PREVALENCE AND FACTORS ASSOCIATED WITH MALARIA AMONG CHILDREN LESS THAN FIVE YEARS ATTENDING FORT PORTAL REGIONAL REFERAL HOSPITAL

BY

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BMS/0279/123/DU

A RESEARCH SUBMITTED TO THE FACULTY OF CLINICAL MEDICINE AND DENTISTRY IN THE PARTIAL FULFILLMENT OF REQUIREMENT

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UNIVERSITY

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DECRALATION

I, **Byamukama Atanazio** declare that this research report is my own work and has never been presented to any university or other institution for academic purpose other than the one for which it's now being submitted for.

Where the work of others has been included, acknowledgement for this has been made in accordance to the text and references quoted.

SIGNATURE…….. **DATE……..**

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APPROVAL

This research under the title: **The prevalence of malaria and the associated risk factors in children less than five years at Fort Portal Regional Referral Hospital from July 2018 to July 2019**; has been done under supervision and is now ready for submission to the Faculty of Clinical Medicine and Dentistry.

SIGNATURE…… **DATE……**

Professor Melvis Bernis

HOD, Department of Paediatrics KIU/TH

ACKNOWLEDGEMENT

Much thanks goes to all people who in one or other ways helped me to do this research; among them is **Professor Melvis** for his maximum supervision and guidance during the process, **my family** for the financial support during the process of finishing the report, the **Hospital management of FPRRH and the pediatric ward** for their permission and help during data collection.

DEDICATION

This proposal is dedicated to my dad Mr. Benard Balijerwa, mum Mrs. Jane Tabita and friends especially Natasha Immaculate who have continuously advised me and supported in one way or the other in my struggles to acquire my dream. May the lord almighty bless them.

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ABBREVIATIONS

FPRRH Fort Portal Regional Referral Hospital

GBD Global Burden of Diseases

TSS Tropical splenomegaly syndrome

PHC Primary Health Care

WHO World Health Organization

OR Odds ratio

ITNs Insect Treated Nets

IRS Indoor-Residual Spraying

ACT Artemisinin Based Combination Therapy

IPTi Intermittent Preventive Treatment of malaria in Infancy

RBM Roll Back Malaria.

CI Confidence Interval

SMC Seasonal malaria Chemoprevention

LLIN Long Lasting Insecticidal nets.

MCP Malaria Control Program

MIS Malaria Indicator Surveys

RDT Rapid Diagnostic Test

DHS Demographic Health Survey

IMCI Integrated Management of Childhood Illnesses

MVI malaria Vaccine Initiative

IREC International Research and Ethics Committee

OPD Out Patient Department

ABSTRACT

Background: Malaria in children still remains a health burden no matter the several MCPs like use of LLIN, put in place to help eradicate malaria. According to WHO, Children under 5 years of age is one of most vulnerable groups affected by malaria. In Africa, about 285 000 children died before their fifth birthdays in 2016. When exposed to plasmodium falciparum, children and pregnant mothers are at increased risk of its fatalness, say severe anemia, premature delivery, delivery of low birth babies, cerebral malaria (Zhong *et al.*, 2009). Of children who tested positive for malaria, the prevalence of any anemia was 79%, mild anemia 21%, moderate anemia 50% and severe anemia 8%. Thus Malaria is the leading cause of morbidity and mortality in Uganda. It's especially lethal among pregnant and children under five years. Malaria account for 25-40% of all outpatient attendances, 20% of all admissions and 14% of all inpatient deaths. > 90% of the nation is highly endemic, with more than 50% of population experiencing high transmission level of 50 or more infective mosquito bites per person per year and yet children and pregnant mothers are the most affected groups (Uganda Malaria Control Policy, 2006, Uganda malaria Control Strategic Plan 2005/6-2009/10.

Objective: To assess the prevalence of malaria among children less than 5 years who attended FPRRH from July 2018 to July 2019.

Methodology: A cross sectional retrospective and a qualitative analytical survey using qustionnaires were used in the study among <5 children attending OPD at FPRRH (Buhinga) Kabarole district from period of 12 months- July 2018 to July 2019; based on Kish and Lashie-1965, 112 respondents were simply and randomly sampled. The data was coded and entered into SPSS for analysis and results were presented in frequesncies and percentages using tables and pie charts.

Results: Of the 112 children assessed, malaria cases were 41 (36.6%) and 71 (63.4%) were normal. 4-5years were 21 (51.2%) followed by 2-3 years 29.3% (12) and the lowest was < 2 years with 19.5% (08). mosquito nets use stands at 75.9% (85) and 24.1% (27) do not. Children who were living in the rural areas were 87.5% (98) and 24.1% (27).in urban areas. Houses with earthed floors were more than a half 58.0% (65), followed by sand floor houses with 19.6% (22), then brick floor houses with 10.8% (12), cement floor houses had 09 (8.0%) and finally tile floor houses had 3.6% (04). Whereas Mud wall houses stands at 60.7% (68), sand wall houses at 25.0% (28), brick wall houses with 8.9% (10) and cemented walls were 5.4% (06).

Conclusion: The prevalence of malaria among <5 children at Fort Portal Regional Referral (Buhinga) Hospital was low (36.6%); majorly influenced by the high level of utilization of ITNs but negatively affected by area of residence (Rural), Nature of the floor (Earthed floor and mud walls) makes malaria persistent thus a need to address the matter.

CHAPTER ONE: INTRODUCTION

1.1Background

A significant segment of the world's population is at risk of contracting malaria infection at any one time. However much sustained control efforts have been made in the past decade to fight malaria, it remains as the major cause of morbidity, mortality and socioeconomic problems in the world.

Malaria has so far been a life-threatening parasitic disease transmitted by the bite of female anopheles mosquitoes. About half of the world population (3.3 billion) is at risk of malaria infection, and around 250 million cases occur annually, leading to approximately 1 million deaths each year. The disease is the leading cause of death in children under the age of five and pregnant women in developing countries. The vast majority of cases reside in the African continent followed by Southeast Asia and Eastern Mediterranean regions. The disease remains one of the most important causes of human morbidity and mortality with enormous medical and economic impact in the world.

Thus, malaria is one of the leading infectious diseases. Malaria is caused by *Plasmodium* parasites. It spreads to people through the bites of Anopheles mosquitoes, known vector for malaria. There are mainly four species that cause human infection i.e. *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium ovale.*

As well Plasmodium *falciparum* is more fatal than *Plasmodium vivax* because of its complications. Malaria is one of the major public health problems and it is endemic in 104 tropical and subtropical countries of the world. In the tropics it’s the major cause of morbidity and mortality too.

In sub-Saharan Africa, the pattern of malaria transmission varies markedly from region to region, depending on climate and biogeography and broad ecological categories. In Uganda for instance, *Plasmodium falciparum* and *Plasmodium vivax* are the two predominant plasmodium species distributed all over the country, accounting for 60% and 40% of malaria cases, respectively.

Children under 5 years of age are one of most vulnerable groups affected by malaria. In Africa, about 285 000 children died before their fifth birthdays in 2016.

In high transmission areas, partial immunity to the disease is acquired during childhood. In such settings, the majority of malarial disease, and particularly severe disease with rapid progression to

death, occurs in young children without acquired immunity. Severe anemia, hypoglycemia and cerebral malaria are features of severe malaria more commonly seen in children than in adults.

With the above disease burden, **WHO recommends the following package of interventions for the prevention and treatment of malaria in children**

- Use of LLINs
- In areas with highly seasonal transmission of the Sahel sub-region of Africa, SMC for children aged between 3 and 59 months;
- In areas of moderate-to-high transmission in sub-Saharan Africa, IPTi except in areas where WHO recommends administration of SMC;
- Prompt diagnosis and effective treatment of malaria infections.

According to the WHO, the number of deaths due to malaria in children under the age of 5 years has decreased significantly since 2000, and thus malaria is no longer considered the leading cause of death in children within this age group. However, malaria remains a major cause of morbidity in children in sub-Saharan Africa with 10 % of all deaths of children under the age of 5 years due to malaria. This is equivalent to one child in sub-Saharan Africa dying of malaria every 2 minutes. Uganda, ranked fourth in the total number of malaria cases in sub-Saharan Africa, experiences weather conditions that often allow transmission to occur all year round with only a few areas that experience low or unstable transmission. Climate affects both the parasite and the mosquito. Mosquitoes are unable to survive in low humidity.

More so, Malaria is the leading cause of morbidity in Uganda with 90–95 % of the population at risk and it contributing to approximately 13 % of under-five mortality.

In Uganda, malaria control received little attention from the Ministry of Health before 1995, after which the MCP was established in order to direct and guide the day to day implementation of the National Malaria Control Strategy. Today, the fight against malaria is part of the overall effort of the Government of Uganda, with the support of several partners, to improve health with an overall goal of reducing mortality due to malaria by 80 % of the 2010 levels and reducing morbidity due

to malaria by 75 % of the 2010 levels by 2020. In these efforts, nationally representative cross-sectional surveys are carried out in the country in order to monitor and evaluate the progress of malaria control. These include DHS which have been conducted every 5 years since 2001 and MIS conducted in 2009.

A core part of the MCP is prevention of malaria, where ITNs and LLINs continue to be distributed free of charge, and IRS is being carried out in a limited number of districts where malaria transmission is very high. Furthermore, in efforts to accelerate the reduction of child mortality, the Integrated Community Case Management-ICCM, was introduced in Uganda in 2013, which is part of the government's IMCI strategy. These strategies involve VHTs offering curative treatments for malaria, diarrhea and pneumonia at community level, which assist in ensuring early diagnosis and treatment.

Although these control measures, together with those implemented by numerous non-profit organizations, have successfully reduced the number of malaria cases in Ugandan children over the past few years, there is still a notably high number of children under five dying from malaria daily. Therefore, in order to apply successful implementations to substantially reduce the burden of malaria, there is a continuous need to understand the epidemiology and risk factors associated with the disease. Although a large number of studies done worldwide have identified a wide variety of risk factors; socioeconomic, environmental, demographic, and others, associated with malaria infection there is still a great need to identify the influence of these factors in a local context to allow a successful formulation of a national malaria-control strategy.

Disease burden

According to the latest *World malaria report*, released in November 2018, there were 219 million cases of malaria in 2017, up from 217 million cases in 2016. The estimated number of malaria deaths stood at 435 000 in 2017, a similar number to the previous year.

In 2017, an estimated 219 million cases of malaria occurred worldwide (95% CI: 203–262 million), compared with 239 million cases in 2010 (95% CI: 219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million).

Although there were an estimated 20 million fewer malaria cases in 2017 than in 2010, data for the period 2015–2017 highlight that no significant progress in reducing global malaria cases was made in this timeframe.

Most malaria cases in 2017 were in the WHO African Region (200 million or 92%), followed by the WHO South-East Asia Region with 5% of the cases and the WHO Eastern Mediterranean Region with 2%.

The WHO African Region continues to carry a disproportionately high share of the global malaria burden. In 2017, the region was home to 92% of malaria cases and 93% of malaria deaths.

In 2017, 5 countries accounted for nearly half of all malaria cases worldwide: Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and **Uganda** (4%).

The 10 highest burden countries in Africa reported increases in cases of malaria in 2017 compared with 2016. Of these, Nigeria, Madagascar and the Democratic Republic of the Congo had the highest estimated increases, all greater than half a million cases. In contrast, India reported 3 million fewer cases in the same period, a 24% decrease compared with 2016.

Rwanda has noted a reduction in its malaria burden, with 430 000 fewer cases in 2017 than in 2016, and Ethiopia and Pakistan estimated decreases of more than 240 000 cases over the same period.

Children under 5 years of age are the most vulnerable group affected by malaria; in 2017, they accounted for 61% (266 000) of all malaria deaths worldwide.

In 2017, *P. falciparum* accounted for 99.7% of estimated malaria cases in the WHO African Region, as well as in the majority of cases in the WHO regions of South-East Asia (62.8%), the Eastern Mediterranean (69%) and the Western Pacific (71.9%).

In 2013, 0.88 million cases have been recorded, with 128 million tests being conducted on the suspected cases, with *P. falciparum* causing 53% and *P. vivax* causing 47% of the infections.

Malaria deaths

In 2017, there were an estimated 435 000 deaths from malaria globally, compared with 451 000 estimated deaths in 2016, and 607 000 in 2010.

Children aged under 5 years are the most vulnerable group affected by malaria. In 2017, they accounted for 61% (266 000) of all malaria deaths worldwide.

The WHO African Region accounted for 93% of all malaria deaths in 2017. Although the WHO African Region was home to the highest number of malaria deaths in 2017, it also accounted for 88% of the 172 000 fewer global malaria deaths reported in 2017 compared with 2010.

Nearly 80% of global malaria deaths in 2017 were concentrated in 17 countries in the WHO African Region and India; 7 of these countries accounted for 53% of all global malaria deaths: Nigeria (19%), Democratic Republic of the Congo (11%), Burkina Faso (6%), United Republic of Tanzania (5%), Sierra Leone (4%), Niger (4%) and India (4%).

All WHO regions except the WHO Region of the Americas recorded reductions in mortality in 2017 compared with 2010. The largest declines occurred in the WHO regions of South- East Asia (54%), Africa (40%) and the Eastern Mediterranean (10%). Despite these gains, the malaria mortality reduction rate has also slowed since 2015, reflecting the estimated trends in malaria case incidence.

Malaria-related anemia

This year's report includes a section on malaria-related anemia, a condition that, left untreated, can result in death, especially among vulnerable populations such as pregnant women and children aged under 5 years.

Anemia was once a key indicator of progress in malaria control, and its prevalence was used to evaluate the efficacy of interventions. Recent years have seen a decline in awareness of the burden of malaria-associated anemia

Despite its importance as a direct and indirect consequence of malaria, the prevalence of anemia among populations vulnerable to the disease has not been reported consistently as a metric of malaria transmission and burden.

Data from household surveys conducted in 16 high-burden African countries between 2015 and 2017 show that, among children aged under 5 years, the prevalence of any anemia was 61%, mild anemia 25%, moderate anemia 33% and severe anemia 3%. Of children who tested positive for malaria, the prevalence of any anemia was 79%, mild anemia 21%, moderate anemia 50% and severe anemia 8%.

1.2 Problem statement

Malaria in children still remains a health burden no matter the several MCPs like use of LLIN, put in place to help eradicate malaria.

According to WHO, Children under 5 years of age are one of most vulnerable groups affected by malaria. In Africa, about 285 000 children died before their fifth birthdays in 2016.

When exposed to plasmodium falciparum, children and pregnant mothers are at increased risk of its fatalness, say severe anemia, premature delivery, delivery of low birth babies, cerebral malaria (Zhong *et al.,* 2009).

Malaria in children compromises the health of a child both at the growing level resulting into low intelligence quotient and this is due to its effect to the brain (Walter *et al.,* 1982). Also according to WHO, global malaria cases in numbers, in 2017, an estimated 219 million cases of malaria occurred worldwide (95% CI: 203–262 million), compared with 239 million cases in 2010 (95% CI: 219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million).

Malaria is the leading cause of morbidity and mortality in Uganda. It's especially lethal among pregnant and children under five years. Malaria account for 25-40% of all outpatient attendances, 20% of all admissions and 14% of all inpatient deaths

More than 90% of the nation is highly endemic, with more than 50% of population experiencing high transmission level of 50 or more infective mosquito bites per person per year and yet children and pregnant mothers are the most affected groups (Uganda Malaria Control Policy, 2006, Uganda malaria Control Strategic Plan 2005/6-2009/10)

With the above data, I felt concerned to assess the prevalence of this malarial disease burden among children less than 5 years who attended the FPRRH from July 2018 to July 2019 since the existing information reveals a greater disease discomfort to the entire population of Uganda and the world.

1.3 Study justifications

This study will add to the existing knowledge, attitude and awareness in regard to malaria prevalence in children and thus augment the efforts of medical workers who have been involved in creating awareness of this problem.

It will also enable in understanding of the effects and risk factors of malaria in children in Kabarole district and the neighboring districts in the Rwenzori Region of Uganda.

The data obtained will be utilized by the implementers of policy and management of the Hospital in providing funds to create awareness and treatment of affected mothers.

The health planners will then be motivated to stress the importance of recognizing symptoms of malaria early within 24hours after the onset or a positive malaria test to prevent its adverse effects in children.

To intensify surveillance systems and preventive mechanisms, where the health planners will now use the data for planning, resource mobilization and effective allocation.

1.4 Objectives of the Study

1.4.1 **General Objective**

To assess the prevalence of malaria among children less than 5 years who attended FPRRH from July 2018 to July 2019.

1.4.2 Specific Objectives

a. To determine the number of malaria cases among children less than five years who attended FPRRH.
b. To assess the specific age group of the under five children commonly affected by malaria
c. To assess the number of children utilizing ITNs
d. To assess the risk factors associated with malaria in under five children.

1.5 **Research questions**

This will help me and other researchers to answer the following questions;

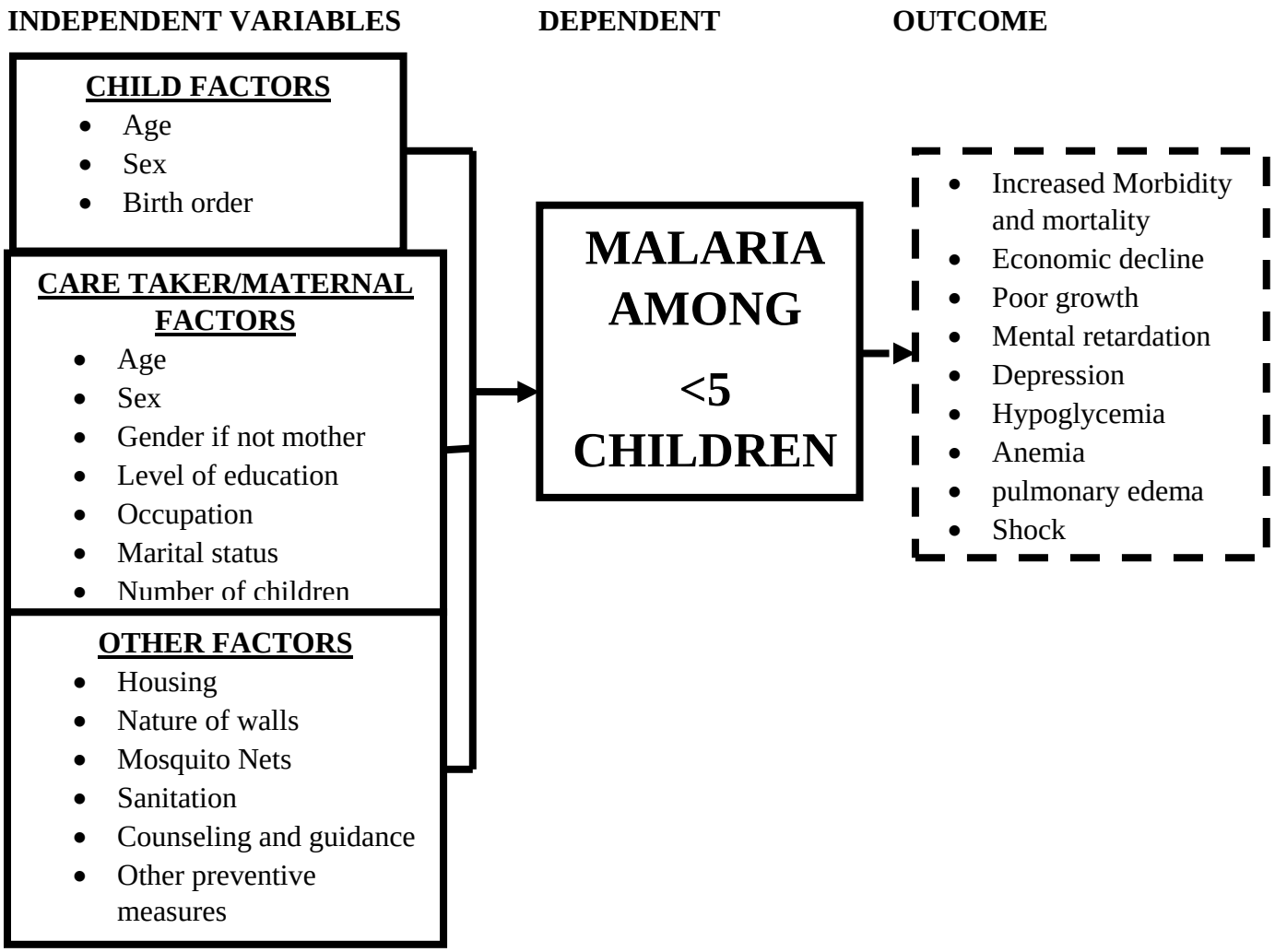
What are the risk factors of malaria in children less than 5 years at FPRRH?

What are the effects of malaria in children less than 5 years at FPRRH?

1.6 Conceptual framework

Malaria in children results in many among other effects into socioeconomic delay, poor growth, frequent hospital visits, mental retardation, and tropical splenomegaly syndrome.

Below is the mode.



CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This section reviews relevant literature to the prevalence and factors contributing to malaria among <5 years children.

2.1 Prevalence of Malaria among children <5 years

Malaria in Africa kills a vast number of children every year. In Africa, a child dies from malaria every 30 seconds, which translates to a massive 2880 children per day (Finkel *et al.,* 2007).

Malaria, together with HIV/AIDS and tuberculosis, is one of the world's most vital public

Health challenges compromising development in poverty-stricken countries and accounting for up to an overwhelming 2.7 million deaths per annum (Gardner *et al.*, 2002).

More than 3billion people (~40%) reside in areas of the world where malaria is prevalent. As such, the disease is largely responsible for the poor economic growth of these areas, which further contributes to more cases of malaria (Korenromp *et al.*, 2005).

Malaria is a complicated disease and its spread may be attributable to a variety of factors such as ecological and socio-economic conditions, displacement of large population groups, agricultural malpractices causing an increase in vector breeding, parasite resistance to antimalarial drugs and vector resistance to insecticides.

In 1998, The WHO established a global partnership called RBM in an attempt to halve the world's malaria frequency by 2010 (http://www.rbm.who.int). Apart from RBM, a number of promising antimalarial drug and vaccine discovery projects have also been launched. This includes the Medicines for Malaria Venture-MMV funded by a number of organizations including The Bill and Melinda Gates Foundation, for the development of novel antimalarial. The latter has also contributed more than 300 million US dollars to the MVI.

With the above I have as well cited out few among the researches that have been done elsewhere. Others studies have been done on specific age groups and gender oriented. Other studies as we will see were done on specific age groups or specific localities.

2.3 Associated factors

A retrospective study about the prevalence of malaria in Tselemti Wereda, North Ethiopia, (Megbaru *et al*., 2016).It showed that a total of 41,773 patients with chief malaria complaint were screened for malaria in the three years period. The overall prevalence of microscopically confirmed malaria was 28.1%. Males (29.5%) were more affected by malaria than females

(26.5%). Malaria was also higher in the age group >15 years (32.6%) followed by 5–15 years (29.3%) and under-five children (20.5%). Plasmodium falciparum, Plasmodium vivax and mixed infections accounted for 58.2%, 35.5% and 6.3%, respectively. The highest prevalence of confirmed malaria cases was observed during spring (35.6%) and summer (25.1%). Higher prevalence of slide positive malaria was recorded in Dima (46.1%), Cherecher (45.3%) and Fyel wuha (35.3%) health centers.

Another study was done in Kenya about the prevalence and associated determinants among children, (Nurnabi Sheik *et al*., 2015). This study analyzed the secondary data extracted from the 2015 Kenya Malaria Indicator Survey (KMIS), a cross-sectional country representative survey. Associations of demographic, socioeconomic, community-based, and behavioral factors with the prevalence of malaria in children were analyzed using multivariable logistic regression analysis.

And the results, Data from 7040 children aged 6 months to 14 years were analyzed. The prevalence of malaria showed an upward trend in terms of age, with the highest prevalence among children aged 11–14 years. Prevalence was also higher among rural children (10.16%) compared to urban children (2.93%), as well as poor children (11.05%) compared to rich children (3.23%). The likelihood of having malaria was higher among children aged 10–14 years (OR = 4.47, 95% CI = 3.33, 6.02; $P < 0.001$) compared with children aged under 5 years. Thus according to their research, Malaria prevalence increases with increasing age of the children in this population. Comparatively aged children (10–14 years) suffer more due to malaria in terms of the prevalence (10.22%), whereas malaria prevalence was 4.83% among children under the age of 5 years.

According to study was done in Benin, West Africa, about, malaria incidence and prevalence among children living in a peri-urban area on the coast of Benin West Africa- a longitudinal study (Ambroisine *et al*., 2014). Their research was that, Clinical malaria incidence was determined over 18 months in a cohort of 553 children living in a peri-urban area near Cotonou.

Another Three cross-sectional surveys were also carried out. Malaria incidence showed a marked seasonal distribution with two peaks: the first corresponding to the long rainy season, and the second corresponding to the overflowing of Lake Nokoue. The overall *Plasmodium falciparum* incidence rate was estimated at 84/1,000 person-months, and its prevalence was estimated at over 40% in the two first surveys and 68.9% in the third survey. Multivariate analysis showed that girls and people living in closed houses had a lower risk of clinical malaria. Bed net use was associated

with a lower risk of malaria infection. Conversely, children of families owing a pirogue were at higher risk of clinical malaria. Considering the high pyrethroids resistance, indoor residual spraying with either a carbamate or an organophospate insecticide may have a major impact on the malaria burden.

Another study analyzed the of the trend of malaria prevalence in Ataye, North Shoa, and Ethiopia between 2013 and 2017(Gebretsadik *et al*.,). It involved a retrospective laboratory record review in Ataye hospital. Malaria data reported from 2013 to 2017 were carefully reviewed from January to March 2018. The study results, a total of 31,810 blood films were prepared and examined from malaria-suspected patients at Ataye District Hospital from 2013 to 2017. Of the examined blood films, 2670 (8.4%) were microscopically confirmed malaria cases. The trend of malaria prevalence in the present study seems non- fluctuating. *Plasmodium falciparum* and *Plasmodium vivax* accounted for 2087 (78.2%) and 557 (20.9%) cases, respectively. From total positive cases, 1.0% of cases were mixed *P. falciparum*/*P. vivax* infections, and that no *Plasmodium malariae* and *Plasmodium ovale* infections were found by malaria microscopists. Malaria cases were higher in males 1584 (5.0%) than females 1086 (3.4%). With regard to age groups, higher numbers of malaria cases were observed in age group 15–45 years old. Malaria cases were high in spring (September to December), which is a peak malaria transmission period in Ethiopia.

Another study was done in Uganda 2016, about the risk factors of malaria in children under the age of five years old (Danielle Roberts *et al*.). This study made use of data collected from the 2014 Malaria Indicator Survey conducted in Uganda. A generalized linear mixed model was used to test for associations between several independent variables and the response variable, which was whether a child tested positive or negative for malaria according to the microscopy test. And the results, the sample in this study was made up of 4939 children. Of those children, 974 tested positive for malaria, resulting in an observed malaria prevalence of 19.7 %.

Furthermore, conclusion was drawn that, although there has been a significant increase in the use of mosquito nets since the previous Malaria Indicator Survey done in 2009, particularly in the use of ITNs and LLINs, these control measures alone may not be sufficient. IRS will be a key strategy in reaching the malaria goals set by the government of Uganda. Supplementing these control measures with education of appropriate and consistent use of ITNs and LLINs, as well as education

of practicing safe living habits, such as reducing outdoor activities during peak biting hours of a mosquito, can go a long way in aiding the reduction of the burden of malaria in Uganda.

CHAPTER THREE: METHODOLOGY

3.1 Study Design

The study is a cross sectional retrospective and a qualitative analytical survey to assess the prevalence and the risk factors of malaria in under five children, who attended FPRRH outpatient department at a period of 12 months- July 2018 to July 2019.

3.2 Study area

FPRRH (Buhinga) among which patients come from Kabarole, Ntoroko, Bundibugyo, Kamwenge, Kasese and Kyenjojo. Two maps are in appendices 1 and 2. 1 is showing the Kabarole district and its neighboring districts and 2 is showing the location of FPRRH in Kabarole district.

The dominant tribe is Batooro, others are, Baganda, Bamba, Banyankole.

Spoken languages are Rutooro, Runyankole and English to some individuals.

3.3 Study population

The study is aimed at all children who attended FPRRH Outpatient in the specified time as (July 2018 to July 2019)

3.4 Sample size

The study population included children five years and below who attended the Outpatient at FPRRH. The sample size (n) was thus calculated using the Kish and Lashie-1965

$$n = \frac{z^2 p (1-p)}{d^2}$$

Where n is the sample size, d is the margin of error of setting a significant level of 0.09 (9%), p is the estimated Prevalence of malaria in Fort Portal of 41.05 (below five years)-Fort Portal HMIS 2014, z is the Level of significance (1.96) for confidence interval of 95%

Thus, sample size (n) $= \frac{1.96^2 \times 0.4105 \times (1- 0.4105)}{0.09^2}$

Sample size n = 112, and so 112 respondents were selected.

3.5 Sampling methods

All subjects were subjected to simple random sampling.

Data will be corrected over five days during which questionnaires will be randomly issued to mothers or the caretakers reporting at the Outpatient Department.

3.6 Variables

The exact factors that will guide me in this study are;

1. Age of each patient
2. Gender; either male or female
3. Place of origin by district; Kabarole, Bundibugyo, Kamwenge, Kasese, Bunyangabo, Ntoroko and Kyenjojo.
4. Number of members in the houdehold, caregivers age, knowledge about malaria
5. Main floor of the house, use of electricity.
6. Use of mosquito nets.

3.7 Data collection methods

A record review tool (questionnaire papers) and pre-tested questionnaires will be used; the questionnaire will contain both closed and open ended questions in a language which the mother of the child understands best. The type of data that I expect to collect will include socio-demographic data, associated risk factors, and use of insect treated mosquito nets.

3.8 Data analysis and presentation

The questionnaires will be sorted in the field and checked for completeness. The data will then be transcribed in Microsoft Word. The data and the general results will be analyzed using a two-way analysis of variance and with the use of SPSS, the correlation coefficient between variables will be determined. The data will be entered in tables, graphs and the analyzed data will be presented in form of tables, pie-charts.

3.9 Ethical considerations

This research project will be done under the validity ordained by the IREC of Kampala International University upon which the patient/participant-researcher bonds are held tight as in principles encouraged by the IREC. Before getting data from each mother, an informed consent will be obtained by explaining the purpose and aim of the study and ensuring privacy and confidentiality like use of coding of questionnaires instead of names will be a priority.

3.10 Limitations that may arise in the process of the research

1. Less number of patients that may result into non reliable information

2. Poor handwriting of the health workers that may arise into wrong data
3. There might also be lack of honesty on the part of those that will be interviewed, I will try by all means to use less time.

3.11 Quality control

Data collection tools will be tested for accuracy, relevance and quality of data.

I will do to my maximum to make sure that the data collected is the right data to make me obtain reliable results. Among my maximum obligations is the work of getting all the required information about those patients so that no information is left out.

Necessary amendments will be made after the exercise before finally collecting data for the study.

CHAPTER FOUR: PRESENTATION AND ANALYSIS OF THE FINDINGS.

4.1 Introduction

The research was carried out according to the design and methodology as presented in the previous chapter. Presented are the results of 112 correspondents. The findings are analyzed in form of percentages, table and pie charts.

4.2 Demographic characteristics

4.2.1 Total number of children who attended the outpatient between July 2018 to July 219 of my correspondents.

Table 1: Total number of malaria cases among the children at the outpatient department.

Malaria infection	Frequency**(n)**	Percentage**(%)**
Yes	41	36.6
No	71	63.4
Total	*112*	*100.0*

Table 1 the number of malaria cases 41 (36.6%) and those without malaria 71 (63.4%) among the children.

4.2.2 Age mostly affected among the children who tested positive for malaria.

Table 2: The age mostly affected of the children.

Age (years)	Frequency **(n)**	Percentage **(%)**
4-5	**21**	**51.2**
2-3	**12**	**29.3**
≤ 2	**08**	**19.5**
Total	**41**	**100.0**

Table 2 shows that out of 41 malaria cases, age 4-5 had 21 (51.2%), 2-3 had 12 (29.3%), and ≤ 2 had 08 (19.5%).

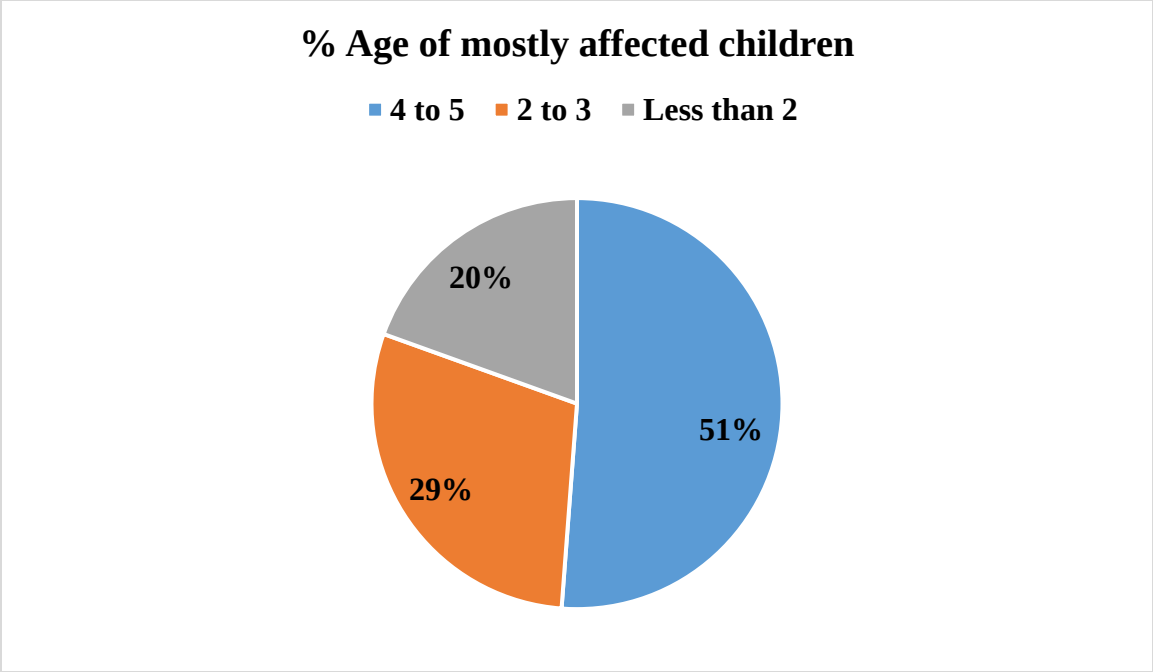


Figure 1: Age mostly affected among the children

Fig 1 shows that out of 41 malaria cases, age 4-5 had 21 (51.2%), 2-3 had 12 (29.3%), and ≤ 2 had 08 (19.5%).

4.3 Associated risk factors.

4.3.1 Use of insect treated mosquito nets by the children.

Table 3: Use of ITNs by the children

Use of ITNs	Frequency **(n)**	Percentages **(%)**
Yes	**85**	**75.9**
No	**27**	**24.1**
Total	***112***	***100.0***

Table 3 shows that out of 112 children, 85 (75.9%) utilized ITNs at home, and 27 (24.1%) did not have ITNs at home.

4.3.2 The nature of the floor status of the houses of the children. Table 4:

Table 4: Nature of floor of the children's homes.

House floor status	Frequency **(n)**	Percentage **(%)**
Tiles	**04**	**3.6**
Cement	**09**	**8.0**
Bricks	**12**	**10.8**
Sand	**22**	**19.6**
Earth	**65**	**58.0**
Total	***112***	***100.0***

Table 4 shows that out 112, earthed floor house had 65 (58.0%), Sand floor house had 22 (19.6%), Bricked floor house had 12 (10.8%), Cemented floor house had 09 (8.0%) and Tile floor house had 04 (3.6%).

4.3.3 The nature of the walls of the rooms.

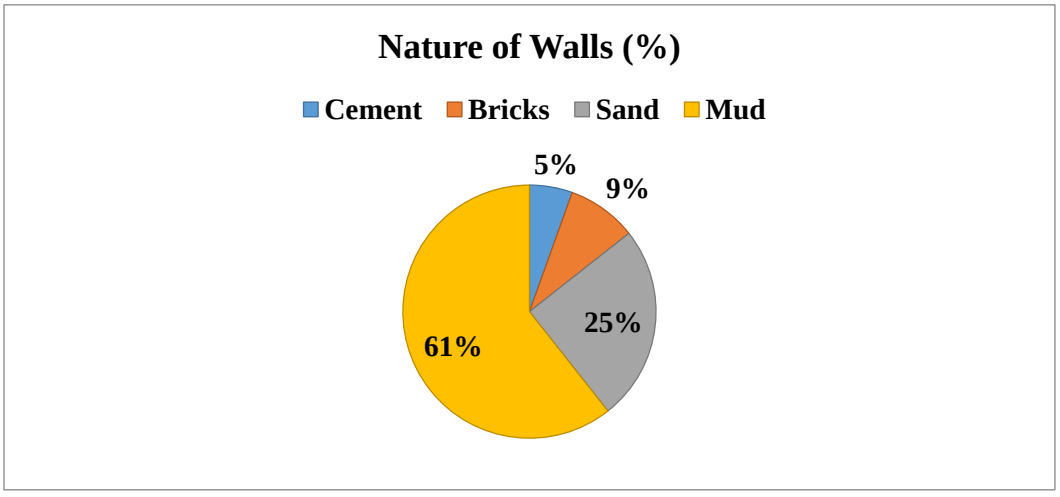


Figure 2: Nature of the walls of the children's rooms.

Fig.2 shows that out of 112, mud walls had 68 (60.7%), sand walls had 28 (25%), brick walls had 10 (8.9%), and cemented walls had 06 (5.4%).

4.3.4 The number of children sleeping in a single room.

Table 5: The number of children per room.

Number of children per room	Frequency **(N)**	Percentage **(%)**
0-2	**18**	**16.1**
2-4	**55**	**49.1**
4-6	**39**	**34.8**
Total	***112***	***100.0***

Table 6 showed that out of 112, 0-2 children in a single room had 18 (16.1%), 2-4 children had 55 (49.1%) and 4-6 (34.8%).

4.3.5 The area of residence of the children.

Table 6: The area of residence of the children.

Area of residence	Frequency **(N)**	Percentage **(%)**
Rural	**92**	**82.1**
Urban	**20**	**17.9**
Total	***112***	***100.0***

Table 6 shows that out of 112, 92 (82.1%) lived in rural areas and 20 (17.9%) lived in urban areas.

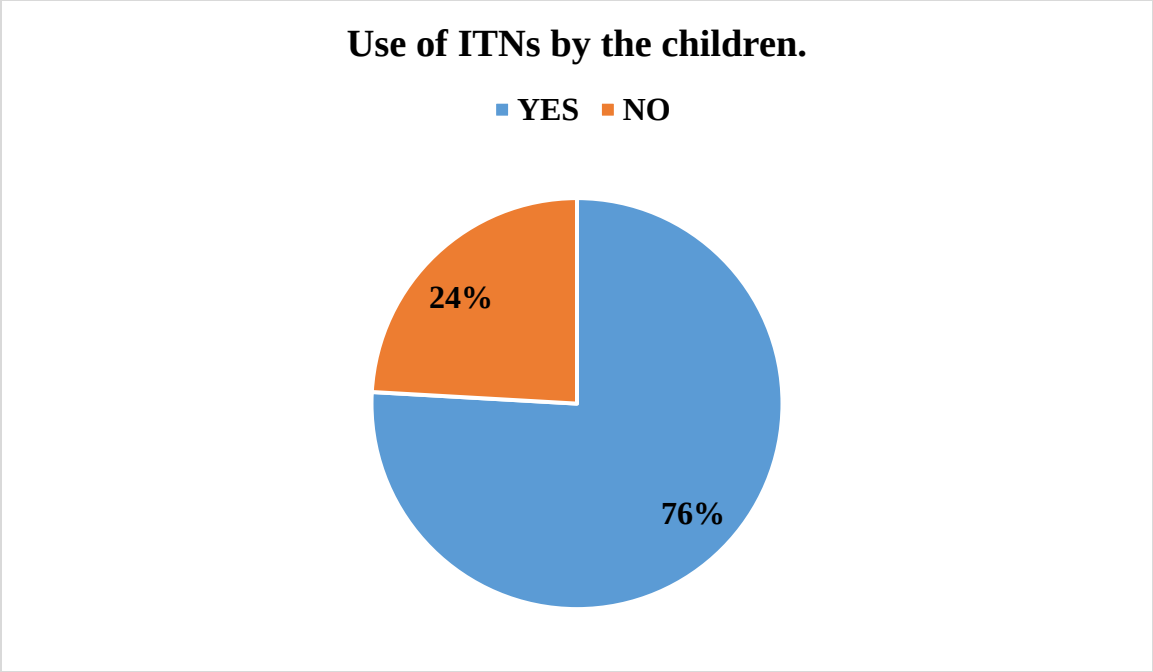


Figure 3: Use of ITNs by the children

Pie chart 1 shows that 75.9% used ITNs, and 24.1% did not have ITNs

4.3.6 The presence of electricity at home

Table 7: The use of electricity at home.

Use of electricity at home	Frequency **(N)**	Percentage **(%)**
Yes	**45**	**40.2**
No	**67**	**59.8**
Total	***112***	***100.0***

Table 7 shows that out of 112, use of electricity at home had 45 (40.2%), and no use of electricity at home at 67 (59.8%).

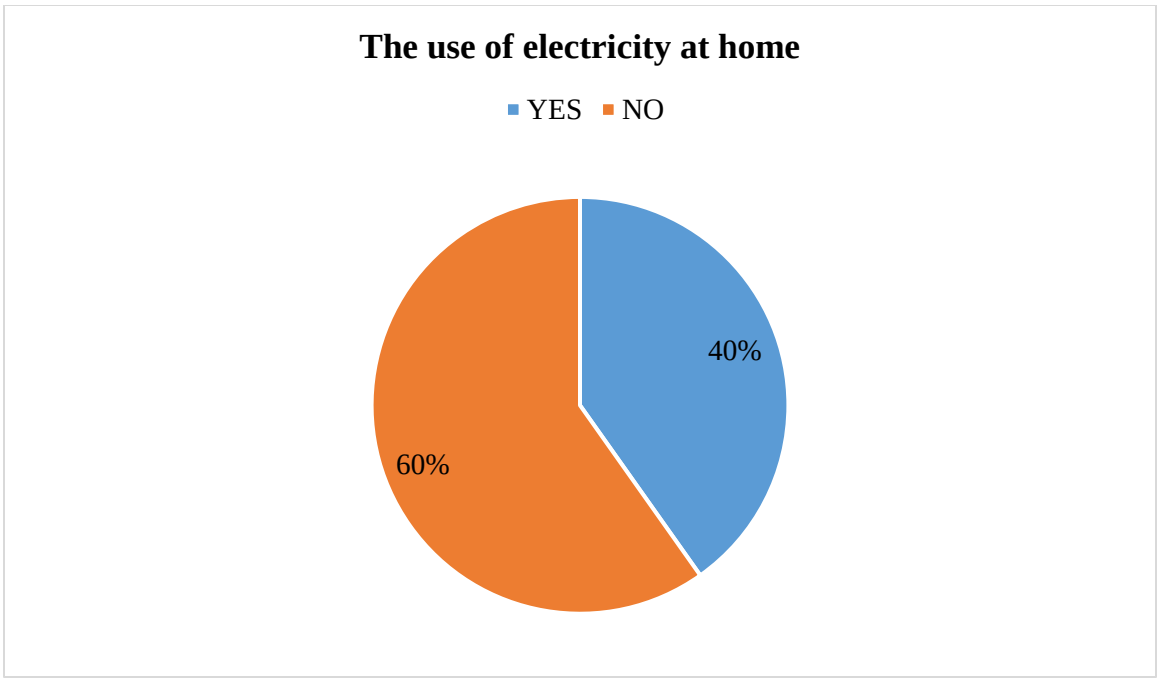


Figure 4: The use of electricity at home.

Pie chart 4 shows that out of 112, use of electricity at home had 45 (40.2%), and no use of electricity at home at 67 (59.8%).

CHAPTER FIVE. DISCISSION, CONCLUSION AND RECOMMENDATION.

5.1 DISCUSSION.

5.1.1 Prevalence of Malaria among Children under five years of age

A considerable number of children attending OPD annually had malaria even though the Majority of these children were normal. This was most likely to be attributed to the proper use of insecticide treated mosquito nets by the children.

The study showed that 4-5 years wee the majority with a considerable number ranging from 2 to 3 years and the rest were less affected. This be because they still have maternal antibodies IgG against the parasites (Gitau *et al.*, 2005). Also children of 4 to 5 years are now grown-ups and so do not sleep with their parents on the same bed and thus their exposure before the parasite at night.

5.1.2 The Associated Risk Factors of Infection among the Children In Relation To Objectives.

The study showed that majority of the children was using ITNs. This has contributed to low cases of malaria in children and in line with Ambroisine *et at.*, (2014). As well, living in rural areas was highly associated malaria infection to those in urban areas. The high prevalence in rural areas is due to adequate breeding areas of mosquitoes due to the winter and the low socioeconomic status as revealed by Megbaru *et al.*, (2016).

On the side; floor houses with Tiles were the least owned, whereas Earthed floor houses had the highest risk factor to malaria and hence the prevalence rate probably because mosquitoes are able to hide in the cracks and have a mosquito bite at night. Together with Mud house, these pose the highest risk and hence the prevalence rate since these mud walls are able to act as hiding places to mosquitoes.

5.2 CONCLUSIONS

The prevalence of malaria among <5 children at Fort Portal Regional Referral (Buhinga) Hospital was low (36.6%); majorly influenced by the high level of utilization of ITNs but negatively affected by area of residence (Rural), Nature of the floor (Earthed floor and mud walls) makes malaria persistent thus a need to address the matter.

5.3 RECOMMENDATIONS.

1. There should be a high index suspicion of suspicion of malaria by medical workers in children.

2. There should a prompt diagnosis and effective treatment of the disease to prevent related complications in children.
3. Follow ups by the medical workers should be emphasized to ensure effective treatment of malaria in children.
4. Medical and community Health Workers should put much emphasis on encouraging children to always use insecticide treated mosquito nets.
5. The management of the Hospital should strive to create awareness of malaria in children.

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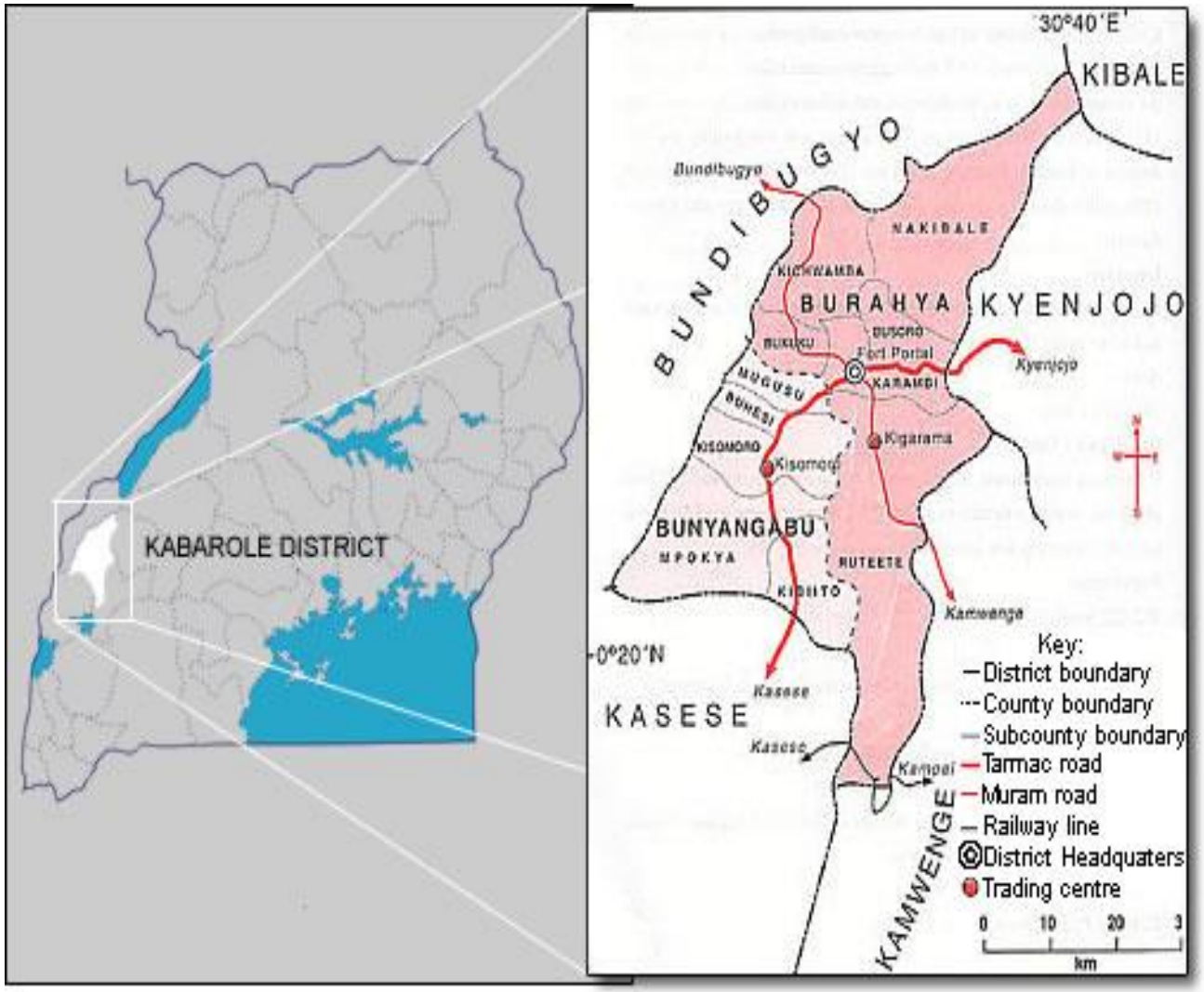
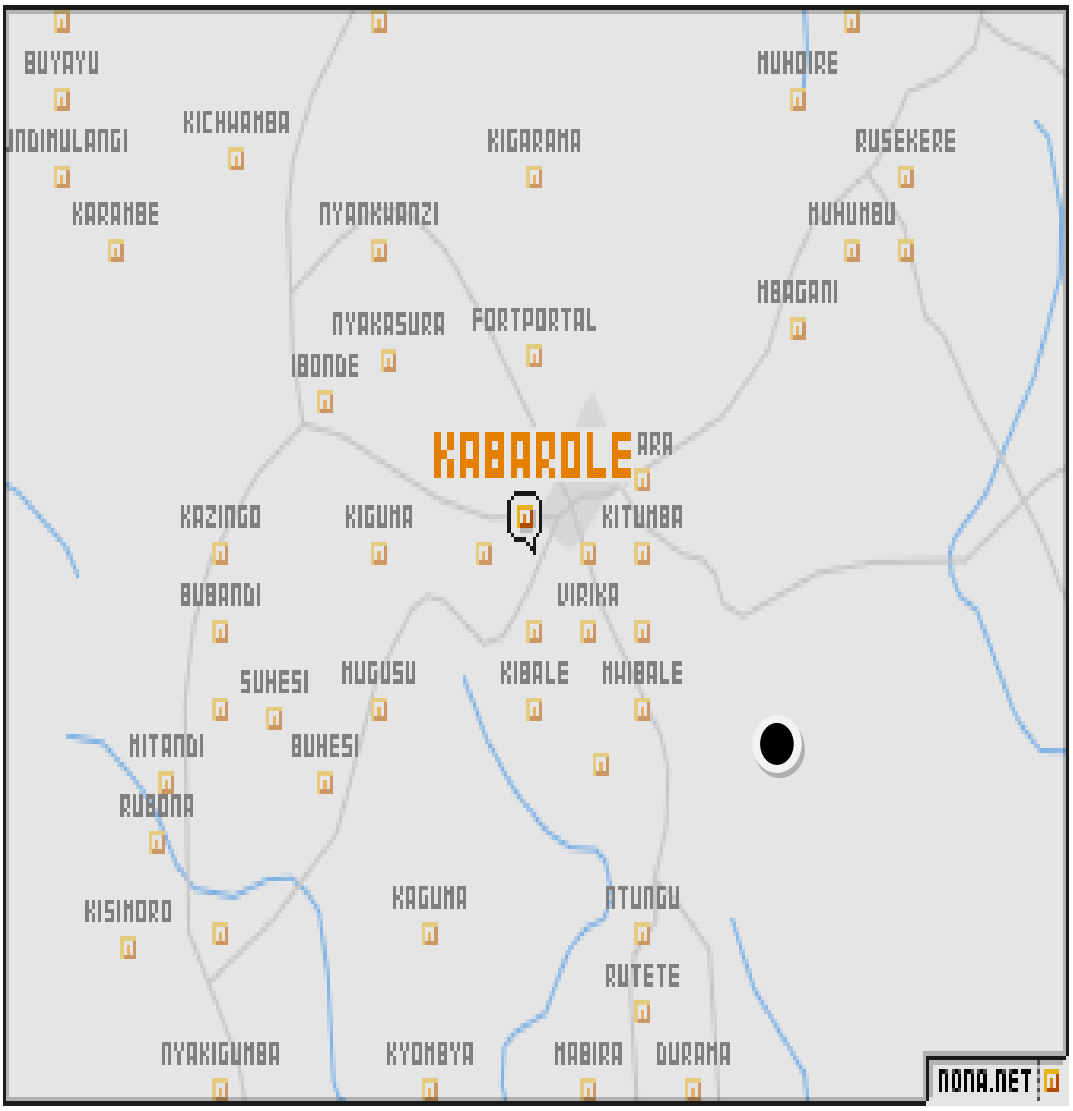
APPENDICES

APPENDIX I: THE MAP OF UGANDA SHOWING THE POSITION OF KABAROLE DISTRICT



APPENDIX II: THE MAP OF KABAROLE SHOWING THE POSITION OF FPRRH



KEY

FPRRH

River

Road

Trading center

APPENDIC III: THE RESEARCH WORK PLAN AND BUDGET

ITEM NUMBER	**ITEM**	**COST (UGX)**
1	Transport	50000
2	Data collection	50000
3	Typing	60500
4	Printing	20000
5	Binding	5000
6	**Total**	**185500**

APPENDIX IV: QUESTIONAIRE.

I am Byamukama Atanazio, a student at Kampala International University; I am conducting a research to assess the prevalence of malaria and the associated factors in children less than five years among patients who attend FPRRH. Your acceptance to participate in this study will help us improve health service delivery to the people in this area. You can accept or refuse to participate. Thank you.

Demographic data

Participant identification number (ID) ……..

Age (years): 4-5 ☐ 2-3 ☐ less than 2 ☐

Sex: Male ☐ Female ☐

Area of residence: Rural ☐ Urban ☐

Religion: Catholic ☐ Protestant ☐ Muslim ☐ Others ……

Caregiver education level: None ☐ primary ☐ Secondary ☐ Tertiary ☐

SECTION 1

Knowledge about malaria.

Did you know that mosquito bite can cause malaria: Yes ☐ No ☐

Did you know there are ways of preventing malaria: Yes ☐ No ☐

If yes, state some…….

Number of children per room 0-2 ☐ 2-4 ☐ 4-6 ☐

Do your children sleep under insect treated mosquito: Yes ☐ No ☐

Do you have and use electricity at home: Yes ☐ No ☐

What is the floor status of your house: Tiles ☐ Cement ☐ Bricks ☐ Sand ☐ Earth ☐

What is the main material of your room's wall: cement ☐ Bricks ☐ Sand ☐ mud ☐