, the findings showed that Batwa performed poorly in terms of presence of windows, screens and cracks/openings in the wall which in turn translated into such dwelling units being at a higher risk of entry by mosquito vectors.

5.2.3 Availability and use of mosquito nets by households

The study compared the risk of contracting malaria with regard to availability and use of mosquito nets as a risk reduction measure. In terms of availability of mosquito nets, the Batwa reported a higher availability at 78.3% compared to 65.6% among non-Batwa. However, with regard to usage of the nets, the findings showed a disproportionate lower usage among the Batwa compared to non-Batwa hence putting this population group at a bigger risk burden of contracting malaria.

These findings are in agreement with other studies which showed that presence of nets which was not matched with usage was likely not to offer protection. Binka *et al,* (1998) and Hawley

et al, (2003) argued that all mosquito nets act as a physical barrier, preventing access by vector mosquitoes and thus providing personal protection against malaria to the individual(s) using the nets. When used by a majority of the target population, ITNs provide protection for all people in the community, including those who do not themselves sleep under the nets. As seen above, Batwa tended not to use their nets as much as the non-Batwa.

This particular finding may point to a gap in the awareness and health education campaigns. It was not enough to convince people to own mosquito nets, but the message should involve how to use and maintain them to in order to get optimal benefits.

5.2.4 Application of IRS to reduce risk to malaria

The researcher made a comparison among the two population groups with regard to the use of IRS. The results from the study indicated limited application of IRS in both groups. A very negligible proportion of the respondents, 5.4% of Batwa and 7.6% of non-Batwa reported IRS use in their homes. These findings were in agreement with other studies for example UBOS and ICF (2012) which reported that overall, 7% of the households in Uganda and 8% in the rural areas were sprayed by IRS 12 months preceding the survey.

In Uganda, IRS is one of the key strategies for malaria control. Various studies have shown decrease in malaria risk and prevalence after IRS application. For example Bukirwa *et al* (2009) in a study in Kanungu district reported a significant and consistent decrease in the proportion of patients diagnosed with clinical malaria. In northern Uganda at Palabek sub county HCIII which was fully occupied by patients' majority of them with severe malaria cases, was empty one month after IRS in the area (USAID, 2010:16).

Considering the effectiveness of IRS as vector control method against malaria, it was clear that it had not been popular in the area. Some health officials recalled that when IRS was applied in mid 2000s, some local clinics which were largely dependent on malaria clients closed down. MOH (2008:48) also reported that Kanungu district was used as a sentinel site and it was found

out that IRS using ICON resulted in rapid decline of malaria case admissions and malaria parasitaemia as per blood smear tests. The question is then, why is IRS not commonly used in Kanungu district as a malaria risk reduction measure. Therefore whereas IRS has that rapid impact on malaria prevalence; the challenge was to sustain a timely, high quality and coverage spraying (USAID, 2010:16). The method was also labour intensive and costly (MOH, 2011c).

5.2.5 Knowledge of causes, symptoms and prevention of malaria

The researcher compared knowledge of causes, symptoms and prevention measures among the two population groups which was assumed to influence risk to contracting malaria either by increasing or reducing it depending on the individual's level of knowledge.

Study findings suggested a good level of knowledge on causes, symptoms and prevention of malaria among both Batwa and non-Batwa respondents. For example majority of Batwa 76.9% and non-Batwa 84.3% mentioned mosquito bites as the cause of malaria. However, a sizeable proportion of the Batwa 68.4% and non-Batwa 50.4% linked malaria to drinking dirty water, while others indicated that staying out in the rain and eating certain fresh foods like maize and mangoes caused malaria. Both communities associated certain events with increased malaria to its causes. This means that the communities may not be able to clarify the intricate malaria epidemiology that is strongly associated with rainfall patterns in the area. These findings confirm what MOH (2005a) stated that:

"Some people believe that one can get malaria by eating mangoes, new millet or maize, drinking dirty water or walking in the rain. This is not true. Those people believe this because malaria is most common in association with the rainy season when mangoes, maize and millet are plentiful. Actually there is more malaria in association with rains because there are more mosquitoes" MOH, 2005a, pg.2

As regards malaria symptoms, the Batwa (77.5%) and non-Batwa (86.3%) correctly identified fever as the major symptom. The variation of almost 10% between the two population groups could be related to the fact that non-Batwa have been exposed to malaria longer than the Batwa who claim they never had malaria in the forest about 21 years ago before eviction. The fever in malaria is related to the rapture of parasitized red blood cells (erythrocytes) which releases toxic substances that in turn cause a rapid onset of fever together with all other symptoms and complications (MOH, 2005a). Because malaria is a common disease in the area,most local languages like *Rukiga* equate fever to malaria.

It should be noted that even in medical circles, the clinical diagnosis has been a common feature. Malaria Consortium (2012) reports that, in fact until recently, the practice has always been to presume that a high fever in a malaria endemic area was most likely to be malaria and therefore should be treated accordingly; only if this did not work would other treatments be considered. This approach not only reflected the high prevalence of malaria but also the lack of facilities to make a confirmed diagnosis. Just 35 percent of suspected cases in endemic African countries were confirmed by parasitological test in 2009.

Batwa and non-Batwa also identified weakness and headache as major symptoms of malaria. What is more, both Batwa and non-Batwa gave additional symptoms including miscarriages and vomiting. Most of the respondents and FGDs participants were explaining from first-hand experience having had malaria and gone through the various symptoms themselves. Others had nursed a member of the family with malaria. Such practical experiences give the community chance to understand malaria symptoms and largely explain the good knowledge of the disease. This means therefore that health education messages should build on such wide knowledge in the community to promote quick health seeking behaviour when malaria is suspected.

It was not enough to be knowledgeable about malaria as a disease in terms of causes and symptoms. It was even more important to know prevention and control in order to reduce its morbidity and mortality. A sizeable proportion of Batwa 73.6% and non-Batwa 81.7% strongly

believed that sleeping under a mosquito net could prevent malaria. The implication of this was that generally, both population groups appreciated net usage as a malaria prevention strategy. In other words, a big proportion of both Batwa and non-Batwa knew that sleeping under a mosquito net reduced the risk to catching malaria.

While the results from this study suggest good knowledge by Batwa and adjacent non-Batwa about malaria causes, symptoms and prevention, results also showed that some participants associated severe malaria with convulsions, unconsciousness and uncoordinated speech to witchcraft. This calls for more health education and awareness to eliminate such negative perceptions.

5.3 Health seeking behaviour as the first action when malaria is suspected

The researcher made a comparison of respondent's health seeking behavior in relation to the first action taken when malaria was suspected using three indicators of where respondents sought treatment. These were: self-medication using herbs, health centres/hospitals and local drug shops/clinic.

Results clearly showed a strong leaning among the Batwa towards use of herbs and traditional practitioners compared to the non-Batwa. For example, 30.2% of Batwa compared to 10.7% non-Batwa used herbs. These findings are in agreement with earlier studies. For example Lewis (2000) discovered that Batwa believed that strong herbs from the forest when administered and dosed by herbalists were one of the optimal options for treating malaria. The implication of this finding was that Batwa were more likely to use herbs and traditional healers than the non-Batwa. However, non-Batwa also used herbs for managing malaria. Results from Ndyomugyenyi *et al*, (2007) confirmed that it was fairly common for non-Batwa in Uganda to use herbs as drug treatment. In Tanzania as in Kenya, convulsions in young children were not associated with malaria despite this being the case. People believed that if a child with convulsions was given an injection he, or she would die (Mwenesi, 1993). Thus, children with convulsions were usually

taken to traditional healers rather than hospitals (Winch *et al.* 1997). Similarly MOH (2011c:34) indicated that community knowledge about malaria treatment was high but many patients still sought treatment late with a significant proportion first seeking treatment elsewhere before presenting to the health facilities.

This therefore means that, for the Batwa especially, herbal treatment is an important treatment option. However, access to Bwindi Forests where herbs are in abundance is officially denied by the government. This calls for a review of the policy to allow regulated access in order to cater for this type of treatment within both population groups. Moreover, MOH (2012b:53) asserted that it was apparent that the integration of traditional and complementary medicine into the national healthcare system had the potential to augment, strengthen and promote better healthcare for all in line with the national vision.

5.4 Factors affecting access to health centre/hospital based malaria case management among Batwa and non-Batwa

Health system factors especially access play an integral part in the control and prevention of malaria at community level. The level and functionality of formal healthcare facilities within the community; whether public or private has a bearing on malaria control and management.

5.4.1 Availability of malaria medicines (ACTs) and RDTs at health centres/hospital

The shortage of medicines and health supplies may constitute a serious problem in relation to accessing malaria case management. Results from this study showed that majority of health facilities surveyed had sufficient malaria treatment stocks (ACTs) as well as RDTs to test for malaria before treatment. Only Kayonza TF HCII reported a stock out of RDTs in the last 12 months. This finding was in agreement with Gulliford *et al,* (2001), who argued that if services are available, in terms of an adequate supply, then the population may have access to quality health care.

However, in view of the above factors, this may require addressing the primary factors which impact on this access namely reliable and affordable means of transportation.

5.4.2 Staffing at health centres/hospitals

With regard to staffing, results revealed that none of the health facilities had the recommended staffing levels as per the Ministry of Health guidelines which state that a hospital should have 190 staff, HCIII 19 staff and HCII 9 staff (MOH, 2011d). All the health facilities had human resource gaps with the highest at 55.6% (Kihembe HCIII) and 22.2% at Byumba HCII and Kanyashogye HCII with the lowest.

Concerning availability of staff, the findings revealed that technical capacity of health centres to confirm malaria was hampered by the absence of certain cadres of medical workers. This therefore means that health facilities in the catchment area were in serious need of addressing the identified staffing gaps in as far as they directly affected malaria confirmation and treatment.

5.4.3 Satisfaction with the quality of malaria case management services

Satisfaction with the quality of care was measured by waiting time and general satisfaction.

In terms of waiting time, a sizeable proportion of both Batwa and non-Batwa respondents did not wait long, they spent less than one hour with 45.7% (n=59) and 49.6% (n=65) of each respectively, whereas 41.9% (n=54) among Batwa compared to 33.6% (n=44) among non-Batwa spent above 1 hour to 3 hours at the health facility before being attended to. Generally, there was no significant difference in terms of waiting time between the Batwa and non-Batwa. The results are in line with a study by Jitta et al (2008) who reported that 46% of exiting patients interviewed felt they had not waited long (less than one hour) while 29% felt they had waited long (over 1 to 3hours).

Regarding satisfaction, the levels among Batwa and non-Batwa were all above average, with 52.7% (n=68) and 60.3% (n=79) respectively. The results of both population groups are below what UBOS (2011) discovered that; regardless of the type of health facility, 78% of patients were satisfied with the way they were received. However, the findings are close to what Jitta *et al* (2008) reported that patients' level of satisfaction in selected districts of Uganda with making diagnosis was 49% and satisfaction with treatment and care received was 55%. In general, users of private health facilities were more satisfied with care than those in public health facilities, reflecting differences in quality of care.

5.5 Intervening/community factors

The five intervening community factors were related to distance and means of transportation to the nearest health centre/hospital, taboos and traditional health practices, role of eQuality health insurance, and role of VHTs.

5.5.1 Physical access and distance to health facilities

Regarding physical access to health centres and hospital-based malaria healthcare services the majority of both Batwa (93.8%) and non-Batwa (88.6%) respondents lived within an estimated 5 kilometres of the nearest a health facility. The above access coverage was discovered to be above the national target of 72% according to MOH, (2010a:106). In spite of this positive finding, there were many physical barriers related to the geography of the area that affected mobility and ease of movement. The area is characterized by steep mountain landscapes, rivers, swamps and thick forests that appeared to hinder easy movement especially for people seeking treatment. Although Kanungu district has a good spatial distribution of health centres/hospitals (Appendix Hb), actual access is dwarfed by the numerous physical barriers. The results are in conformity with UBOS (2011) where 18% of the respondents mentioned long distance to the health facility as the major concern in accessing health services.

5.5.2 Means of transport to the nearest health centre/hospital

Varied means of transportation were used to reach the nearest health centres. Among both population groups, majority reported using non-motorized means of transport with Batwa reporting a higher percentage of 83.7% (n=108) compared to 74.0% ((n=97) of non-Batwa. This category included walking, using a bicycle and community stretcher (*ekigagara).* Use of non-motorized means however was associated with difficulties like the hot sun or rain when one used this option to the health centre when sick with malaria. Use of motorized transport was also common accounting for 23.7% (n=31) among non-Batwa and 16.3% (n=21) among Batwa showing that more non-Batwa used this option.

Considering that most respondents reported walking to the health facilities (76.7%) Batwa and (68.8%) non-Batwa, accessibility and mobility in the area could be seriously hampered. Moreover, motorized means (boda boda and pick-up trucks) remained expensive and most participants reported that they could not afford to pay for this option. This means therefore that communities should be encouraged to report early to the facilities for treatment whenever malaria or any illness was suspected. It was revealed that BDP and BCH run an ambulance system in the past for the Batwa which tremendously helped them access healthcare. This could be revived for all communities within the *eQuality* community health insurance framework.

5.5.3 Taboos and traditional health practices

Generally among the Batwa and non-Batwa, malaria was not associated with taboos and traditional practices. However, it was discovered that complicated malaria with convulsions and uncoordinated speech was associated with evil spirits. It was also very clear that both population groups believe in use of herbs especially *omubirizi* (a local herb) which is prepared into a concoction for the management of malaria. Health seeking behaviour for malaria treatment among the Batwa and non-Batwa was intricately associated traditional health

practices whereby, majority Batwa prefer to consult traditional practitioners for malaria treatment.

5.5.4 Role of *eQuality* health insurance

The study discovered that eQuality community health insurance plays an important role in raising awareness and improving access to formal health care services in the area. With a modest annual contribution of 6,000 Uganda shillings members can access basic health services including malaria treatment. In line with such community insurance schemes, Halvorson (2007) observed that, the new insurance ID card allows the family, often for the very first time in their lives, to seek and receive needed healthcare without financial hardship. It allows family members to receive sufficient healthcare without bankrupting the family. Children with malaria, dysentery, and parasitic infections can use the ID card to receive basic, necessary medical care.

5.5.5 Role of VHTs

The VHT strategy aims to ensure that every village in Uganda has VHT members who work together to mobilise individuals and households for better health. UBOS (2011) reported that 79% of the health facilities indicated existence of VHTs in their catchment areas and that 66% of the VHTs were functional (i.e. doing health promotion, holding quarterly meetings and reporting to nearest health facilities). Indeed the VHTs constitute the first contact point for the majority of people in the rural areas. Uganda's health sector strategizes to build capacity; to ensure participation of communities in the design, planning and management of health services by expanding VHTs to all local governments and exploring ways of sustaining them.

5.6 Key implications of the findings in relation to malaria control policy

Exposure to risk for contracting malaria and access to malaria case management differs for population groups like the Batwa and non-Batwa even when they live in a similar geographical location. This is because of the unique household environmental and social characteristics,

health seeking behaviour and access factors. In order to address such unique scenarios it is important that malaria control policies should consider targeted programmes for marginalised and vulnerable population groups like Batwa.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents conclusions and recommendations based on the objectives and findings.

6.2 Conclusions on risk factors for contracting malaria among Batwa and non-Batwa

This study established that Batwa households had a higher risk burden of contracting malaria compared to the non-Batwa. The risk was associated with household immediate environment, poor housing type and characteristics which increased their exposure mosquito bites.

Furthermore, although mosquito net availability was high among Batwa, in terms of usage, it was lower among Batwa compared to the non-Batwa. There was also adequate knowledge among the Batwa and non-Batwa about the causes, symptoms and measures of preventing malaria. This wide knowledge however, appeared not to be adequately translated into malaria risk reduction for example improving housing characteristics and homestead environment and usage of IRS.

6.3 Conclusions on health seeking behaviours when malaria is suspected

Self-treatment using locally available herbs was still an important method of treatment when malaria was suspected among both Batwa and non-Batwa. But overall, the Batwa were more likely to use herbs for treatment or consult traditional practitioners compared to non-Batwa. More non-Batwa were more likely to seek treatment from health centres and hospitals compared to Batwa. The introduction of *eQuality* insurance scheme and VHTs covering both Batwa and non-Batwa were positive steps towards improving health seeking behaviour among both population groups.

6.4 Conclusions on access to health centre/hospital-based malaria case management

Apart from individual practices and health seeking behaviour, availability and adequacy of services at the health facilities also attracted people to seek healthcare. In this regard, the health facilities surveyed generally had adequate essential malaria medicines and commodities like ACTs and RDTs, however the identified critical staffing gaps call for urgent intervention.

6.5 Conclusions on intervening variables/community factors

- **Distance and means to nearest health facility**

Distance and means of transport to the nearest health facilities were vital in improving access to health centre/hospital based care for malaria. However, the area of study has constraining physical geography characterised by widespread steep hills, swamps, thick forests, rivers and a poor road infrastructure. These features hamper easy movement and access to health facilities even when the distance appears short. Increasing mobility of the population was critical in view of introduction of motorized instead of non-motorized transportation, and improving the road network.

- **Taboos and traditional health practices**

Apart from the belief that complicated malaria with convulsions is associated with evil spirits, Both Batwa and non-Batwa do not have negative taboos. The Batwa are more likely to use herbs and traditional practitioners as their first action when malaria is suspected compared to the non-Bawa who go to health centres and local clinics.

- **eQuality Health insurance**

It was discovered that *eQuality* community health insurance was a means of increasing access to health/centre/hospital based malaria case management for both Batwa and non-Batwa even

for other conditions in view of primary health care services. The eQuality health scheme appears to have contributed to the uptake of a broad spectrum of services including malaria treatment.

- **Village Health Teams**

Regarding VHTs, the strategy appears to have empowered communities to take care of their own health. Some Batwa had been elected on VHTs giving them an opportunity to interact and participate actively in formal and community-based healthcare. The combined operations of eQuality and VHTs as community-based health initiatives provide an excellent springboard for malaria prevention and improved case management, plus other health interventions like hygiene and sanitation.

6.5 Recommendations

The study therefore proposes the following recommendations in views of the above findings:

- House improvement campaigns that address both in-door and out-doors surroundings, and which directly contribute to making houses less favourable for mosquito multiplication, entry and resting be promoted. Simple efforts like putting windows, screens, closing cracks in walls could reduce exposure and risk to malaria. This should be combined with household environmental improvement for example removal of mosquito breeding grounds like stagnant water and clearing of bushes around the homesteads.
- Mobilization of the resources to increase supply and use of mosquito nets and scale up IRS in order to reduce malaria transmission by all relevant stakeholders in Kanungu district be intensified. The distribution of mosquito nets and IRS use should be combined with a strong health promotion behaviour change component on their use and maintenance to ensure sustainable reduction on malaria transmission.

- Deliberate efforts to empower the community through VHTs, and eQuality insurance be strengthened through advocacy programmes facilitated by health workers focusing on malaria prevention and management.
- Develop and strengthen beneficial partnerships between public and private stakeholders in the formal district health system to address challenges like low levels of knowledge on the intricate malaria epidemiology, unfavourable means of transportation to health centres/hospitals which directly impede access to malaria case management.

List of References

1. AMIN E. MARTIN (2005); Social Science Research: Conception, Methodology and Analysis, University of Yaoundé, Cameroon
2. APPIAH-DARKWAH, I., BADU-NYARKO, S., 2011, Knowledge of malaria prevention and control in Sub-urban community in Accra, Ghana*, International Journal of Tropical Medicine*, 6 (3): 61-69
3. BAGEWITZ, A., 2009, Healthcare seeking behavior when suspecting malaria-an ethnographic field study of indigenous people in Uganda, Malmo University, Health and Society- Department of Nursing, available on http://dspace.mal.se/bitstream/handle/2043/7840/MFS%20PDF%20E5ndag.pdf?sequence1, viewed 25/06/2012
4. CHARLES C. M., 1995, Introduction to education research, San Diego, Longman.
5. BERG L. M. (2004); Statistical Methods for Social Researchers, MacMillan, London, UK
6. BERRANG-FORD, L., K. DINGLE, J.D. FORD, C. LEE, S. LWASA, D. NAMANYA, J. HENDERSON, A. LLANOS, C. CARCAMO, V. EDGE (2012) Vulnerability of Indigenous health to climate change: a case study of Uganda's Batwa pygmies. *Social Science and Medicine.*
7. BINKA F, INDOME F, SMITH T., Impact of spatial distribution of permethrin-impregnated bed nets on child mortality in rural northern Ghana. *American Journal of Tropical Medicine and Hygiene*, 1998, 59:80–85.
8. BIRUNGI M., R., E., 2010. A comparative study of HIV risk factors and health care utilization between Batwa pygmies and surrounding communities of Kanungu district, Bwindi Community Hospital, Kanungu, pp. 27
9. BODKER, G., 2008, The healthcare of indigenous peoples/nations, in Carrin et al 2008, Health systems, policy, finance and organisation, Elsevier Inc, Oxford UK.
10. BRUCE-CHWATT L J, 1988, History of malaria from prehistory to eradication, *Malaria: Principles and practice of mararіology*, Edinburgh: Churchill Livingstone Wernsdorfer WH, McGregor I, **1**:1-59
11. BUKIRWA H., YAU, V., KIGOZI, R., FILLER, S., QUICK, L., LUGEMWA, M., GUNAWARDENA, D., KAMYA, M., WABWIRE-MANGENI, F., AND DORSEY , G., 2009, Short report: Assessing the impact of IRS on malaria morbidity using a sentinel surveillance system in SW Uganda, Am. Journal of Tropical Medicine and Hygiene, 81(4), pp. 611-614
12. BWINDI COMMUNITY HOSPITAL (BCH), 2009, Kayonza and Mpungu sub-counties household survey, pp. 28, available on: www.BwindiHospital.com, viewed 16/04/2012
13. CLARKE SE et al. Do untreated bed nets protect against malaria? *Transactions of the Royal Society of Tropical Medicine and Hygiene,* 2001, 95:457–462.
14. COX, F.E.G., 2010, History of the discovery of the malaria parasites and their vectors, Parasites and Vectors, **3**:5, http:/www.parasitesandvectors.com/content/3/1/5.
15. ERNST, K. C., ADOKA, S. O., KOWUOR, D. O., WILSON, M. L., CHANDY C.J., 2006, Malaria hotspot areas in a highland Kenya site are consistent in epidemic and non-epidemic years and are associated with ecological factors, Malaria Journal 2006 5: 78 doi:10:1186/1475-2875-5-78, available on http://www.malariajounal.com/content/5/1/78, viewed on 21/06/2012
16. EPISCOPAL MEDICAL MISSION FOUNDATION, 1999, Making a difference in Uganda, available on: http://www.emmf.com/ugandasurvey.htm, viewed 12/04/2012

17. GHEBREYESUS, T. A., HAILE, M., WITTEN, I. H., GETACHEW, A., YOHANNES, M., LINDSAY, SW., BYASS, P., 2004, Household risk factors for malaria among children in the Ethiopian highlands, Trans R Soc Trop Med Hyg, 94:17-21
18. GILLES H.M et al (1993), Essential Malariology, 3rd Edition; Edward Arnold, London; pp 340 in *International Journal of Medicine*, Vol. 6, 6(3) 61-69, 2011 .
19. GOVENDER, V., MCINTYRE, D., LOUWESON, R., 2008, Progress towards the Abuja target for government spending on healthcare in East and Southern Africa, EQUINET Discussion paper 60, Ministry of Health, Government of Kenya, National Malaria strategy 2001-2010.
20. GOVER-KOPEC, E. K., BLUMETHAL, M., BENNO, CECCATO, P., DINKU, T., OMUMBO, J.A., CONNOR, S.J., 2006, Web-based climate information resources for malaria control in Africa, Malaria Journal, doi: 10.1186, 1475-2875-5-38, 5:38
21. GULLIFORD, M., FIGUERA-MUNOZ, J., MORGAN, M., HUGHES, D., GIBSON, B., BEECH, R., HUDSON, M., CONNELL, P., ARUMUGAM, C., MOHIDDIN, A., SEDGWICK, J., 2001, Access to health care, The Public Health and Health Services Research Group, Department of Public Health Sciences, King's College London, pp. 142, available on http://www.kcl-phs.org.uk/martin/reprints/accessscopingexercise_report.pdf , Viewed 13/04/2012
22. GULLIFORD, M., FIGUERA-MUNOZ, J., MORGAN, M., HUGHES, D., GIBSON, B., BEECH, R., HUDSON, M., 2002, What does 'access to healthcare' mean? *Journal of health services research and policy*, **7**: 186-188
23. GUNAWARDENA, WICKREMASINGHE, A., R., MUTHUWATTA, L., WEERASINGHA, S., RAJAKARUNA, J., SENANAYAKA, T., P. KOTTA, K., ATTANAYAKE, N., CARTER, R., MENDIS K., N., 1998, Malaria risk factors in an endemic region of Sri Lanka, and the impact and cost implications of risk factor–based interventions, American Journal of Tropical Medicine and Hygiene, 58(5), pp. 533-542, available on: http://www.ncbi.nlm.nih.gov/pubmed/9598437, viewed on 16/04/2012
24. HALVORSON, G. C., 2007,Health care co-ops in Uganda, The Permanente Press, California, USA.
25. HAWLEY WA, PHILLIPS-HOWARD PA, TER KUILE FO, TERLOUW DJ, VULULE JM, OMBOK M : Community-wide effects of permethrin-treated bed nets on child mortality and malaria morbidity in western Kenya. *Am J Trop Med Hyg* 2003, 68: 121-127.
26. JITTA, J., ARUBE-WANI, J., MUYINDA, H., 2008, Study of client satisfaction with health services in Uganda, Ministry of Health, Kampala, Uganda. Pp. 74
27. JOPPE, M., 2000, The research Process, in *The Qualitative Report*, Volume 8 Number 4 Dec 2003, 597-607
28. KANUNGU DISTRICT, 2007, District Health Work Plan 2007/08, Government of Uganda, Kanungu.
29. KIDD, C., ZANINKA, P., 2008, Securing indigenous peoples' rights in conservation: a review of southwest, Forest Peoples Programme and UOBDU, available on www.forestpeoples.org, viewed 22/04/2012
30. KILLEEN GF et al., Preventing childhood malaria in Africa by protecting adults from mosquitoes with insecticide-treated nets. *PLoS Medicine*, 2007, 4(7):e229.
31. KIRK, J., MILLER, M., L., 1986, Reliability and validity in qualitative research, Beverly Hills: Sage Publications, in *The Qualitative Report*, Volume 8 Number 4 Dec 2003, 597-607
32. LAST J., M., (ed)., 1988, A Dictionary of Epidemiology. Second Edition, Oxford University Press, New York, p. 115-116. In Honrado E., R, and Fungladda, W., Social and behavioural risk factors

related to malaria in Southeast Asian countries, available on http://psmid.org.ph/vol23/vol23num2topic5.pdf , viewed 27/04/12

33. LEWIS J, 2000, The Batwa pygmies of the Great Lakes, London, Minority Group, in Bgewitz A. (2009) Healthcare seeking behaviour when suspecting malaria: An ethnographic field study of indigenous people in Uganda, Malmo University, Dept. Of Nursing, Malmo, Sweden.
34. LINDSY, S.W., EMERSON, P.M., CHARLWOOD, J.D.: Reducing malaria by mosquito-proofing houses. *Trends Parasitol* 2002, **18**:510-514, in Ye et al. Housing conditions and *plasmodium falciparum* infection: protective effect of iron-sheet roofed houses, *Malaria Journal,* 2006, **5**:8
35. MALARIA CONSORTIUM, 2012, When it is not malaria, available on http://www.malariaconsortium.org/news-centre/when-it-s-not-malaria.htm, viewed 04/07/2012
36. MAZIGO, HD., OBASY, E., MAUKA, W., MANYIRI, P., ZINGA, M., KWEKA, JE., MNYONE, LL., HEUKKELBACH, J, 2010, Knowledge, attitudes and practices about malaria and its control in rural Northern Tanzania, Malaria Research and Treatment, doi:10.4061/2010/794261
37. MINISTRY OF HEALTH, 2005a, Management of uncomplicated malaria: A practical guide for health workers, 3rd Edition, Malaria Control Programme, Government of Uganda, Kampala, pp. 40
38. MINISTRY OF HEALTH, 2005b, Uganda Malaria Control Strategic Plan 2005/06-2009/10, Malaria Control Programme, Government of Uganda, Kampala, pp.48
39. MINISTRY OF HEALTH, 2008a, Health sector strategic plan II 2005/06–2009/10 medium review report, Government of Uganda, Kampala, pp. 155
40. MINISTRY OF HEALTH 2008b, Proposal for improvement of health care delivery through improvement of human resources for health and functionality of health infrastructure, October 2008, Kampala, Ministry of Health.
41. MINISTRY OF HEALTH, 2009, Human resources for health audit report, Government of Uganda, Kampala, pp. 206
42. MINISTRY OF HEALTH, 2010, Health Sector Strategic and Investment Plan HSSIP, 2010/11-2014/15, Government of Uganda, Kampala, pp. 180.
43. MINISTRY OF HEALTH, 2010b, Human resources for health audit report, Government of Uganda, Kampala, pp. 407
44. MINISTRY OF HEALTH, 2011a, Uganda National Malaria Control Strategic Plan 2010/11-2014/15, Government of Uganda, Kampala, pp. 44.
45. MINISTRY OF HEALTH, 2011b, Annual health sector performance report, Government of Uganda, Kampala.
46. MINISTRY OF HEALTH, 2011c, Uganda Malaria Programme Review Report 2001-2010, Government of Uganda, Kampala, pp. 103
47. MINISTRY OF HEALTH, 2011d, Health Facility Inventory, Government of Uganda, Kampala, Uganda. Pp. 154
48. MINISTRY OF HEALTH, 2012a, Annual health sector performance report 2011/2012, Government of Uganda, Kampala, Uganda.
49. MINISTRY OF HEALTH, 2012b, National policy on public private partnership in health, Government of Uganda, Kampala, Uganda, pp. 62

50. MOH, Health Systems 20/20, and Makerere University School of Public Health (2012), Uganda Health System Assessment 2011, Kampala, Uganda and Bethesda, MD: Health Systems, 20/20 project, Abt Associates Inc. pp. 153
51. MINISTRY OF WATER AND ENVIRONMENT, 2007, National adaptation programme of action, Government of Uganda, Kampala.
52. MURRAY, C. J. L., ROSENFIELD, L. C., LIM, S.S., ANDREWS, K. G., FOREMAN, K. J., HARING, D., FULLMAN, N., NAGHAVI, N., LOZANO, R., LOPEZ, A. D., 2012, Global malaria mortality between 1980 and 2010: a systematic analysis, Lancet 2012: 379:413-31.
53. MOHANKUMAR, A., 2009; Health status of an indigenous population in India receiving preventive and curative services, Association for health welfare in Nilgiris, available on: www.ashwini.org, viewed 12/04/2012
54. MWENESI, H., 1993, Mothers definition and treatment of childhood malaria on the Kenya coast (Ph. D. Dissertation). London School of Hygiene and Tropical Medicine, University of London, in Mitullah et al., 2012, Draft literature review on socio-economic aspects of malaria, schistosomiasis and rift valley fever, UoN and Healthy Futures Project.
55. NAMANYA B. D., 2013, Community Health Insurance a Policy Option for Climate Adaptation. http://www.africaportal.org/blogs/community-practice/community-health-insurance-policy-option-climate-adaptation, viewed 14/05/2013
56. NAMARA, A., 2007, GEF Impact Evaluation. Case Study: Impacts of Creation and Implementation of National Parks and of Support to Batwa on their Livelihoods, Well-Being and Use of Forest Products. Washington, DC: Global Environmental Facility Evaluation Office. Available on: http://www.thegef.org/gef/sites/thegef.org/files/documents/Impact_Eval_Infodoc10.pdf, viewed 10/04/2012
57. NDYOMUGYENYI, R., MAGNUSSEN, P., 2007, Malaria treatment-seeking behaviour and drug prescription practices in an area of low transmission in Uganda: Implications for prevention and control, Hygiene and tropical Medicine, 101:209-215
58. OHENJO, N., WILLIS, R., JACKSON, D., NETTLETON, C., GOOD, K., MUGARURA, B., 2006, Health of indigenous people in Africa, Lancet, Vol. 367, 1937-46, www.thelancet.com viewed 18/04/2012
59. OSUNWOLE, A., 2007, Indigenous methods of malaria control by the Osooro people of Ondo State Nigeria, African Journal for Pshychological study of social issues, Vol. 10(1),
60. PAHO, WHO, 2007, Malaria prevention, surveillance and control: A habdbook for leaders and community health workers and Afro descent peoples, Pan American Health Organisation and WHO, Washington DC, pp. 65
61. PULLAN, R. L., BUKIRWA, H., STAEDKE, S., SNOW, R. W., BROOKER, S., 2010, Plasmodium infection and its risk factors in eastern Uganda, Malaria Journal 2010,9:2 doi:10.1186/1475-2875-9-2, available on http://www.malariajournal.com/content/9/1/2, viewed 20/06/2012
62. REITER, P., LATHROP, S., BUNNING, M., BIGGERSTAFF, B., SINGER, M., RAMIREZ, B., ROBINSON, J., RAWLINGS, J., VORNDAM., V., WATERMAN S., GUBLER, D., CLARK, G., HAYES, E.: Texas lifestyle limits transmission of dengue virus. *Emerg Infect Dis*, 2003, **9**: 86-89, in Housing conditions and *plasmodium falciparum* infection: protective effect of iron-sheet roofed houses, *Malaria Journal,* 2006, **5**:8

63. SARANTAKOS G. (1998); Social Research, Mc Millan, London, UK
64. UGANDA BUREAU OF STATISTICS (UBOS), 2010a, Uganda national household survey 2009/10, Government of Uganda, pp. 205
65. UGANDA BUREAU OF STATISTICS (UBOS), Macro International Inc., ICF., 2010b, Uganda malaria indicator survey 2009, Government of Uganda, Kampala.
66. UGANDA BUREAU OF STATISTICS (UBOS), 2011, Uganda National Panel Survey, Government of Uganda, Kampala.
67. UGANDA BUREAU OF STATISTICS (UBOS) and ICF International Inc., 2012, Uganda Demographic and Health Survey 2011, Kampala Uganda: UBOS and Calverton, Maryland: ICF International Inc., pp. 224
68. UNFPA, 2008, The state of Uganda population report: The role of culture, gender and human rights in social transformation and sustainable development, Kampala, Uganda, pp. 115
69. UOBDU, 2004, Long-term priorities of Batwa from southwest Uganda, UOBDU Report.
70. USAID, 2009, Uganda IRS Quarterly Report Oct-Dec, Abt Associates Inc., Uganda IRS Project.
71. UTWIN S. MARK (1994); Improving Survey Validity and Reliability, Kogan Page, London, K
72. WINCH, P., J., et al. 1997, Local terminology for febrile illness in Bagamoyo district, Tanzania, and its impact on the design of a community-based malaria control programme. *Social Science and Medicine*, 42: 1057-67
73. WINSKILL, P., ROWLAND, M., MTOVE, G., MALIMA, R., C., KIRBY, M., J., 2011, Malaria risk factors in northeast Tanzania, Malaria Journal 2011, 10:98, available on http://www.malariajournal.com/content/10/1/98, viewed 16/o4/2012
74. www.who.int/heli/risks/vectors/malariacontrol/en/index2.html, Malaria control: the power of integrated action, viewed 23/04/2012
75. www.idrc.ca/en/ev-56602-201-1-DO_TOPIC.html, MODULE 8 Variables
76. WHO, 2004, Insecticide-Treated Mosquito Nets: A WHO Position Statement, WHO Global Malaria Programme, pp.12
77. WHO, 2006 Malaria vector control and personal protection, WHO Technical Report Series No. 936, Geneva, Switzerland, pp. 72)
78. WHO, 2010, Guidelines for the treatment of malaria, Second Edition, Geneva, Switzerland, pp. 194
79. WHO, 2011, Q&A on malaria mortality estimates, available on http://www.who.int/malaria/world_malaria_report_2011/WHOGMP_burden_estimates_qa.pdf , viewed 21/06/2012
80. WHO, 2011, World malaria report, Switzerland, Geneva, pp. 111
81. WHO, 2012a, Community-based reduction of malaria transmission, Geneva, Switzerland. pp. 53
82. WHO, 2012b, Test, Treat, Track: Scaling up diagnostic testing, treatment and surveillance for malaria, WHO Global Malaria Programme, Geneva, Switzerland, pp.12
83. WHO, 2012c, Malaria, available on: http://www.who.int/ith/diseases/malaria/en/ viewed 19/11/2012

84. WHO, 2012d, World Malaria Report 2012, available on: http://www.who.int/malaria/publications/world_malaria_report_2012/en/index.html, viewed on 26/08/13
85. WHO, 2012e, World Malaria Report 2012 Fact Sheet, available on: http://www.who.int/malaria/publications/world_malaria_report_2012/wmr2012_factsheet.pdf , viewed on26/08/13
86. WHO, 2013, Malaria Factsheet No.94, available on: http://www.who.int/mediacentre/factsheets/fs094/en/index.html viewed on 26/08/2013
87. WHO, 2007, Health of indigenous peoples, available on http://who.int/mediacentre/factsheets/fs326/en/ viewed 15/06/2012

Appendices:

Appendix A: Consent Request from respondents

International Health Sciences University Kampala

P. O. BOX 7782, KISUGU, KAMPALA UGANDA

WWW.IHSU.AC.UG

Informed Consent for the study on Malaria risk factors among Batwa and non-Batwa in Kanungu District Community

Hello. My name is…… and I am an Mph student at International Health Sciences University (IHSU) in Kampala*. [Research Assistants will say their names and indicate they are working on my behalf].* We are conducting a research is on malaria which is very common in this country and in this region. The research is titled " **Comparative Study Of Malaria Risk Factors And Access To Healthcare Services By Batwa And Neighbouring Communities In Kanungu District Southwestern Uganda**". The study is being carried out as a partial requirement for the award of a Master of Science in Public Health of International Health Sciences University.

We want to learn what people who live in this community know about the causes of malaria and why some people get it, the different ways that people try to stop malaria, how people know when someone has it and local health practices because this knowledge might help us to learn how to better control malaria in this community.

As part of the study we would like ask you some questions about your household/health facility. All the answers you will give will be confidential and used only for this research. If we should come to any question and you do not want to answer, just let me know and I will go on to the next question.

You are being invited to take part in this research because we feel that your experience as a responsible citizen can contribute much to our understanding and knowledge of malaria and local health practices.

Your participation in this research is entirely voluntary. It is your choice whether to participate or not.
You may change your mind later and stop participating even if you agreed earlier.

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact: Didacus B. Namanya on Mobile tel. 0772 484771 Or Email didamanya@yahoo.com

May I begin the interview now? Yes [continue] No [End and move to next Household/health facility]

Date _____

Day/month/year

Appendix B: Household head questionnaire

QUESTIONNAIRE FOR THE HEAD OF THE HOUSEHOLD

COMPARATIVE STUDY OF MALARIA RISK FACTORS AND ACCESS TO HEALTHCARE SERVICES BY BATWA AND NON-BATWA COMMUNITIES IN KANUNGU DISTRICT SOUTHWESTERN UGANDA

Interviewer Name: Date:

PART A: BACKGROUND INFORMATION

1. Administrative Location
   Sub county:
   Parish:
   Settlement/Village:

2. Sex of respondent:
   a) Male
   b) Female

3. Age of respondent
   a) ≤-23 years
   b) 24-35 years
   c) 36-47 years
   d) 48-59 years
   e) 60+ years
   f) No response

4. What is the highest level for school attendances have you attained?
   a) Never been to school
   b) Primary
   c) Secondary
   d) Tertiary Institution

PART B: RISK FACTORS FOR CONTRACTING MALARIA

5. What is the type of housing? Select one
   a) Permanent
   b) Semi permanent
   c) Temporary

d) Other, specify……

6. Are the windows in your house? (select all that apply)
    a) With shutters
    b) With screens
    c) No windows
    d) Other specify

7. At any time in the past 12 months has anyone sprayed the interior walls of your house against mosquitoes?
    a) Yes
    b) No

8. Does your household have any mosquito nets which can be used while sleeping?
    a) Yes
    b) No

9. Did you sleep under a mosquito net last night?
    a) Yes
    b) No

PART C: HEALTH SEEKING BEHAVIOUR

10. In your opinion what do you think are the causes of malaria?
    ……
    ……

11. Identify one major symptom of malaria you think can best describe a malaria case.
    a) Fever
    b) Weakness
    c) Headache

12. In your opinion how do you think malaria can be prevented and controlled?
    a) Sleeping under mosquito net
    b) Spraying of walls with insecticide
    c) Clearing bushes around the house
    d) Ensuring no stagnant water around the house

13. Has any person in your household in the past 30 days got affected by malaria?
    a) Yes
    b) No

14. Where did you go for the first consultation for malaria treatment when you or a member of your household was suspected to have malaria?
    .....

PART D: ACCESS TO HEALTH CENTRE/HOSPITAL BASED MALARIA CASE MANAGEMENT

15. What is the estimate distance to the nearest health facility in KM?

16. How do you get to the health facility when a member of your family is sick?
    a) Walk
    b) Bicycle
    c) Motor bike/*Boda boda*
    d) Vehicle
    e) Community Stretcher
17. The last time you visited a health facility with malaria: How much time did you wait before you were attended to?
    a) Less than 1 Hour
    b) Above 1 Hour to 3 Hours
18. In your opinion, were you satisfied with the services given to you at the health facility?
    a) Yes
    b) No

THANK YOU FOR YOUR PARTICIPATION

Appendix C: In charge of health facility questionnaire

IN-CHARGE OF HEALTH FACILITY/HOSPITAL QUESTIONNAIRE

COMPARATIVE STUDY OF MALARIA RISK FACTORS AND ACCESS TO HEALTHCARE SERVICES BY BATWA AND NON-BATWA COMMUNITIES IN KANUNGU DISTRICT SOUTHWESTERN UGANDA

Interviewer: **Date:**

PART A: BACKGROUND INFORMATION

1. Health Facility Name:
2. Health Sub-district:
3. Health Facility level:
    a) Hospital
    b) HCIV
    c) HCIII
    d) HCII
    e) Other specify…….
4. Health facility ownership
    a) Government/ Public
    b) Private-not-for-profit/ NGO
    c) Private-for-profit
    d) Other, specify……
5. Respondent Title:
6. Facility telephone contact;
7. Health facility Geographical codes;
   Latitude:
   Longitude:

PART B: MALARIA CASE MANAGEMENT

8. Does this facility have Guidelines for management of malaria? Yes No
9. Out of these how many were malaria cases?.....
10. Does the health facility have a functioning Laboratory? Yes No
11. What is the recommended staffing level, specify.....and what is the present staffing, specify.....
12. How many laboratory technicians/technologists work full time in this facility?.....
13. How many microscopists work full time in this facility?.....
14. How many medical doctors work full time in this facility?.....

15. How many nurses (all cadres) work full time in this facility?.....
16. How many clinical officers work full time in this facility?.....

Part C: MALARIA CASE MANAGEMENT: MEDICINES AND COMMODITIES

17. Are the following medicines and commodities available today in this facility?

Medicine/Commodity	Available Today	Not available Today	Not available for last 1Month
Paediatric ACTs			
Adult ACTs			
Rapid Diagnostic Tests (RDTs			
Reagents for malaria testing			

THANK YOU FOR YOUR PARTICIPATION

Appendix D: Focus Group Discussion (FGD) Guide,

FOCUS GROUP DISCUSSION GUIDE

COMPARATIVE STUDY OF MALARIA RISK FACTORS AND ACCESS TO HEALTHCARE SERVICES BY BATWA AND NON-BATWA COMMUNITIES IN KANUNGU DISTRICT SOUTHWESTERN UGANDA

COMMUNITY MEMBERS

Date: Settlement: Village:

Population Group:

Introduction

Thank you for accepting to participate in this study and Focus Group Discussion. As you already know this study is about malaria risk factors and access to health care services among the Batwa and non-Batwa in this area. You are kindly requested to give your views and opinions. All the ideas discussed here will be treated with confidentiality and will only be used for research purposes.

Risk factors for contracting malaria

1. What are the major health concerns/most common diseases in the community?
2. Give your views about:
    a) Household and surrounding environment in relation to contracting malaria,
    b) Housing types and characteristics in relation to malaria,
    c) Availability and use of mosquito nets in this community,
    d) Indoor residual spraying.

3. What do you think are the causes of malaria in your community?
4. How do you tell someone has got malaria?
5. How do you think malaria can be prevented?

Health seeking behaviour as the first action when malaria is suspected

6. What is the first action when you or a member of your household is suspected to have malaria? *[Probe the use of herbs, traditional healers, health centres, hospitals, drug shops, clinics etc]*

Access to health centre/hospital-based malaria case management

7. Where is the nearest health centre/hospital in this area? [Estimate distance in KMs]

8. How do you normally move to the health facility when you are sick? [Probe; walking, bicycle, *boda boda*, car etc]
9. Are there any challenges in accessing the health facility?
10. Are there any challenges in getting treatment at the health facility?
11. Are there any taboos/beliefs/practices associated with malaria? *(e.g. severe malaria with convulsions, cerebral malaria?)*
12. Give your views about:
    a) Equality Health Insurance,
    b) Village Health Teams.
13. For the Batwa people, was malaria experienced while in the forests?
14. How do you compare prevalence in the forest and out of the forest?
15. How did you manage malaria in the forests?
16. How do you think malaria can be prevented and controlled?
17. As community what measures have you put in place to deal with malaria problem?

THANK YOU FOR YOUR PARTICIPATION

Appendix E: List of Key Informants

Institution /Population Group	**Gender**		**Number**
Kanungu District Health Department		M	1
Bwindi Community Hospital	F	M	2
Batwa Development Programme		M	2
Batwa	F	M	4
Non-Batwa	F	M	4
Total	**5**	**8**	**13**

Appendix F: Observation checklist for households malaria Environmental risk factors

Household/Respondent Number:

Location [settlement]

Population Group:

1. Type of House?

Type of house	Yes	No
Permanent		
Semi-permanent		
Temporary		

2. Observe the House walls, do the walls have cracks and openings that can allow entry of mosquitoes: Yes No

3. Observe household surroundings and inquire where necessary. Tick Right option

Risk Factor	Yes	No	Comment
Presence of bushes around household			
Presence of broken utensils, bottles, rubbish			
Presence of stagnant water around home			
Presence of pits			
Location near stream/swamp			

4. Describe general cleanliness of the surroundings

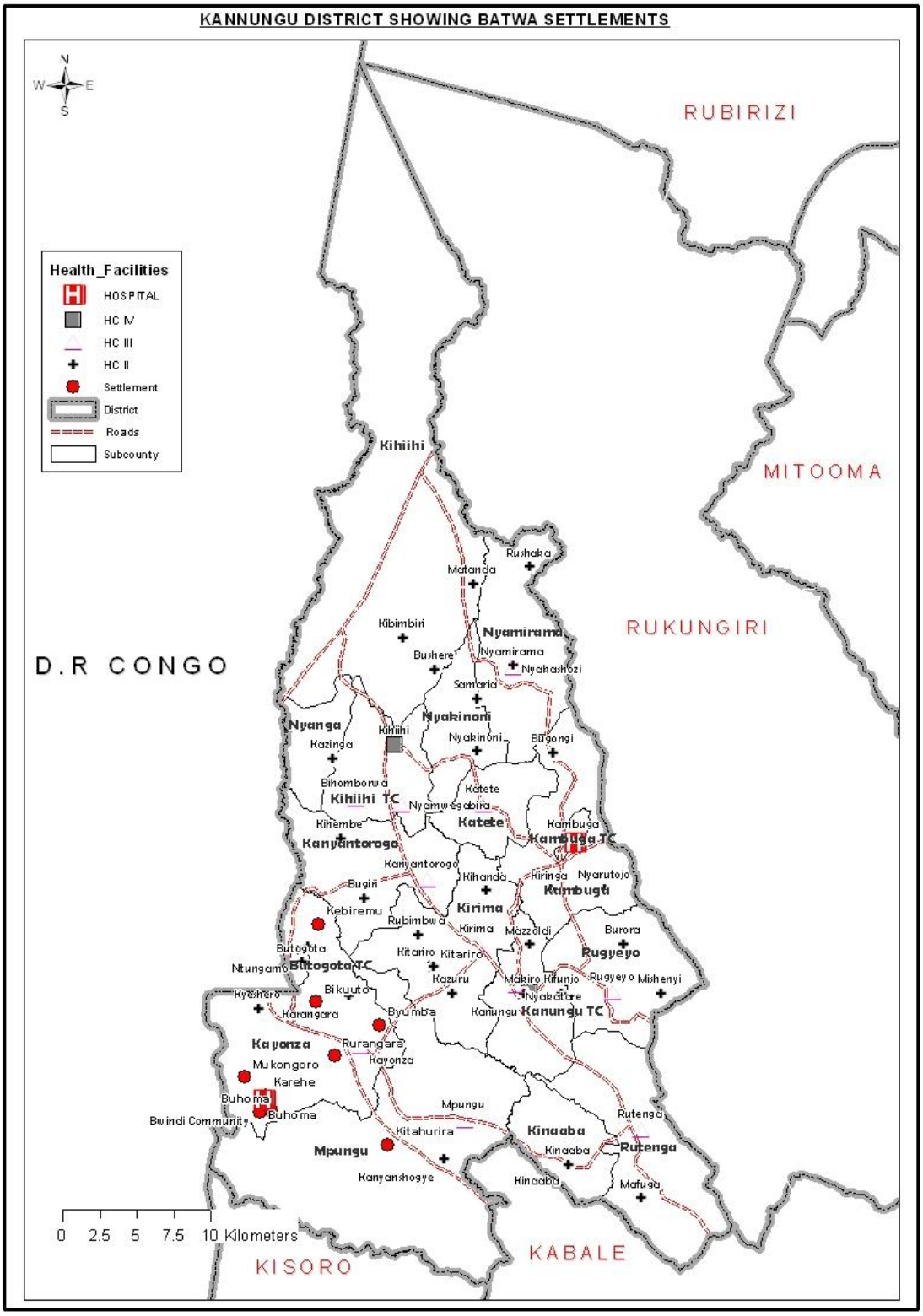
.....
.....
.....

Appendix G: IHSU Research Introductory Letter

Appendix H (a): Location of Area of study

Kanungu district showing sub counties and location of Batwa settlements

Appendix H (b): Location of health facilities in Kanungu district



Kanungu district showing location of Batwa settlements and health facilities

Appendix I: Chi square calculations to test whether distance affects Batwa and non-Batwa to use health centre/hospital or use herbs/traditional practitioners

A. 2 X2 CONTIGENCY TABLE

Distance in Kms	Health centre/ hospital	Herbs/Traditional Practitioner	**Total**
0-5Km	a	b	**a+b**
6-10Km	c	d	**c+d**
Total	**a+c**	**b+d**	**a+b+c+d =N**

NOTE: Expected values for each cell in the table is calculated by row total multiplied by the column total devided by the grand total. For example Expected (E) for cell ***a*** above = **(a+b)(a+c)/N**

Degrees of freedom (df) = (number of columns minus 1) x (number of rows minus 1) not counting the totals for rows or columns

B. BATWA

Distance in Kms	Health centre/ hospital	Herbs/Traditional Practitioner	**Total**
0-5Km	21	44	**65**
6-10Km	6	24	**30**
Total	**27**	**68**	**95**

Observed (O)	Expected (E)	O-E	(O-E)2	(O-E)2/E
21	18.47	2.53	6.4009	0.35
44	46.53	-2.53	6.4009	0.14
6	8.53	-2.53	6.4009	0.75
24	21.47	2.53	6.4009	0.30
Total Chi Square				**1.54**

C. NON-BATWA

Distance in Kms	Health centre/ hospital	Herbs/Traditional Practitioner	**Total**
0-5Km	33	10	**43**
6-10Km	8	13	**21**
Total	**41**	**23**	**64**

Observed (O)	Expected (E)	O-E	(O-E)2	(O-E)2/E
33	27.55	5.45	29.7	1.08
10	15.45	-5.45	29.7	1.92
8	13.45	-5.45	29.7	2.21
13	7.55	5.45	29.7	3.93
Total Chi Square				**9.14**