

**FACTORS CONTRIBUTING TO THE PREVALENCE OF MALARIA IN
CHILDREN UNDER FIVE (5) YEARS IN KAMPALA INTERNATIONAL
UNIVERSITY TEACHING HOSPITAL.**

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DECLARATION

I, MUSOLO ALLAN ZELOGOYI (BMS/0069/133/DU) declare that this dissertation about “Factors affecting the Prevalence of malaria in children under five years admitted in Kampala International University Teaching Hospital” is the original record of project work I carried out under the supervision of PROF. MELVIS BERNIS MAREN and this work has never been submitted to any other institution for the purpose of an academic award.

Signature.....

Date.....

SUPERVISOR’S APPROVAL

This research project report titled “Factors affecting Prevalence of malaria in children under five years admitted at Kampala International University Teaching Hospital” has been done under my supervision and is ready to be submitted for examination with my approval.

.....

Signature

.....

DATE

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DEDICATION

This report is dedicated to my beloved Family of Mr Zelogoyi Peter and to my dear uncle Mr Wekomba Steven for doing all it has taken them to see me reach this level in the academic struggle

ACKNOWLEDGEMENT

I sincerely thank the Almighty, God, for my life and the gift of perseverance he gave me throughout this research and my educational through the various levels that I have gone through to this point of the university.

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LIST OF ABBREVIATION

ACTs: Artemisinin Based Combination Therapy

DALYs: Disability Adjusted Life Years

HIV/AIDS: Human immunodeficiency virus infection / acquired immunodeficiency syndrome

IPTp: Intermittent preventive therapy in pregnancy

IRS: Indoor-residual spraying

ITNs: Insecticide-treated mosquito nets

LLITNs: Long Lasting Insecticide Treated Nets

MOHsw: Ministry of Health and Social Welfare

MOP: Malaria Operational Plan

MSAT: Mass screening and treatment

NIMR: National Institute of Medical Research

NMCP: National Malaria Control Program

NMTSP: National Malaria Medium Term Strategic Plan

RBM: Roll Back Malaria **RDts** Rapid Diagnostic Tests

U5CC : Under-five catch-up campaign

UNDP: United Nations Development Programme

UNICEF: United Nations Children Education Fund

WHO: World Health Organization

DEFINITION OF TERMS

Stable malaria transmission: Areas with a stable transmission have a persistent transmission and hence prevalence of infection.

Unstable malaria transmission: In areas with an unstable malaria transmission the prevalence of infection varies highly over time and space.

Holo-endemic: Endemic at a high level in a population, affecting most of the children and so affecting the adults in the same population less often Hyper- endemic - an area exhibiting a high and continued incidence—used chiefly of human diseases.

Endemicity: The quality or state of being endemic.

Epidemic: Affecting or tending to affect an atypically large number of Individuals within a population, community, or region at the same time. A malaria epidemic is defined as an abrupt increase in Malaria transmission that exceeds by far the inter-seasonal variation normally experienced in a given area and often associated with increased morbidity and mortality.

Haemoglobinuria: Presence of haemoglobin in urine.

ABSTRACT

Background: Enhanced malaria control has resulted in its reduction in some areas of Sub Saharan Africa including Uganda. However, asymptomatic hosts serve as a reservoir for the malaria parasite for communities. The objective of this study was to determine the prevalence of malaria parasites and risk factors associated with malaria infection among children under-five years admitted on paediatric ward of Kampala International University Teaching Hospital.

Methods: This community-based cross sectional study was conducted from 1st-October-2017 to 1st-December 2017 among children under five years admitted on paediatric ward. Interviews with parents or guardians were conducted to collect data on malaria associated risk factors.

Results: A total of 138 children were included in the study. Nearly a third (28.8%) of the children were within the age of 25-36 months. The majority (70%) of the children were females. Children who were not sleeping under insecticide treated nets were 15 times more likely to be infected with malaria parasites compared to those who were sleeping under nets

Conclusion: It is important to understand the determinants of malaria so that effective monitoring and evaluation of malaria can be carried out. This study showed the importance of socioeconomic status as well as education in the fight against malaria.

The asymptomatic infections in the community forms a reservoir for transmission in the area. Young age of the child and not sleeping under mosquito net were associated with malaria parasite infection. It is important to ensure that resources are channeled in order to optimize prevention strategies that are put in place. Once the population is empowered, then preventive strategies for malaria elimination can then be implemented successfully and if the population is educated, then it is able to understand better the strategies in place and implement them successfully. The government must be economically sound in order to effectively implement the malaria control strategies so resources must be in place to implement malaria control strategies as well as sustaining them.

Keywords: Malaria, Children, Prevalence, Risk factors, Kampala International University Teaching Hospital

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CHAPTER ONE

INTRODUCTION

1.1: BACK GROUND

Malaria is a febrile parasitic infection transmitted by an infected female anopheles mosquito.

It is a major cause of illness and death in children.

Malaria has remained a major threat to public health and economic growth in Africa.

It threatens 2.4 billion people, or about 40% of the world's population living in the world's poorest countries, and more than one million deaths are attributable to the disease annually (WHO, 2000). According to WHO/UNICEF (2005), the disease is a major public health problem in Africa with over 200 million clinical episodes.

This preventable disease has reached epidemic proportions in many regions of the world and continues to spread unchecked (W.H.O., 1998). African children under five years are most at risk of malaria.

In semi-arid and highland regions of Africa, malaria is epidemic and causes deaths annually (Worall et al, 2004). Malaria presents a major socio-economic challenge to African countries, considering that it is the most affected region. This challenge cannot go unnoticed given that good health is not only a basic human need, but also a fundamental human right and a prerequisite for economic growth (UN, 2003).

Malaria is caused by a parasite that is transmitted from one person to another through the bite of the Anopheles mosquito (a female infected Anopheles mosquito). The major vectors of human malaria are Anopheles gambiae, Anopheles funestus, Anopheles arabiensis and Anopheles melas.

A. arabiensis is most dominant in the savannah areas and cities. A. gambiae are found in highly dense forest areas, A. funestus has an uneven distribution while A. melas is a salt water species (Federal Ministry of Health, 1990).

When the mosquito bites an infected person, it ingests microscopic malaria parasites found in the person's blood. The malaria parasite must grow in the mosquito for a week or more before the infection is passed to another person. Thereafter, if the mosquito bites another person, the parasites pass from the mosquito's mouth to the person's blood. They feed on the blood cells, multiply inside the liver thereby destroying the red blood cells. This causes a cut off in blood circulation, which could lead to premature death, (WHO, 2000). Symptoms of malaria include fever, shivering, pains in the joint, vomiting, anemia, hemoglobinuria, retinal damage, and convulsions. The classic symptom of malaria is cyclical occurrence of sudden coldness followed by rigor then fever and sweating lasting four to six hours. This occurs every two days in plasmodium vivax (*P. vivax*) and plasmodium Ovale (*P. ovale*) infections, while every three days for plasmodium malariae (*P. malariae*) (Nyika, 2009). Rarely transmission can be through accidents, such as transfusion, inoculation of infected blood from one person to another, or transfer through the placenta from an infected mother to her unborn child.

Malaria can be prevented by the use of mosquito coils and repellants, spraying the insides of houses (where most *Anopheles* species feed and rest) with insecticides (indoor residual spraying, IRS) and by sleeping under bed nets that have been treated with long-lasting insecticides (long-lasting insecticide nets, LLINs). Mass screening and treatment (MSAT) with effective anti-malarial drugs can also reduce malaria transmission (Griffin et al., 2010).

However, the levels of malaria risk and transmission intensity exhibit significant spatial and temporal variability related to variations in amount of rainfall, temperature, altitude, topography, and human settlement pattern (Abeku et al, 2003). Once adult mosquitoes have emerged, the ambient temperature, humidity, and rains will determine their chances of survival. Warmer ambient temperatures shorten the duration of the extrinsic cycle, thus increasing the chances of transmission (Jackson, 2010).

The Ministry of Health (MOH, 2009) records show that between 3-3.5 million cases of malaria are reported each year, over 900,000 of which are children under five years. Malaria is said to account for 61% of under-five hospital admissions and 8% of admissions of pregnant women. In those children who survive, malaria drains vital nutrients from them impairing their physical and intellectual development (W.H.O. 199)

1.2: STATEMENT OF THE PROBLEM.

Malaria continues to be an economic burden and a great threat globally and almost impossible to eradicate for the past six decades. Malaria is by far the leading cause of death in Kampala International University Teaching Hospital. The disease is responsible for 25% of deaths of children below 5 years.

Uganda is a malaria endemic country in which malaria control measures such as the use of insecticide treated bed nets (ITNs), indoor residual spraying of insecticide (IRS), and Intermittent Preventive Treatment (IPTp) for children have been implemented. Despite of all these efforts yet the overall prevalence of malaria infection remains high among the under-five children.

This verifies that there could be several reasons for this situation including the deficiencies in the Health system that leads to lack of access to malaria control interventions and low effectiveness of these interventions than expected. Thus it is very essential that operational research is conducted to identify the gaps. Therefore this work involves a community approach first to confirm the prevalence of malaria in under-fives, coverage of ITNs, IRS as well assessing of malaria prevalence among the under-five children, determining the coverage of ITN use among community members, as well as assessing the factors (socio-economic, physical, environmental, demographic factors) associated with malaria prevalence in Kampala International University Teaching Hospital under five year old admissions.

1.3: STUDY OBJECTIVES

1.3.1: General Objective.

To specify the factors contributing to the prevalence of malaria in children under five (5) years in Kampala International University Teaching Hospital.

1.3.2: Specific Objectives.

- To establish the effects of variation in climatic condition on prevalence of ma
- To describe the prevalence of malaria parasite infections among children under five years
- To determine the socio-economic factors associated with the prevalence of malaria among under- fives admitted in Kampala International University Teaching Hospital.
- To determine the coverage of ITN use among the community members

1.4: RESEARCH QUESTION.

The study sought to answer the following research questions:

- What are the effects of variation in climatic conditions on prevalence of malaria.
- What is the prevalence of malaria parasite infections among children under five years in Kampala International University Teaching Hospital admissions.
- What socio-economic factors are associated with the prevalence of malaria among under- fives.
- What is the coverage and use of ITN among the community members

1.5: SCOPE OF THE STUDY

1.5.1 Subject Scope

The study is aimed at determining the factors contributing to the prevalence of malaria in under fives. The relationship between socioeconomic and environmental factors and their influence on the prevalence of malaria in under five year olds

1.5.2 Geographical Scope

The study will be carried out in Kampala International University Teaching Hospital which is found in Bushenyi district , KIUTH, where the study is going to be conducted is located in Bushenyi-Ishaka municipality, Ishaka town in Bushenyi district. Bushenyi-Ishaka municipality is composed of 3 divisions i.e. Ishaka, Nyakabirizi and central division and each division is divided into wards which are further divided into cells. The dominant tribe being Banyankole and others like Bakonjo, Batooro and Bakiga. The major economic activity is agriculture particularly matooke, coffee and tea. Ishaka is the largest town in Bushenyi district and it is located 75km by road, northwest of Mbarara, the largest town in the sub region. Bushenyi district which is located in south western Uganda and it is approximately 350 kilometers (200 miles), by road using the Mbarara-Kasese highway from Kampala, the capital city of Uganda. Western Uganda, in Elgon zone and it is 222 kilometers (138 miles) North East of Kampala.

1.5.3 Time Scope

This study is estimated to take about 8 weeks starting from 1st-October-2017 to 1st-December-2017.

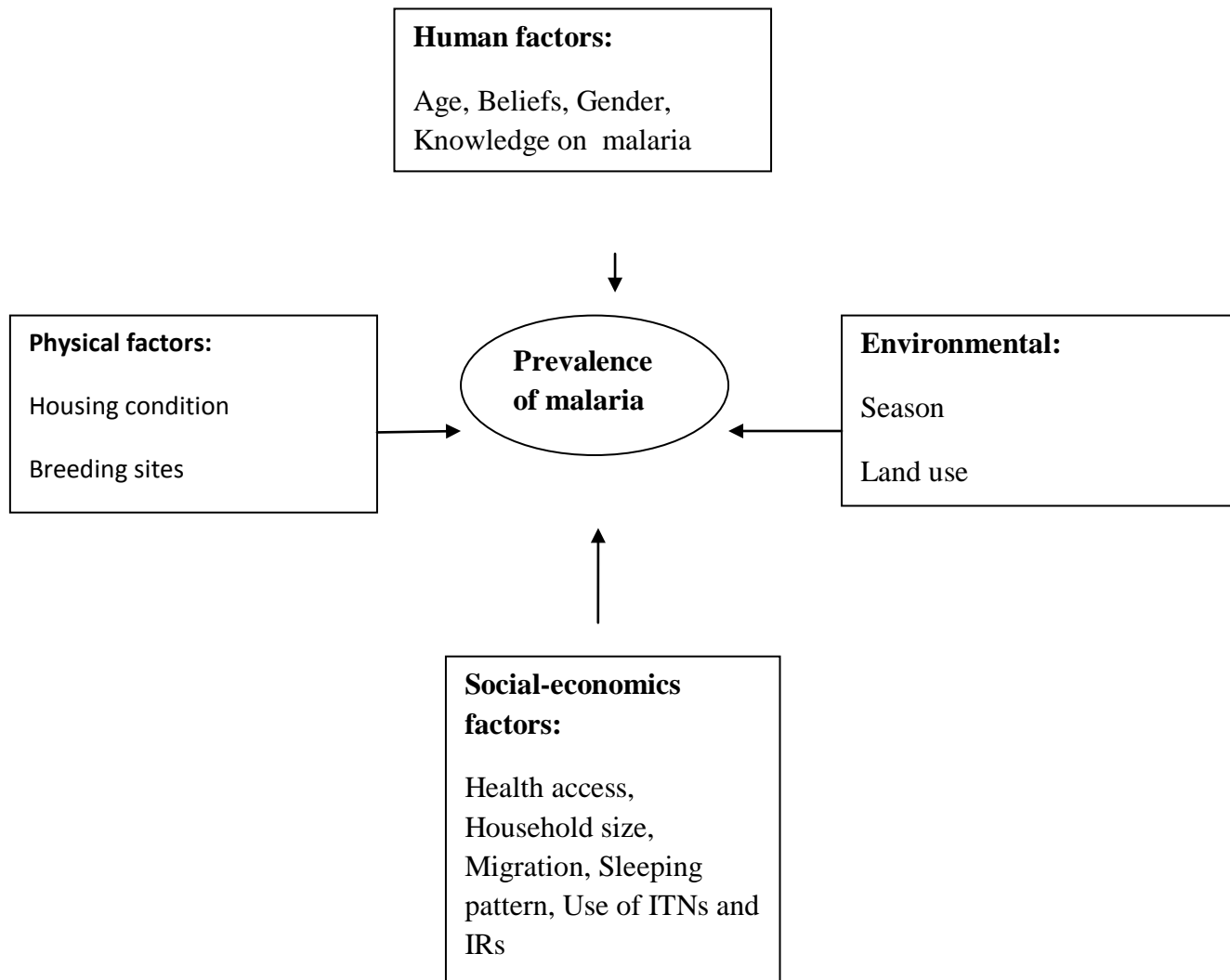
1.6: JUSTIFICATION

Despite the availability of the malaria control measures and intervention, the morbidity and mortality in under-fives is still unacceptably high. (MoH, 2010). This study is then designed to investigate the changing epidemiological data of malaria. The collected data will provide the understanding on the factors that influence the high prevalence of malaria parasite among the under five year's children admitted in Kampala International University Teaching Hospital.

The information that will be collected will be an essential component in the effectiveness of Malaria control and elimination interventions that are currently being scaled up hence it will be used to realign the effectiveness of Malaria control measures so as to effectively reduce malaria burden and achieve elimination.

1.7: CONCEPTUAL FRAME WORK.

The conceptual framework represents a relationship between factors that influence the prevalence of malaria among the under fives admitted in Kampala International University Teaching Hospital.



CHAPTER TWO:

LITERATURE REVIEW.

2.1: INTRODUCTION:

Malaria is caused by a parasite called Plasmodium, which is transmitted through the bites of infected female anopheles mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells. There are four of this different species causing the human malaria disease: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale and Plasmodium malaria. (WHO, 2010).

2.2: MALARIA SITUATION:

Malaria is a vector-borne disease that is widespread in the tropical and subtropical areas of the world. It is a major parasitic disease that can be prevented and treated (US PMI, 2009). Several efforts based on protection of individuals, households at community level (Warrell et al, 2002) have been initiated to ensure morbidity and mortality due to malaria is reduced.

This has become a serious challenge for most developing countries where between 300 and 500 million people are infected annually. There have been several efforts by government and other development partners in the health sector to eradicate malaria in the country, but its prevalence rate is still on the increase. This has prompted the question why the malaria cases are still on the increase despite these efforts. The country is still at the control stage of Malaria programme, which is the first step in the fight against the disease. The second stage is the elimination of the disease, which must be supported by a functioning health system, while the third stage is the eradication, which is usually global and undertaken when vaccines exists (GNA, 2010).

2.3.0: Factors affecting the prevalence of malaria in under fives

2.3.1: Socio-economic Factors

Ignorance and impoverished conditions of people contribute in creating source and spread of malaria and hinder disease control strategy (Collins et al, 1997& Yadav *et al.*, 1999). This was also evidenced by Filmer 2002) that high costs of malaria treatment may lead to delays in treatment seeking behavior, whereby he found that the poorest groups in a society did not seek care as much as the non-poor, and did so at lower level public facilities.

Economic inequities in areas such as the control of household resources also affect access to ITNs.

Alnwick 2000, also observes that malaria afflicts primarily the poor, who tend to live in dwellings that offer little or no protection against mosquitoes. Furthermore, (Brown, 1997) notes that —the continuation of brutal poverty and hunger in much of the world is undoubtedly linked to large numbers of unnecessary deaths from malaria.

Households can be forced to sell their food crops in order to cover the cost of treatment (Wandiga et al, 2006.) Depleting household resources and leading to increased food shortages, debts, and poverty for the poorest households

The costs of malaria are highly regressive, with the poorer households spending a significantly higher proportion of their income on the on the treatment of malaria than their least poor counterparts.

2.3.2: Environmental factors contributing to the prevalence of malaria in children under five years

2.3.2.1: Rainfall

Malaria is greatly influenced by rainfall in the tropics. It creates an opportunity for anopheles mosquitoes to lay eggs, which can reach adulthood within nine to twelve (9-12) days, necessary for the mosquito life cycle. Rainfall is one of the climatic variables that aid in the multiplication of mosquito breeding places and increases humidity, which improves mosquito survival rates. The rainy season is a fertile period for the breeding

sites, which are numerous. These species have the highest population density during the rainy season and these account for the high incidence of malaria at this period of the year (Reid, 2000). Studies have established complex relationship between malaria and rainfall because water is very vital for larval development. A prolonged dry season can decrease mosquito numbers by reducing breeding sites and also minimizes malaria incidences.

2.3.2.2: Topography

Topography generally has a great influence on mosquito replication and thus affects the rate of malaria cases. Higher topographies result in cooler temperatures, which limits the reproduction rate of the parasite.

The complexity of topography and landscape in the highlands contributes to the spatial heterogeneity of vector abundance and malaria transmission intensity. It has implications for the survival of the vector for different altitudes (Minakawa et al., 2002).

2.3.2.3: Temperature

Malaria incidence is closely linked with temperature. Either the minimum temperature is so low that it prevents parasite and vector development or the temperature is too high resulting in increased mortality of the vector. A minimum temperature of 16 degrees Celsius restricts parasite development and also prevents the development of the vector in its aquatic stages. At 17 degrees Celsius parasites develop, but not rapidly enough to cause an epidemic (Lindsay and Martens, 1998).

The optimum temperature for the malaria parasite extrinsic incubation period is about 20°-27°C, while the maximum temperature for both vectors and parasites is 40°C (MARA/ARMA, 1998). Malaria transmission in areas colder than 20°C can still occur because Anophelines often live in houses, which tend to be warmer than external temperatures.

Higher temperatures increase the number of blood meals taken and the number of times eggs are laid by the mosquitoes (Martens et al, 1995).

2.3.2.4: Land Use and Forest cover

Land use and land cover changes have a significant influence on malaria transmission intensity. It affects the spatial and temporal variations in the distribution of anopheline larval habitats. Forest cover may double the high rate of malaria in some of the areas recording high malaria cases. The disease incidence is very high in the forest and forest fringes as compared to plains or urban areas (Sharma, 1991). Mosquitoes in the forested area according to the study were seen to live longer, than those in the deforested area in both dry and rainy seasons in the highlands. Forested areas have high humid conditions which favour the ecological reproduction.

2.4: Gender

The literature on gender differences in malaria relates mainly to pregnancy, occupational risks (e.g.: forest workers) and care-seeking behaviors. (Desai et al 2007) Reported gender differences with regard to increased risk of infection and impact of malaria on individuals largely focus on women; however, there is some evidence that suggests that in some countries men have increased exposure because they spend more time sitting outside in the evenings during peak mosquito biting times (Vlassoff & Bonilla 1994) and that some male-dominated types of work lead to increased exposure. For example, agricultural work extending to the evenings or sleeping away from settlements may raise risk, especially in forests, which can make men more vulnerable than women. (Incardona et al 2007& Erhart A, *et al* 2004).

2.5: Coverage of ITN use among the community members

Although ITN distribution has been massively expanded in most parts of malaria endemic sub-Saharan countries since 2005, there is limited information on community based actual use of nets owned, area specific reasons for non-use, and the possible impact of the variations in use on malaria vector densities and transmission in either Uganda or other countries where malaria is seasonal and unstable, Net ownership has been found to be

lowest among the poorest households (UNICEF and WHO 2003) thus possibly linking possession to the cost of the net (Guyatt et al, 2002).

The use of insecticide-treated nets is currently considered one of the most cost-effective methods of malaria prevention in highly endemic area. This has been achieved through free distribution of long lasting insecticidal nets (ITNs) that has been conducted through campaigns, public health facilities, faith-based organisations (FBO), and non-governmental organisations (NGOs) with the goal of achieving universal access for the at-risk population of children under age five and pregnant women.

CHAPTER THREE:

RESEARCH METHODOLOGY.

3.0: METHODOLOGY.

3.1: Research Design.

The study design was a descriptive quantitative cross-sectional study which was conducted in a period of four weeks in Kampala International University Teaching Hospital paediatric ward and children out patient department.

3.2: Study Population

The study population focused on children under five years admitted in the Kampala International University Teaching Hospital

3.3: Sampling Method

Consecutive continuous sampling techniques was applied to select children under five years with malaria.

3.4: Sample Size

Sample size was calculated basing on the prevalence of malaria among the under-five in Kampala International University Teaching Hospital admissions. **The sample size was calculated from the following formula:**

$$n = \frac{Z^2 P(1-P)}{E^2}$$

Where:

N- Total number of subjects required in the sample

z= a standardized normal deviate value that correspond to a level of statistical significance equal to 1.96

p= estimate of prevalence of malaria in children < 5 years taken to be 0.9% basing on the absence of information about any pilot study done in the area.

E= margin of error which correspond to the level of precision of results desired

Assuming **p=10%**

$$\mathbf{E=5\%}$$

$$\mathbf{N=1.96^2 \cdot 0.1(1-0.1)/0.05^2}$$

N= 138.

Therefore 138 children under five was used in the study

3.5: Data Processing

A structured and pre-tested questionnaire was used to collect information.

Questionnaire was checked for errors and completeness before entry into Data base where by summary statistics sheet was analyzed using SPSS statistical software.

Data was processed and presented in form of distribution tables, frequency, percentage, and pie charts, and then interpreted.

Association between proportions of the under-five children who were tested positive and those who tested negative was compared using Chi-square

3.6: Inclusion criteria

- ✓ All patients under five years admitted on paediatric ward of Kampala International University Teaching Hospital with a diagnosis of malaria.

3.7: Exclusion criteria

- All patients admitted under five years admitted on paediatric ward of Kampala International University Teaching Hospital with a diagnosis of malaria but later developed complications and were referred to Mbarara Regional Referral Hospital for better management
- All patients under five years admitted on paediatric ward of Kampala International University Teaching Hospital with a diagnosis of malaria but the parents refused to participate in the research

CHAPTER FOUR

PRESENTATION OF FINDINGS

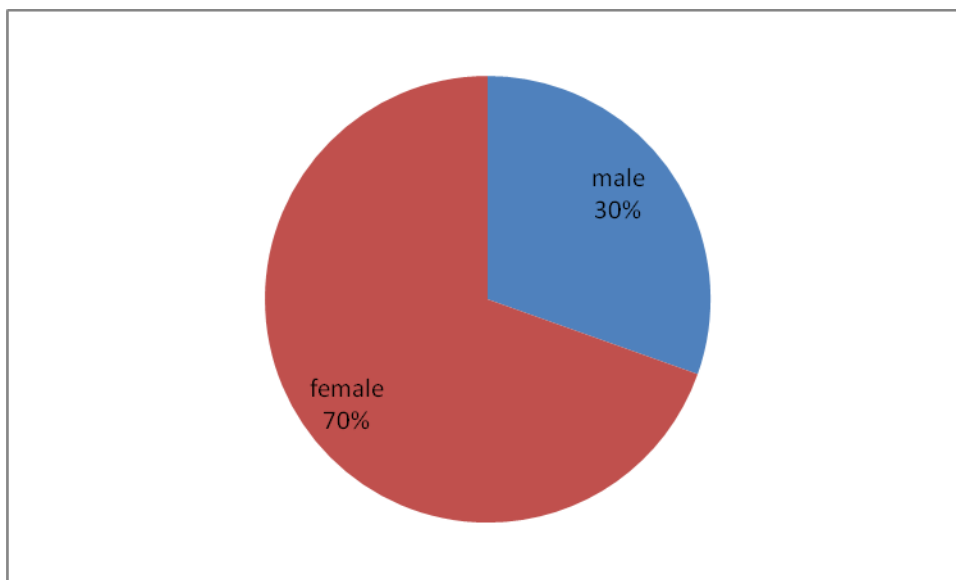
4.1 Introduction

This chapter presents the study findings and describes them in sections according to the study objectives. The first section presents the social demographics characteristics of the study respondents, the second section presents the ITNs utilization to under five children, the third section presents factors contributing to the prevalence of malaria and the fourth section presents program implementation on ITNs distribution and use in the community. A total of 138 study respondents were enrolled in the study. Among them 138 were mothers and caretakers.

4.2 Demographics Characteristics of the Respondents

Some of the social demographic characteristics of the respondents that were considered in this study included sex, age, marital status, level of education and employment status. These background variables investigated influence the respondent's knowledge on the utilization of ITNs to under five children in the area of the study.

Pie chart showing the Gender



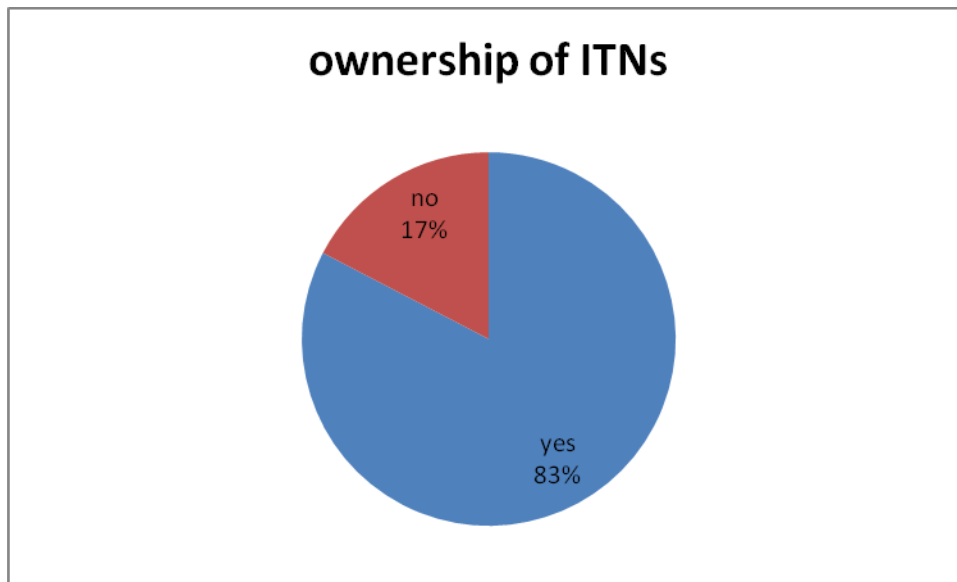
The majority of children aged below five years were female 96(70%), male children below five years were only 42(30%)

The table below shows the weight distribution.

1-9 Kgs	>- 10Kgs
34 (15%)	200 (85%)

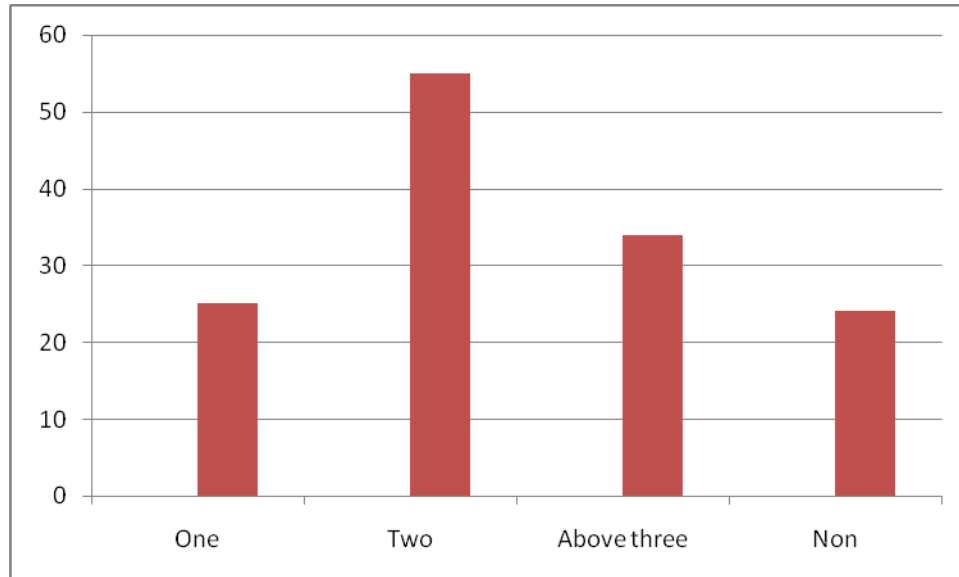
The majority of children aged below five years weighed above 10kg 200(85%), while only 34 (15%) weighed less than 10kg.

The pie chart below shows the ownership of ITNS



The majority of children aged below five years belong to parents who have ITNs 114 (83%), while only 24 (17%) belong to parents who lack ITNs.

The bar graph below shows the number of ITNs



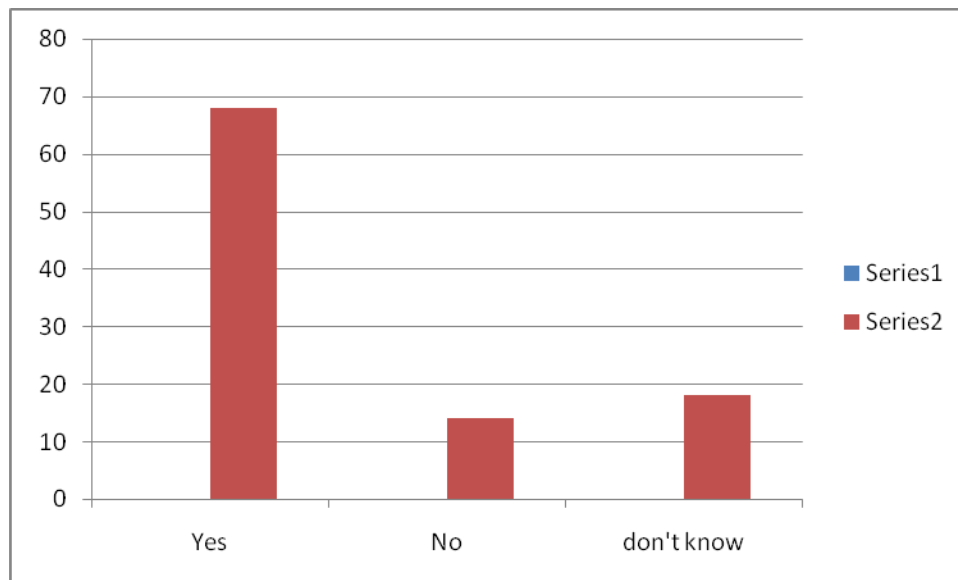
A simple majority 55 (40%) of children aged below five years come from families that have two ITNs while only 24 (17%) come from families that lack ITNs.

The table below shows the state of ITNs

In good order	Torn
88 (77%)	26 (23%)

The majority 88 (77%) of children aged below five years have ITNs in good condition while only 26 (23%) have torn ITNs.

The bar graph below shows the number of treated ITNs



The majority 78 (68%) of children aged below five years use treated ITNs while only 20 (18%) lack treated ITNs.

The table below shows the utilization of ITNs

Currently used	Not used
95 (83%)	19 (17%)

The majority 95 (83%) of children aged below five years uses ITNs while only 19 (17%) do not utilize ITNs.

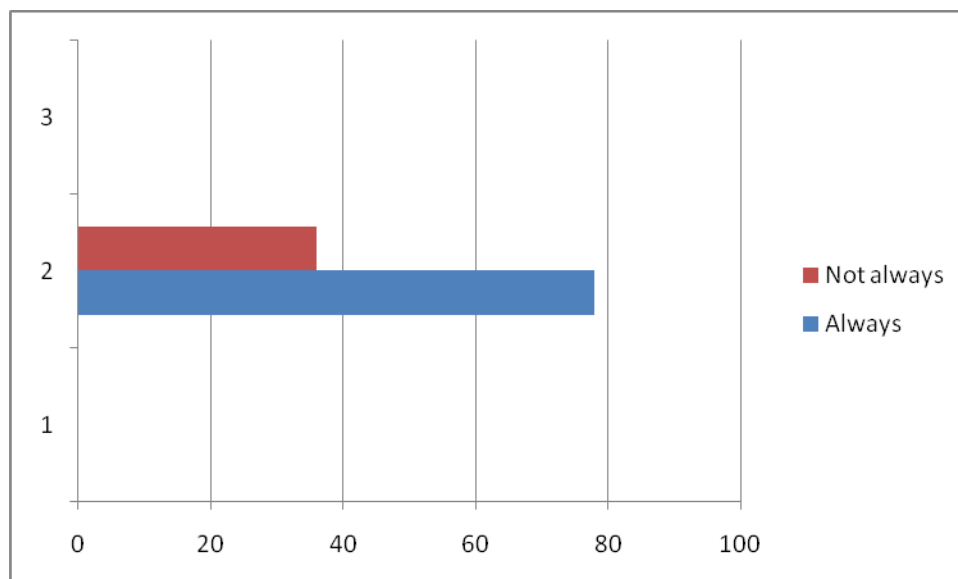
The table below shows the use of ITNs last night before malaria attack

Yes	No
73	12

(77%)	(13%)
-------	-------

The majority 73 (77%) of children aged below five years used ITNs before admission, while 12 (13%) did not use ITNs.

The bar graph below show the Frequency of mosquito net use



The majority 78 (68%) of children aged below five years always used ITNs before admission, while 36 (32%) did not always use ITNs.

The table below shows the sources of ITNs

Free from government	Voucher system	Others
62 (54%)	28 (25%)	24 (21%)

The majority 62 (54%) of children aged below five years used ITNs obtained free ITNs from government, while 24 (13%) obtained from other means.

The table below shows the Date when an ITNs supplied

< 6 months	>_ 6 months
54 (47%)	60 (53%)

A simple majority 60 (53%) of children aged below five years used ITNs got more than 6month, while 54 (47%) have ITNs less than 6month old.

The table below shows the Reasons for /not owning the ITNs

Not available	Cost/ affordability	Lost/ stolen	Used for other purposes	Old then thrown away	Others
2 (8%)	3 (13%)	6 (25%)	5 (21%)	7 (29%)	1 (4%)

A simple majority 7 (29%) of children aged below five years did not use ITNs because it was too old and thrown away, while 1 (4%) had other reasons of not using ITNs.

The table below shows the affordability of ITNs

Yes	No
-----	----

78 (68%)	36 (32%)
-------------	-------------

The majority 78 (68%) of children aged below five years can afford ITNs, while 36 (32%) cannot afford ITNs.

The table below shows the previous episodes of malaria

Yes	No
70 (51%)	68 (49%)

The majority 70 (51%) of children aged below five years had malaria, while 68 (49%) did not have episodes of malaria.

The table below shows whether the child was treated at the health facility.

Yes	No
42 (60%)	28 (40%)

Simple majority 42 (60%) of children aged below five years went to hospital for treatment, while 28 (40%) did not go.

The table below shows the respondent knowledge on measures of malaria prevention.

Use	Environmental	Destroying	Use of	Use	Fumigants/	Use	Use	Others
-----	---------------	------------	--------	-----	------------	-----	-----	--------

ITN	cleanliness	breeding sites	anti-malarials/ALU	traditional remedies	IRS	insecticide sprays	mosquito repellants	
97 (70%)	40 (29%)	30 (22%)	10 (7%)	5 (4%)	20 (14%)	39 (28%)	22 (16%)	10 (7%)

Majority 97 (70%) of children aged below five years prefer use of ITNS to prevent malaria, while 5 (4%) use traditional remedies..

The table below shows the place of treatment when the child gets malaria.

Hospital	Traditional herbalist	Self medication	Others
107 (78%)	3 (2%)	23 (17%)	5 (4%)

Majority 107 (78%) of children aged below five years went to hospital for treatment, while 3 (2%) are taken to herbalist.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter discusses the findings of the research study on factors affecting the malaria prevalence in children under five years in KIU-TH in the year 2018. The purpose of the research was to analyze social-economic, the demographic as known as human factors, behavioral as well as the environmental factors of malaria prevalence in children under five years. The findings are going to be categorised according to the behavioral determinants, environmental determinants. The recommendations from this study will be discussed as well as the conclusions that were obtained from this study.

5.2 social-economic and human factors

This study showed that malaria has got important behavioral related drivers in the disease. A higher malaria prevalence is associated with a number of factors that lead to lowered malaria transmission, like increased literacy levels, higher access to malaria health awareness campaigns and health education, as well as being able to afford disease prevention methods and treatment (Imbahale et al., 2010, Ademowo et al., 1995, Tarimo et al., 2000).. The findings from chapter 4 are consistent with literature review as far as malaria prevalence under five is concerned. Both studies show that failure to use ITNS was an important determinant in malaria prevalence and morbidity in KIU-TH in children under 5 in the year 2018. Social-economic, type of place of residence and weather were significant factors in malaria prevalence. These factors and malaria prevalence are strongly correlated. So this finding confirms what other studies have shown. A number of studies that have been carried out have also confirmed that malaria is poverty related (Sachs and Malaney, 2002, Gallup and Sachs, 2001, Teklehaimanot and Paola Mejia, 2008, Malaney et al., 2004). The type of place of residence whether its urban area or rural area as well as region could be linked to the altitude, where some studies (Drakeley et al., 2005a, Hay et al., 2004, Lindsay and Martens, 1998) found an effect on malaria prevalence depending on the altitude. This study also showed that those dwelling in rural areas had a higher risk of contracting malaria as compared to those living in urban areas. This could also be linked to the fact that those living in rural areas are generally of a low economic status compared to their counterparts living in urban areas in one report on malaria and poverty it was shown that poverty results in people living in conditions that promote mosquito breeding (Teklehaimanot and Paola Mejia, 2008). Generally the population of Bushenyi is mainly rural (Luka, 2010) and this also explains the problem of malaria in Bushenyi as it is more common in rural populations as this study showed. Factors contribute to increased transmission in poorer areas with slum conditions. This study showed in that those who dwelt in slum-like conditions were at a higher risk of contracting malaria as compared to those whose dwellings were not classified as slum. Use of insecticide treated bed nets was also an important factor in malaria control with households that had more children sleeping under ITNs having less cases of malaria in the household. This finding is corroborated by other studies (Maxwell et al., 2002, Deressa et al., 2007, Mmbando et al., 2011) that also found that the use of ITNs is important in malaria control. This again links to social-

economic those households with a higher income are the households that are able to provide ITNs for their children.

5.3 Environmental determinants

Temperature and rainfall influence malaria endemicity. Altitude is a known factor in influencing temperature and rainfall (Cibulskis et al., 2011, Reiter, 2001). The environmental factors that were analyzed in this study were seasons, rain or wet as well as dry as these environmental factors have been shown to be important drivers of malaria prevalence (Alegana et al., 2013, Weiss et al., 2014, Alegana et al., 2014). TSI, rain and precipitation were generated from long-term annual average temperature, vegetation and precipitation and represent estimates of a year (Noor et al., 2013). These environmental factors that were used in this study were not statistically significant.

5.4: Insecticide Treated Mosquito Nets

5.4.1 Utilization of ITNs Household members and under five children

In this study the utilization of ITNS for respondents has shown that majority of them (83percent) were using bed nets when they went to sleep, while only a few (17percent) who were not using bed nets in regular bases during their sleep. This means that there was regular utilization of bed nets in the area of the study although there was minor proportion that were not using especially during the hot season. Also the study found the utilization of ITNS for the children of under-five years was highly marked of (99 percent) and only one percent (1%) did not use ITNs on the previous night of the study. The higher ITNS utilization have been achieved due to the fact that most of household members were able to access freely ITNS distribution to the community through health facilities and by using community leaders and highly knowledge on ITNs utilization and attitude which leads to the community to change of behaviour. It means that most of the under five children were protected with malaria infection by using ITNs strategy. From these results Bushenyi district has been able to reach the proposed target goal of ITNs utilization set by Roll Back Malaria by reaching more than 75 percent by 2015 and required to sustain this condition and other malaria control measures including IRS, early diagnosis and

proper treatment. The mother and caretaker have understood the importance of using ITNs for their children to prevent transmission of malaria.

Low rate of use was primarily due to lack of sufficient nets to cover all household members and what they had were very old and torn out. This also experienced by (Gobena, Berhane, & Worku, 2016) on their study at Kersa, Eastern Ethiopia where it found that among the reasons of low utilization of bed nets include hot weather, social factors, perceived low mosquito density, technical factors such as hanging of ITNs and its adequate availability were the major reasons to non-use of mosquitoes nets owners

High utilization of ITNS could be contributed with ministry of health Malaria Elimination Program for conducting pushing system of distribution of bed nets to the community by using mosquito net distribution team and all health facilities which providing health services in the catchment area of the community. Also, higher health education and promotion on ITNS use which was provided by the program has contributed on raising awareness, acceptability and utilization the bed nets which were distributed to the community.

5.4.2 Knowledge of Respondents on the Use of ITNs

Despite level of education of the respondents, the majority have good knowledge of the use of LLINs in their homes. The respondents were knowledgeable of the importance of using treated bed nets, the time of using it, types of nets and source of information pertaining to LLINs utilization. They mentioned that LLINs strongly prevent them from mosquito's bites which can lead to malaria illness, most of the respondents explained their concern on proper LLINs utilization make them live free with malaria without gets recurrent sickness or gets disturbance with mosquitoes when they sleep during night.

This was consistent with the study conducted by Rutagwera, (2014) to the women in a household, found that there was significant difference of ITNS utilization between those who had knowledge on the use of ITNS as means for protection against malaria and those who had no knowledge. It was shown that most of those women who know that ITNS protect against malaria they are more likely to sleep under bed nets with their children of under five years compared to those who not know they are less on utilization.

5.4.3 Attitude of Respondents on the Use of ITNs

In this study majority of respondents have positive attitude on the use of LLINs as they believe that ITNs have the ability to kill mosquitoes when they are correct utilized as directed, also it prevents them from mosquito bites and malaria transmission, while some of them explained that by using ITNs make them sleep comfortable in the night.

Despite of ITNs for prevention against malaria, it also kills other nuisance insects in the household. Similar findings were observed by Terefe, Samuel, & Fiseha, (2013), in the study conducted in Nairobi hospital showed that more than half of pregnant women had positive attitude toward ITNs utilization for prevention against severity of malaria for pregnant mothers as well as under five children

This study contradicts with the one done in Tanzania where the attitude of respondents showed that there was a negative attitude of the study respondents towards the use of ITNs. The study participants perceived that young children were the most susceptible to the insecticide poisoning they believe that ITNs were most powerful to kill mosquitoes within six months continuously, even ticks cannot survive if they land on it, so they are feared that if their children touch it they will die too, they also believe that its poison could even harm the unborn baby if pregnant mothers inhales it during asleep (Nnko et al., 2012).

Other study from Ghana also found a negative attitude on the perception of ITNs where parents considered using bed nets was difficult because sleeping under them can be hot and uncomfortable or they believed that bed nets resemble as a burial shroud. In a study conducted at Southern Ethiopia by Dagne, and Deressa, (2016), found that ineffective ITNs utilization for under five years children was affected by the unavailability of bedrooms in some of family members, inadequate number of ITNs according to household members and less perception of ITNs a preventive measure for malaria control. It was found that about 13.2 percent of the household were supplied with free ITNs but did not own these bed nets at the time the survey and about 42 percent of the children of under five years were not sleeping under ITNs during previous night of the study and it was found that many of community members do not understand the importance of ITNs utilization.

5.5 Recommendations

The following recommendations arise from the findings of this study. These are:

- There must be targeted interventions in malaria prevention programs and concentrate on areas with high prevalence as this will help to maximise the use of the available resources so that malaria can be effectively eliminated Health education is important in malaria control, therefore health education materials Must be readily available and easily accessible to the targeted population. This health education can result in behaviour change that results in improved prevention of malaria
- ITNs are also an important tool in malaria control and must be made available to the population in need. Funding must be made available in order to provide the required ITNs and programs must prioritise their availability and need to have in place a budget to adequately supply ITNs to the population There must be programs to empower the communities so that they improve their Social-economic and this in turn helps to reduce prevalence of malaria It is important that care-givers especially mothers have access to information on malaria and how to identify signs and symptoms so that suspicious cases can be quickly identified and appropriate action is taken in order for the children to get the treatment that they need

5.6 Conclusions

It is important to understand the determinants of malaria so that effective monitoring and evaluation of malaria can be carried out. This study showed the importance of socioeconomic status as well as education in the fight against malaria. In order for malaria to be eliminated in the population it is important for the government to empower the population economically and also ensure that health education is a part of the efforts that are put in place to fight malaria. This will assist in the fight to eliminate malaria. It is important to ensure that resources are channeled in order to optimize prevention strategies that are put in place. Once the population is

empowered, then preventative strategies for malaria elimination can then be implemented successfully and if the population is educated, then it is able to understand better the strategies in place and implement them successfully. The government must be economically sound in order to effectively implement the malaria control strategies so resources must be in place to implement malaria control strategies as well as sustaining them. The other important determinates also are linked to socio-economic status, therefore reduction of poverty will go a long way in the fight to eliminate malaria. More work needs to be done on the identification of hotspots and identifying the determinants in specific populations. This will help in ensuring that the interventions are not generic but specific for a given population.

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APPENDIX I

CONSENT FORM

ID-NO

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Consent to Participate in INTERVIEW

Greetings! My name is **Musolo Allan Zelogyi** and I am working on this research project with the objective of investigating the prevalence of malaria among the under-five children and factors influencing the use of ITN.

Purpose of the study

The study is intended to collect information about the use of ITNs from parents/head of the house of under fives admitted in Kampala International University Teaching Hospital. Findings from the study will help the principal investigator to write a dissertation which is a partial fulfillment of Bachelors Degree in Medicine and Surgery for academic year 2013/20108.

What Participation Involves

If you agree to participate in the study, you will be required to answer questions and if possible to allow me to draw blood from the under-five children so as to investigate the presence of malaria parasite. Do not hesitate because in this interview there is no RIGHT or WRONG answers.

Confidentiality All collected information will be entered into computers with only the study identification number. Confidentiality will be provided and unauthorized persons will have no access to the data collected.

Rights to Withdraw and Alternatives

Participation in this study is completely your choice. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

If you agree to take part in this study, you will benefit directly or indirectly. Indirectly, the information you will provide will help us to understand and know the magnitude of ITNs use and ownership by the families of under fives admitted in Kampala International University Teaching Hospital and the findings will be disseminated to the policymakers especially health planners so as to help in addressing the problem. And directly, you may receive assistance to any problem(s) which may be known during the study period including being given the anti- malaria if your child will be found with the malaria parasite immediately. Furthermore I will tell you about the new information from this or this study that may affect your health, welfare, or willingness to stay in the study.

Who to contact

If you ever have questions about this study, you may contact the study Coordinator or the Principal Investigator: **Musolo Allan Zelogyi, Kampala International University Western campus P.O. BOX 71 BUSHENYI**. If you ever have questions about your rights as a participant, you may call – the Supervisor of this study.

Signature:.....

Do you agree? Participant agrees.....

Participant does not agree

I _____ have read/listened the contents in this form. My questions have been answered. I agree to participate in this study with my child.

Signature of participant _____

Signature of witness (if mother/caretaker cannot read) _____

Signature of research assistant _____

Date of signed consent _____

APPENDIX II

QUESTIONNAIRE

Part I: IDENTIFICATION

1. Division _____

2. Ward _____

3. Village _____

4. Sub-village _____

Part II Socio-demographic factors:

5. Sex: male ☐ female ☐

6. Age: _____ -

7. Marital status: single ☐ married ☐ divorced ☐ separated ☐ widow

8. Level of education: primary school ☐ secondary school ☐ college ☐ others(please specify) _____

9. Employment status ☐ public service ☐ self employed. ☐ private sector ☐ ☐ others _____

10. No. of children _____

11. No of children aged 0-5 years

Number	Age	Weight

Availability, ownership and use of ITNs

12. Have you ever seen or heard of mosquito nets treated with insecticide YES ☐ NO ☐ don't know ☐

13. Do you own one? YES ☐ NO ☐ if No then answer No 22.

14. How many ITNs do you have in the household? One ☐ Two ☐ Three and above ☐ none ☐
15. The current situation of the available ITN: in good order ☐ torn ☐
16. Is your ITN treated with insecticide? Yes ☐ No ☐ don't know ☐
17. Are they currently being used -Currently used ☐ Not used ☐ if they are not in use please answer the question number 23
18. Did you use it last night? YES ☐ NO ☐
19. Frequency of mosquito net use; always ☐ not always ☐
20. How did you get them? Free from the government source, ☐ voucher system, ☐ others/specify ☐
21. Date when an ITNs supplied : < 6 months ☐, ≥6 months ☐
22. Reasons for unavailability of ITNs /not owning the ITNs
- a) Not available
 - b) Cost/affordability
 - c) Lost/stolen
 - d) Used for other purposes
 - e) Old; then thrown away
 - f) Others _____
23. Reasons for not using the available ITNs
- a) Housing structure affects net use
 - b) Absence of bed
 - c) Nets do not prevent malaria
 - d) Afraid of its toxicity
 - e) Weather
 - f) Other (specify) _____--
24. Did the child/Children who is/are the under-five years age slept under ITN in the previous night: Yes ☐ No ☐
25. What do you think are the advantages of children sleeping in the nets
- a) Reduce the burden of malaria on them ☐
 - b) Help save money for other purposes ☐
 - c) Child sleeps better ☐

d) Saves time from visiting the hospital []

26. In case you did not receive an ITN from the hospital, can you afford one? Yes [] No [] if No . Explain why _____

Knowledge on malaria / The influence of health seeking behavior

27. Within the past six month did your child had episodes of fever? Yes [] No []

28. Was she/he taken to the hospital? Yes [] no []

29. If the answer is no explain why! _____

30. Was he/she given the anti-malaria? Yes [] No []

31. If the answer is yes, mention the name of the drugs that was given

32. What causes malaria

a) _____

b) _____

33. Can you mention signs and symptoms of malaria?

a) Fever

b) Headache

c) Feeling cold

d) With a tendency of bask in the sun

e) General body weakness

f) Body/joint pains

g) Vomiting

h) Abdominal pain/Diarrhoea

i) Convulsion

j) Don't know

34. What are the main preventive measures of malaria

a) Use ITN

b) Environmental cleanliness

c) Destroying the breeding sites

d) Use of Anti-malarials /ALU

e) Use traditional remedies

f) Fumigants /IRS

g) Use insecticide sprays

h) Using repellents

i) Other_____

35. Normally what do you usually do when another member of the house/ under-five contract malaria , where do you go for treatment

a) Hospital

b) Traditional herbalist

c) Self medication

d) Others (specify)

Housing environment

36. Housing environment

a) Proximal to breeding sites: old tires, containers, ponds

b) Clean environment

c) Farming activities,

37. Are the windows screened with the mosquito wire gauze .Yes [] no []

38. Does the house have separate bed room? Yes [] No []

39. What is the structure of the room?

a) Such that bottoms can be put up for hanging the nets[]

b) Such that there is no space for putting up bottoms for hanging the nets[]

c) Such that the rooms are so small there is hardly any space []

40. In which season of the year does the family use the ITNs

a) Rain

b) Dry

c) Throughout

d) Don't know

e) Others (specify)_____

41. What is the reason for ITNs use specifically in the above mentioned season

42. Has your house been sprayed with IRS yes [] No[]

43. If No, explain why_____

