

**MALARIA PREVALENCE AND ASSOCIATED FACTORS AMONG CHILDREN
BELOW THE AGE FIVE YEARS ATTENDING NAKALOKE HEALTH
CENTER III IN NAKALOKE TOWN COUNCIL, MBALE
DISTRICT**

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**A RESEARCH REPORT SUBMITTED TO THE SCHOOL OF NURSING
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DECLARATION

I hereby declare, to the best of my understanding that this research study is my original effort and has never been presented to this University or any other institution of higher learning for a scholarly award.

I therefore present it for the award of a Degree of Bachelor of Nursing Science at International Health Sciences University.

Signature.....

Kituyi Irene Rose

Date.....

APPROVAL

The research work entitled malaria prevalence and the associated risk factors among children below age five years attending Nakaloke HC III in Nakaloke Town council in Mbale District, was done under my supervision.

I therefore certify that I have read this research report and it is fully adequate in scope and quality and I recommend it for execution

Signature.....

MR. AFAYO ROBERT

SUPERVISOR

Date.....

DEDICATION

I dedicate this research work to my family members especially my husband Mr.Bichacha Michael God almighty bless you.

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My sincere thanks go to my family members especially my husband Mr.Bichacha Michael for the financial, spiritual and moral support, my supervisor Mr. Afayo Robert for his generous support and guidance right from the proposal writing and full report writing to submission of the whole work. All my class mates especially my group members for that love encouragement you bestowed to me. Thank you all for giving me your time and a chance to accomplish my work. God almighty bless you.

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OPERATIONAL DEFINITIONS

Prevalence is the total number of cases of a disease that are present in a particular Population at a given period.

Malaria is a life threatening disease caused by a bite of an infected female anopheles mosquito.

Parasitaemia is the number of malaria parasites contained in the blood.

Malaria prevalence is the proportion of people who are infected with malaria infection at a given point of time.

Children below five years- these are the most vulnerable group for malaria infection.

Caregiver – refers to someone who takes responsibility for those children below the age of five years.

Household- a unit that consist of one or more people who live in the same dwelling and also share meals and consist of a single family or other group of people.

Environment – the circumstances, objects, conditions by which one surrounded.

ACRONYMS

MOH-	Ministry of health.
WHO-	World Health Organization.
UNICEF-	United Nations Integrated Children Fund
RDT-	Rapid Diagnostic Test.
RBM-	Roll Back Malaria.
ITNs-	Insecticide Treated Nets
LLINs-	Long Lasting Insecticide Treated Nets.
ACT-	Atemethisine Insecticide Treated nets.
MIS-	Malaria indicator survey.
NMCP-	National malaria control program.
GDP-	Gross domestic product.
CDC-	Center of disease control.
IRS-	Indoor residual spraying.
VHT-	Village Health Team.
ICCM-	Integrated case control program.
IMCI-	Integrated management of childhood illness.
OPD-	Outpatient department.
MCP	Malaria control program.
NMCS-	National malaria control strategy.

ABSTRACT

Introduction:

It is noted globally over 95 countries and territories have on going malaria transmission with an estimated 3.2 billion people who are at risk of getting infected. The WHO indicates that 214 million people are infected with malaria worldwide and of these 438,000 cases result in deaths. Children below five years are the most susceptible to malaria illness which accounts for estimated deaths of 303,000 before reaching age five globally and 292,000 occur in the African region (WHO world malaria report 2016).

Objective:

To determine the prevalence of malaria and the associated risk factors among children below 5 years in Nakaloke HC III, Nakaloke town council in Mbale district.

Methodology:

The study was a quantitative and cross section survey which involved a sample size of 243 care takers of 243 children below the age of five who attended Nakaloke HCIII. A convenient sampling method allowed data to be collected about malaria prevalence and the associated factors simultaneously in the months of August and September 2017.

Results:

The prevalence of malaria was high 118(48.6%) and the factors that were significant with malaria prevalence included; house hold source of light ($\chi^2= 8.560$, $P=0.036$), care taker knowledge of signs and symptoms (loss of appetite) $\chi^2=4.023$, $P=0.045$) and environmental factor about presence of garbage heaps ($\chi^2=4.322$, $P=0.038$).

Conclusion:

Prevalence of malaria was high and it was influenced by house hold source of light, knowledge and signs and symptoms of malaria and garbage heaps around the homes.

Recommendations:

This study recommended that caretakers should not stop at having knowledge about malaria prevention transmission, but should have a positive attitude on the implement of the preventive measures. Health unit workers, community health workers and VHTs together with stakeholders should put in more effort to ensure that information about malaria is communicated to the caretakers in languages best understood and should mainly target the vulnerable households in the community. The town council authorities and local leaders need to work with community to ensure proper garbage disposal. The Town council health team has to liaise with the district health team to strengthen the health system on prevention and control of malaria through sustainable messages like posters on malaria, TV messages and programs on malaria. Lobby for electricity in all the households of the town council.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Malaria is one of the world's most deadly diseases caused by an infection with single celled parasitic female anopheles mosquito.

This remains a burden especially in the sub Saharan Africa despite all the efforts put in by the various countries to control and eradicate the disease in these areas. Its problem has further contributed to low economic progress especially among countries that have been affected by the disease.

1.2 Background of the Study

World health organization defines malaria as a life threatening parasitic disease caused by a bite of an infected female anopheles mosquito. (WHO) (malaria fact sheet updated December, 2016). Malaria can kill within 24 hours of onset of symptoms and whereas it affects all people the most affected are children under five years of age.

Malaria has been and continues to be if not checked and controlled the number one parasitic killer disease globally that affects children mainly less than five years due to their low immunity. Malaria is an entirely preventable and treatable mosquito borne illness. (WHO - world malaria day, 2016).

Globally, over 95 countries and territories have on going malaria transmission with estimation of 3.2 billion people at a risk of getting infected. The world health organization (WHO) indicates that 214 million people are infected with malaria world wide and 438.000 cases result in deaths. Children under five are particularly susceptible to malaria illness which kills an estimate of 303.000 before their age of five years globally including 292.000 in the African region. (WHO world malaria report 2016).

According to WHO the malaria prevalence depends on the possible environmental factors related to parasite, vector, the human host and the environment. The transmission is also observed more in places where the life span of the mosquito is longer favoring the parasite to develop completely in a mosquito increasing the transmission and therefore high prevalence of malaria. The climate conditions such as rainfall patterns, temperature and humidity also affect the number and survival of mosquitoes and in many places transmission is seasonal and high always in rainy seasons and immediately after the rainy season. More transmissions and

epidemics can occur in people who have little or no immunity to malaria. (WHO world malaria report 2017).

Sub Saharan- Africa continues to carry a high portion on global malaria burden with 90% of malaria cases and 92% of malaria deaths, children being particularly vulnerable accounting for 70% of all the malaria deaths. Malaria remains a major cause of morbidity in children in sub Saharan Africa under the age of 5 years and one child die after every 2 minutes (WHO world malaria report 2015).

As one of the most serious and complex public health problem, malaria is identified as the disease most likely to be affected by climate change and this allows the spread to newer areas together with the prevailing socio-economic conditions. The mean temperature is highly associated with malaria prevalence in Uganda. (Niringiye and O.G Douglaston 2010).

In Uganda malaria is still a major public health problem associated with slow economic development and poverty and is the most frequently reported disease at both public and private health facilities in Uganda. It accounts 30 - 50% of the outpatient visits at health facilities and 15 -20% of in patients or hospital admissions. Malaria accounts for 27.7% of deaths amongst children under the age of five. (MOH, NMCP 2014 - 2020).

Uganda ranked third in the total number of malaria cases in sub Saharan Africa (WHO Malaria report 2015). Malaria is the leading cause of morbidity in Uganda with 90 -95%of the population at risk and contributing approximately 13% of the under-five mortality (Daniel Roberts and Glenda Mathews 2016).

Children under five years are most vulnerable to malaria infection as their immunity is not yet developed to fight any disease. (CDC- Global health division for parasitic diseases and malaria, 2012). Statistics from the ministry of health show that malaria is still the leading cause of death in Uganda accounting for 27% of deaths and that Uganda has the world's highest malaria incidence with a rate of 478 cases per 1.000 populations per year.

Acceding

In Mbale district where the study area is located, malaria is the most common cause of death in children and the district suffers the highest malaria burden in the country. This creates a reason to find out the prevalence of malaria and the associated factors in children below the age of five years.(malaria consortium, Mbale malaria control project).

1.3 Statement of the problem

The government's long term objective is to ensure total eradication of malaria in all the endemic areas of the country and as such a lot of effort through funding has been sourced both internally and externally towards the above cause. A lot of sensitization and prevention measures of malaria such as education of individuals and families to sleep under insecticide treated nets, vector control through spraying (IRS), eliminating breeding places, and reducing infections through prophylaxis and treatment with ACTs. The government has also through the years 2009 -2015 conducted several programs including integrated community case management (ICCM), integrated management of childhood illness (IMCI) and training of VHTs to offer curative malaria treatment at community level. (Danielle Roberts, Glenda Mathews).

Despite all these efforts malaria cases continues to remain high and one of the leading causes of ill-health and deaths in Uganda. According to the records available in Mbale district health office, the trend for the last three years indicated that malaria prevalence was at 17,216, in 2014, 17322 in 2015, and 12790 in 2016 both outpatient and inpatient of which 242 deaths were registered.

In Nakaloke alone 7437 cases were registered in the same period of 3 years. The overall trend indicates that malaria is still a threat in the district and Nakaloke being one among the affected areas still has a high number of malaria cases being reported in the outpatient department. This therefore verifies that there could be several reasons or factors contributing to the high prevalence of malaria in Nakaloke health center despite all the efforts that the government has put in place to reduce on the infections.

As a result of this trend therefore, malaria infection has led to a high number of referrals due to complicated malaria which has resulted into complications like cerebral malaria, hypoglycemia, jaundice, severe anemia leading to increased number of in-patient admissions and deaths. The infection has also led to malnutrition, growth retardation, reduced school attendances and dropouts among the children. Malaria infection has also led to low economic growth as a lot is spent on treatment of the disease and this has left the people poor and economically devastated. It also contributes to low productivity as parents spend most of the time attending to the sick children.

1.4 Objectives

1.4.1 General objective

To determine the prevalence of malaria and the associated factors among children under the age of five who attend OPD of Nakaloke health center 111, Nakaloke Town council in Mbale District during the period of August and September, 2017.

1.4.2. Specific objectives

1. To determine the prevalence of malaria among children below five years who attend OPD of Nakaloke health center III in Nakaloke town council in Mbale district in the months of August and September, 2017.
2. To identify the care giver factors associated with prevalence of malaria among children below five years who attend OPD of Nakaloke health center III in Nakaloke Town council in Mbale district in the months of August and September, 2017.
3. To assess the environmental factors contributing to the prevalence of malaria amongst children below five years who attend OPD of Nakaloke health center III in Nakaloke town council in Mbale District in the months of August and September, 2017.
4. To find out the house hold factors associated with prevalence of malaria amongst children below age five who attend OPD of Nakaloke health center III in Nakaloke town council in Mbale District in the months of August and September, 2017.

1.5 Research question

1. What is the prevalence of malaria among children below five years who attend the OPD of Nakaloke health center III in Nakaloke town council Mbale district?
2. How does the care giver factor affect the prevalence of malaria prevalence in children less than five years who attend out patients department of Nakaloke health center III Nakaloke Town council in Mbale District?
3. What are the environmental factors associated with malaria prevalence in children less than five years who attend in outpatient department of Nakaloke health center III in Nakaloke Town council Mbale District.
4. What house hold factors are associated with malaria prevalence in children below five years who attend out patients department of Nakaloke health center III in Nakaloke Town council in Mbale District?

1.6 Significance of the study/justification

Despite the availability of malaria control measures the morbidity and mortality in children under five years is still unacceptably high. This study therefore was to help to identify the factors associated with malaria prevalence. The study will help the concerned authorities to plan and sensitize the community about the above factors and put in place strategies to help reduce on the number of malaria cases in the community. This will reduce on overcrowding in the health units and referrals due to complicated malaria; this will cause a reduction of inpatient admissions and mortality rates in children below five years. It will be an essential component in the effectiveness of malaria control and elimination in the already existing strategies that are being scaled up hence re-align the effectiveness in the malaria control measures. This study is also as a requirement for the fulfillment of my bachelor's degree which will also help in the future literature review by other researchers.

1.7 Scope of the study

The study was carried out in Nakaloke health center III situated in Nakaloke town council Mbale district in the months of August and September 2017. The study aimed at determining the prevalence of malaria and the associated factors which included care taker factors household factors and environmental factors among children below five years who attended in the OPD of Nakaloke health center III together with their care givers. Health workers were also included in the study for statistical information about malaria prevalence in Nakaloke health center III

1.8. Conceptual frame work

CARE GIVER FACTORS

- Age of the care taker.
- Health seeking behaviors.
- Knowledge about the disease.
- Care givers education level.
- Marital status.
- Educational level.
- Occupation.
- Attitude and practices.

HOUSE HOLD FACTORS:

- Numbers of households members
- Level of income.
- Sleeping patterns
- Use of ITNs.

ENVIRONMENTAL FACTORS.

- Drainage system.
- Bushy surroundings.
- Garbage heaps.
- Climate and altitude.
- Place of residence.
- Type of house.

**MALARIA
PREVALENCE**

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graph TD; A["CARE GIVER FACTORS"] --> C("MALARIA PREVALENCE"); B["HOUSE HOLD FACTORS"] --> C; D["ENVIRONMENTAL FACTORS"] --> C;
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Figure 1: Conceptual frame work

The above conceptual frame work shows the relationship between the different variables; the dependent and independent variables. In this case the prevalence of malaria was the dependent variable and the independent variables were, care giver factors, house hold factors, and environmental factors.

The care giver factors included; care givers age, educational level and knowledge about disease, occupation, attitude on disease prevention. The environmental factors were bushy surrounding, drainage system and garbage heaps and climate. The house hold factors were place of residence, income level, sleeping pattern, type of house, and number of household members, use of ITNs.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides the related literature regarding the variables of the study as follows.

Overview of malaria, prevalence of malaria in children below age five, burden of malaria in children under five years of age, global vision and global target for malaria control, the factors associated with malaria prevalence which include; environmental factors, care giver factors, household factors on malaria prevalence in children below five.

2.1 Burden of malaria in children less than five years of age.

The burden of Malaria is heaviest in the WHO African region where an estimated 90% of all cases of malaria deaths, 78% of these deaths are children below 5 years old. According to WHO, malaria exerts a heavy burden on the poorest and most marginalized communities who are most affected and have the highest risks associated with malaria. They are the ones who have limited access to effective treatment and services for malaria prevention. Malaria control and its elimination is closely linked to health system strengthening, infrastructure development and poverty eradication.

Overview of malaria indicates that children below 5 years old are one of the most affected groups with malaria infections. In high transmission areas, partial immunity to the disease is acquired during childhood. In some settings majority of malaria disease is severe with rapid progression to death in children without acquired immunity. Severe anemia, hypoglycemia and cerebral malaria are features of severe malaria more commonly seen in children than in adults. (WHO update 2016).

Malaria as an ancient scourge of humanity has only been eradicated from industrialized nations but still continues to extract a heavy toll of life and health in substantial parts of the world. Almost half of the world's live in countries where the disease is endemic and almost every country of the world encounters imported malaria. Children are the worst affected especially those aged below 5 years old (Parang .N. Mehta updated, 2015).

According to UNICEF data there were 214 million malaria cases that led to 438000 deaths and of these about 80% were children under 5 years of age. This translates into a daily toll of more than 800 children under age 5 and most of these deaths occurred in sub Saharan Africa.

Today almost half of the world population (3.2 billion) is at risk of getting malaria infection and it has costed Africa \$300 million each year for case management alone costing up to 1.3% GDP in Africa.

The WHO African countries had disproportionately a high share of the global malaria burden. In 2015 the region was home to 90% of malaria cases and 92% of malaria deaths according to (WHO malaria sheet 2017).

In Uganda according to ministry of health and National guidelines on malaria prevention and control program malaria is a major public health problem associated with low –social economic development and poverty. It is the most common reported disease at both public and private facilities in Uganda. It accounts 30-50% of the outpatient visits at health facilities. It is the major cause of morbidity and mortality. (MOH).

According to the national malaria control program malaria is a major public health problem associated with low social economic development and poverty and it is the most reported disease both in public and private health facilities in Uganda. It is the leading cause of morbidity and mortality accounting for 30 -50% of outpatient visits at health facilities, 15-20% of inpatient admissions and up to 20% of all hospital deaths. 27.2% of deaths among children less than five years are due to malaria. It also noticed that a significant percentage of deaths occur at home and are not captured by the facility based health management information system. Uganda has the sixth highest number of deaths from malaria in Africa as well as highest malaria transmission rates in the world with approximately 16 million cases reported in 2013 and over 10,500 deaths annually

2.2 Global vision and target for malaria control

The vision of the roll back malaria partnership is a world free from malaria burden (RBM Geneva WHO 2008) together with the United Nations through the MDGs and world health assembly they had consistent goals for intervention coverage and impact for 2010 and 2015(MDG indicators and the united nations statics division 2009).

According to WHO recommendations on strategies, policies and goals for malaria control, in April 2008 the united nations put forward a vision of ending malaria deaths by ensuring universal coverage of malaria prevention and control by the end of 2010(RBM partnership).

The aim of intervention was to make available preventive strategies like IRS, ITNS, and LLINs to all people at risk of malaria especially pregnant mothers and children below 5 years of age in Africa and for all public health facilities to be able to provide effective malaria diagnosis and treatment.

In September 2008 the roll back malaria partnership availed three additional strategies as part of the global malaria action plan (WHO, roll back malaria 2008). The first strategy was to reduce the total number of malaria deaths worldwide to near zero through preventive measures by 2015. The second was to eliminate malaria in 8- 10 countries by 2015 and afterwards in all countries that were in the pre elimination phase in 2008. Another goal was to eradicate malaria worldwide by reducing the global incidence to zero through progressive elimination in all countries.

WHO also recommends malaria control through prevention and case management as this reduces the transmission of the parasite. Through vector control to protect people against infective malaria mosquito bites by reducing on vector longevity, density and human vector contact to reduce on intensity of local malaria transmission at community level and hence decrease the incidence and prevalence. (WHO, 2016).

According to WHO malaria control can also be through diagnosis and prompt treatment of malaria in order to reduce morbidity and mortality by ensuring rapid and complete cure of the infection thus preventing the progression of uncomplicated malaria to severe and potentially fatal disease. This will shorten the transmission of malaria by reducing the human parasite reservoir of infection and infectivity (WHO, 2009). The prompt diagnosis by microscopy and mRDT are the recommended methods by WHO in all patients with suspected malaria and treated by ACTs for uncomplicated malaria. (WHO, 2010- malaria treatment guidelines).

In 2012 WHO recommended the seasonal chemoprevention as an additional malaria prevention strategy for areas of sub Saharan regions of Africa which involved administration of amodiaquine plus sulphadoxine pyrimethamine monthly to all children under 5 years during the high transmission seasons.

In 2013 the annual funding for malaria control totaled US\$ 2.7 billion where international investments represented 82% of total malaria funding with domestic investments for malaria control reaching 18 % (US\$ 527 million) and an estimated US\$ 5.1 billion is required to achieve global target for malaria control and elimination. If the funding gap is to be narrowed, the governments of malaria endemic countries and international funders need to give greater priority to investments in malaria control.

Malaria has costed sub Saharan Africa US\$ 300 million each year for case management alone and it's estimated up to 1.3 percent GDP (gross domestic product) in Africa.

In 2015 the global total of international and domestic funding for malaria control and elimination was US\$ 2.5 billion and this was less than half of what is needed in order to

achieve the goals of malaria free world. The annual spending needs to triple the current level to 8.7 billion by 2030. (UNICEF- 2015).

In 2013 an estimated 49% of the population at risk of malaria in sub Saharan Africa had access to ITNs in their households compared to 3% in 2004 and 44% of the population who are at risk were sleeping under an ITN in 2013 compared to 2% in 2004. The population of those household members owning at least one ITN rose from 5% in 2004 to 67% in 2014. However in 2013 alone 29% household had access to an ITN. Malaria control program (MCP) implements the (NMCS) National Malaria Control Strategy to reduce mortality due to malaria by 80% of the year 2010 and reducing morbidity by 75% in 2015.(world malaria report -2014).

2.3 Literature review on prevalence of malaria in the under five years of age:

Malaria is the main cause of morbidity and mortality among children under age five years in Malawi. Study was done to compare the prevalence and associated factors with malaria parasitaemia among children under the age of five years between 2012 and 2014 malaria indicator surveys. A multistage cluster sampling method was employed were total of 4040 children under age of five years were involved in the study. The 2112 (52%) were from the 2012 MIS and 1928 (48%) were from the 2014 MIS and these showed that the prevalence among the children under age of five years increased from 28% in 2012 to 33% in 2014($P>0.05$) and these showed a high prevalence of malaria among children below the age of five years (Maggie zgambo et al).

A study done in Nigeria in Kano state which is located north central part of the country that involved 551 participants using a cross sectional community based study and carried out between the months of May and June 2013 among the inhabitants showed that prevalence of malaria was at 37.5% in children below 5years of age. The participants were subjected to blood tests using both microscopy and RDT and all this infection were of *p. falciparum*. (Kazeem Adefemi et al).

According to the secondary data analysis of 2014 which was done in Uganda conducted in December 2014 and January 2015 using a stratified two stage cluster design overall 938(19.04%, 95%CI 16.63-21.71) children under five out of 4930 in 2014 had malaria parasitaemia by microscopy and 95.65% of all these cases were due to *p. falciparum*. Foresight of fever in 2 weeks prior to the survey was reported in 285 out of the 938(30.33%) children diagnosed with malaria parasitaemia. (Humphrey Wanzira et al, 2017).

In the study that was done in Ghana using the secondary data drawn from the 2008 Ghana demographic survey and health survey (GDHS) children's data file, the highest prevalence of malaria of 26% was found among children aged 12-23 months while 24% was found among children aged 24-35 months. Malaria was less common among children aged less than 12 months (12%) and those aged 48-59 months (16%). About 21% of the males were found to have had malaria compared to 19% for their female counterparts. The total proportion of malaria in the under five children in Ghana showed one in five children (20%) for the five-year period that preceded the survey. (S H Nyarko et al 2014).

A cross sectional survey that was conducted amongst children attending the outpatient clinic at the Nyasa health center located in Nsenga district, Tabora region in Tanzania between August and October 2010 to confirm malaria cases among children under five with fever and history of fever. A total of 300 children under five years with fever or history of fever participated in the study and of the 300 children under five, 54.3% (163/300, 95% CI, 48.7-59.9) were boys and 45.7% (137/300, 95% CI, 40.1-51.3) were girls. In all the children, parents or guardians reported fever or history of fever as part of illness in all children although during physical examination only 25.3% (76/300, 95% CI, 22.8-27.8) had an axillary temperature ≥ 37.5 degrees centigrade. The parasitological diagnosis of malaria revealed that out of the 300 children under five only 12% (36/300, 95% CI, 8.3-15.7) had positive slide readings and of these 52.7% (19/36, 95% CI, 47.5-58.3) had fever and 42.7% (17/36, 95% CI, 35.7-58.7) had no fever on physical examination. The distribution of positive malaria slide readings between girls and boys was not statistically significant ($\chi^2=2.7248$, $P=0.099$). All the children who were positive, were positive for *P. falciparum* with 52.8% (19/36, 95% CI, 40.9-64.1) had 1-500 parasites per micro liter of blood and 22.2% (8/36, 95% CI, 12.7-35.7) had between 501-1000 parasites per micro liter and 25% (9/36, 95% CI, 15.9-39.1) had ≥ 1001 parasites per micro liter.

There was no statistical significance on the distribution of positivity and parasite density by age ($\chi^2=0.5684$, $P=0.753$) and sex ($\chi^2=1.4079$, $P=0.495$) on univariate (OR=2.13, 95% CI, 1.02-4.43, $p=0.044$) and multivariate (OR=2.15, 95% CI, 1.03-4.49, $P=0.042$) analysis, only children above one year of age were associated with malaria infection. (Humphrey D Mazigo et al 2011).

The study carried out in Uganda using data that was collected from the 2014 malaria indicator survey (MIS) among children under the age of five years using a sample of 4939 children. These children were tested using microscopy and mRDT and 974 tested positive for malaria resulting in an observed prevalence of 19.7%. This was associated with social economic factors like housing and availability of electricity in household and other care giver factors. (Danielle Roberts and G. Mathews).

A study conducted in Rwanda a total of 749 children below 5 years of age were examined including 545 randomly selected from 24 villages, 103 attending the health center in charge and 101 at the referral district hospital, clinical, hematological, and social-economic data were collected. The study was a combined community and facility based survey.

Plasmodium falciparum infection 2.08 was identified by microscopy and PCR in 11.7% and 16.7% respectively, 5.5% of the children had malaria. PCR-based *P. falciparum* prevalence ranged between 0 and 38.5% in the villages, and was 21.4% in the health center, and 14.9% in the hospital. Independent predictors of the infection included increasing age low mid upper arm circumference, absence of several house hold assets, recent intake of artemether-lumefantrine and chloroquine in plasma, measured by ELISA. Self-reported bed net use showed 58% reduced infection only in univariate analysis. In the communities, most infection were seemingly asymptomatic but anemia was observed in 82% and 28% of children with and without parasitaemia, respectively, the effect increasing with parasite density, and significant also for submicroscopic infections. *Falciparum* infection in the highlands surrounding Butare Rwanda is seen in one out of six children less than five years of age. The abundance of seemingly asymptomatic infections in the community forms a reservoir for transmission in this epidemic prone area. Low social economic status and insufficient effectiveness of self-reported bed net use is a risk factor to areas of no provable intervention (Jean-Boscow Gahutu et al 2011).

2.4 Literature review on the factors associated with malaria prevalence

2.4.1 Care giver factors:

A cross sectional study was conducted in the district of Bata of the main land of Equatorial Guinea involving 440 houses selected from 18 rural villages and 26 urban neighborhoods were a total of 428 care givers were interviewed and the significant difference between rural and urban households was observed. On care giver malaria knowledge and beliefs, it showed that about 42% of the urban and 65% of rural care givers were un aware as to how malaria is transmitted (OR=2.69; 95%CL: 1.78-4.05) The presence of a malaria case was 1.2 times more

frequent in rural than in urban Bata were 78.91% of the household had experienced at least one case of malaria compared to 62.15 household in urban areas. The factors most significant and associated with the malaria knowledge were the level of education of care giver and the social economic status of the house hold. (Maria Romay – Barja, et. al. 2016).

Regarding malaria knowledge, 79.19% of rural versus 87.45% of urban care givers believed that malaria is more dangerous in children ($p=0.022$). Care givers in rural households had one third the odds of recognizing fever as a malarial symptom than those from urban households. Convulsions were the second most common symptom (20.85%) mentioned in rural areas with nausea being the second mentioned symptoms with (22.75%) in urban households. Of 64.74% of rural care givers were unaware of malaria transmission patterns versus 41.96% of urban care givers. Only 35.26% of rural households and 58.04 of urban knew that a mosquito bite is the means of malaria transmission. (Maria Romay-Barja et al).

In a community based cross sectional survey that was conducted in Nigeria in different households among mothers with children below five years selected by systematic random sampling showed that most respondents associated malaria with infected female anopheles' mosquito bites at 99.7% and reported to have sought treatment within 24 hours of noticing the first symptoms of malaria. 37% preferred to use herbs while 17% would take their children to the clinic or dispensary for treatment. 28% of care givers were aware of preventive measures such as ITNs. There was low ownership and use of ITNs among the respondents were only 19% was observed, 29% new about spraying, 29% wearing long sleeved and 13% draining stagnant water. (Oluwasogo A O, et al. 2016).

In another study where qualitative descriptive survey was utilized involved determining the care givers awareness about management and treatment of malaria in Okomesi-Ekiti state, Nigeria in children below 5 years of age. This study involved stratified sampling technique where 50 questionnaires were distributed among 50 care givers that were randomly selected from the community. Majority of respondents (72.9%) were between the ages of 21 – 50 and only 10 (23.26%) and 2 (4.65%) were between ages of 15 -20 and 51-60 respectively. This showed that only 55% of the care givers were aware that female anopheles mosquitos were responsible for malaria while 2.5% believed that rats can cause malaria, 7.5% believed that dogs can cause malaria, 5% believed that cockroach is a vector and can transmit malaria to humans and 30% did not know the vector for malaria transmission. The care givers were able to ascertain some sign and symptoms of malaria like chills vomiting, body pains, loss of

energy headache, loss of appetite and high body temperature. The e study therefore showed that 92% care givers had knowledge about the methods used in preventing the spread and control of malaria among children below five years of age and only 8% were not aware of the prevention and control. (Oluwasogo A O et al, 2016).

Some 1,939 care givers of young children were recruited through a school based survey in two states. A 20 item multidimensional survey instrument was developed and used to rank care givers knowledge in five dimensions which included the cause, transmission, vulnerability, symptoms and treatment. The predictors for ITN use was ITN ownership, however ownership only explains 43% Of variance in net use. The total knowledge index for the study population was significantly associated with ITN ownership. Care givers knowledge of malaria and its causes was found to be poor were only 50% of the respondents knew that malaria is transmitted by female anopheles' mosquito and 65% still believe that too much exposure to the sun is a risk factor for malaria. Knowledge about the population vulnerable to malaria was 83% and knowledge of malaria transmission was 32% were the domain with highest and lowest average correct answers. (L. Ovadje and Jerome nriagu-2016).

In a study done in Ghana that used secondary data drawn from the 2008 Ghana Demographic and health survey children's data file showed that highest proportion of malaria among under five years old was reported in children whose mothers had primary school education (22.7%) while mothers with higher education reported the lowest malaria cases among children (17.4%).The highest proportion of children with malaria was also seen among children of divorced mothers (29.7%) while the lowest proportion was reported among children of mothers who were never married (17,3%) (Samuel. Harrison. Nyarko and Anastasia Cobbla 2014).

According to the study that involved secondary data analysis of the 2014 malaria indicator survey that employed a stratified multistage cluster design that involved 4,930 children under five years and 4,156 respondents who were mothers of the children showed that the higher the mothers education attained directly correlated with a significant reduction in malaria parasitaemia from a 25% reduction among those with primary education to 89% reduction among those with tertiary education using those with no education as the reference category.(Humphrey Wanzira et al, 2017)

In a study conducted in Uganda using data collected from the malaria indicator survey of 2014, a sample of 4939 were subjected to the study and it showed that some care giver factors including care giver level of education were associated to malaria prevalence. (Danielle Roberts and G. Mathews 2016).

2.4.2 Household factors

In a study carried out in Ghana on social demographic determination, the highest proportion of children below five years who contracted malaria was reported among mothers who came from poor households (16.9%) and the lowest was reported among rich households (6.9%). The child's age was also one of the factors that had significant relationship with malaria among under five children, the odd of malaria were quite higher among children aged 12-23 months (OR=2.514, $P<0.001$), 24-35 months OR=2.958, $P<0.001$, 36-47 months (OR=3.627, $P<0.01$), 48-59 months (OR=3.480, $P<0.05$) compared to their counterparts who were aged less than 12 months.

In terms of mosquito net ownership, children from households which owned mosquito net were 0.694 ($P<0.05$) times less likely to contract malaria compared to their counterparts from household which owned no mosquito net. (S.H Nyarko and Anastasia Cobbla 2014).

According to a descriptive cross sectional study conducted in Bata district in Equatorial Guinea, on both rural and urban households when asked about the preventive measures 54.12% of urban caregivers and 33.53% of rural reported bed nets as the best preventive measure (OR=0.43, 95% CI: 0.28-0.64), some misconceptions like boiling drinking water could prevent malaria are still present in both rural and urban. Regarding the best way to avoid mosquito bites, most of them mentioned bed nets (71.76%) with no significant difference. The spraying of insecticide was significantly less mentioned by rural care givers (OR=0.44, 95% CI: 0.24-0.81). Most caregivers would not allow the government health workers to spray their houses (89.02%) urban and (91.91%) rural. (Maria Romay –Barja et al, 2016).

A study that was done in Uganda using a secondary data of the 2014 MIS dataset on factors associated with malaria parasitaemia in children aged below 5 years had a sample taken by finger or heel prick for determination of malaria parastaemia. This study showed that the chances of having parsitaemia among children from household that had received IRS was significantly reduced by 77% as compared to those who had not received IRS. The opposite was observed from LLIN use with the chances among children who had used an LLIN

significantly increasing by 1.33 times as compared to those who did not use one. Children from wealthier households had reduced chances of having parasitaemia with a significant reduction trend with increasing wealth from 30% in the poorer households to 80% in the richest households, using the poorest household as a reference. The entire study showed that there were no statistically significant differences in chances of having parasitaemia for gender, residence-urban, rural and region. (Humphrey Wanzira et al, 2017).

In a study carried out in Botswana in Tubu village showed that 94.4% (67) of the respondents indicated that they owned mosquito nets. More than half of the respondents who possessed mosquito nets had not experienced any malaria attack indicating an association between previous malaria episode and possession of mosquito net. Number of nets per household were reported to range from zero 2.8 % (2) to more than six 5.6 % (4), with 39.4 % (28) possessing one or two nets, 18.3 % (13) possessing five or six nets. There was no association between history of malaria attack and the number of mosquito nets owned by a household. Insecticide treated nets were possessed by 78.9 % (56) of the respondents whilst 50.7 36 also possessed untreated nets. It was unusual to find some households with a mixture of both treated and untreated mosquito nets at the same time. The 2.8 % (2) of the respondents were not sure of the status of whether nets were treated or not indicating poor knowledge on mosquito net use. The 91.5%(65) of respondents indicated that they always used mosquito nets, only 11.4%(1) mentioned that they used mosquito nets more often whilst 5.6% 4 sometimes used them and 1.4%(1) never used mosquito nets. Usage of mosquito nets, among those who always used them, was reported to be relatively high 46.2% 30 during summer and very low 3.1%(2) in winter. Most of the respondents were aware of governments efforts to control malaria through indoor residual spraying (IRS) 97.2 % (69) and distribution of ITNs 97.2 % (69). Only 2.8 % (2) Of the respondents were not aware of what the government did to control malaria in Tuba village. (Elijah chirebvu et al, 2014)

2.4.3 Environmental factors

In a descriptive cross sectional study conducted in Bata district Equatorial Guinea were sampling was carried out with a multi stage stratified cluster method showed that regarding to mosquito habits, 24.77% of the caregivers answered that garbage heaps served as breeding site for mosquitoes, 18.446% of both urban and rural said that puddles could serve as breeding sites and only 12.94% of urban caregivers and 4.62% of rural knew that stagnant water was a breeding place for mosquitoes.79.67% of caretakers knew that night time was the

risk time for mosquitoes to bite while the rural households had less knowledge about this than urban ones (OR=0.45 95% CI:0.24-0.86). (Maria Romay –Barja et al, 2016).

According to a study which was conducted to investigate potential risk factors associated with malaria transmission in Tubu village, Okavango sub district a malaria endemic area in northern Botswana, a study involved descriptive census questionnaire and participatory rural appraisal survey conducted in June 2012. The study involved a total of 483 individuals who were residing in all the 71 study homesteads. In the whole village two house roof types were observed and these either of grass or iron sheets. It was observed that houses in the village were either grass thatched, built of reeds, poles and mud or homemade bricks (traditional hut or built with bricks and roofed with iron sheets (modern houses). Among those structures used as bed rooms by the respondents, 52.1 % (37) were traditional and 47.9 % (34) were modern houses. In traditional houses large eave openings were observed in 89.2 % (33) and the rest 10.8 % (4) had small eave openings. In modern houses 2.9 % (1) had large eave openings and the rest 97.1 % (33) had no eave openings.

There was an association between history of malaria episode and use of traditional huts as bedrooms. Majority of individuals who experienced a malaria attack used traditional huts as bedrooms.

Low vegetation cover surrounding homesteads was observed at 81.7 % (58) of the homesteads and moderate vegetation cover was observed at 14.1 % (10) of the homestead only 4, 2 % (30) were surrounded by dense vegetation cover. (Elijah chirebvu et al, 2014).

A study that was conducted in rural Bolifamba, Cameroon to investigate some environmental factors on malaria parasite prevalence showed that malaria parasite was prevalent throughout the year but was significantly higher in the rainy season at 51.1% (284/567) than in the dry season 44.2% (392/887) ($\chi^2=4.8$, $P=0.028$) parasite density ranged from 38 -50252 parasite per microliter of blood. The geometric mean parasite density was 470 ± 9318 and 414 ± 432 parasites per microliter of blood for the rainy season and dry season respectively, and this difference was also significant ($t=0.86$, $DF=1$, $P=0.001$). Of the 11 houses examined 31, (26.5%) were built with cement and bricks and 86(73.5%) with wooden plank. The malaria parasite prevalence for children living in wooden plank and cement brick houses was 62.7% and 45.4% respectively and the difference was significant ($\chi^2=13.56$, $P=0.00$). households that were surrounded by bushes/garbage and swamps/stagnant pools of water when compared with those inhabiting cleaner environment, there was a high positive correlation between swamps and stagnant pools and malaria parasite prevalence ($r=0.82$, $P=0.001$) while bushes

and garbage were highly positively correlated($r=0.56, P=0.001$). Therefore, according to this study, the impact of environment surrounding on malaria prevalence was potentially important.

The highest malaria prevalence was recorded in children living in houses surrounded by bushes and swamps. There was a high Anopheles species population caught this environmental reduction of malaria transmission in this area was to be achieved by control intervention involving environmental management alongside the use of bed nets. Implementation of an environmental control program was to be achieved by improving drainage flooded areas and swamps, campaigns to clear bushes and disposal of garbage. House improvement by sealing off of crevices and breaks on the walls and roof (Armand Seraphin Nkwescheu et al 2015).

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter described the methodology that was used in establishing the prevalence of malaria and the associated factors amongst children below five years who attend Nakaloke health center III in Nakaloke town council Mbale district. It described the study area, study population, the study design, study population, sample size determination, eligibility criteria, sampling method, data collection method, data management, data analysis plan, quality assurance, and ethical issues.

3.1 Study design

The study was quantitative using the cross-sectional survey design because the design was to allow data to be collected on prevalence of malaria and associated factors simultaneously at a particular point in time.

3.2 Study setting

The study setting was Nakaloke health center III a government owned health unit located in Nakaloke town council in Mbale district. The health center serves a catchment area of five sub-counties namely Nakaloke sub county, Namabasa s/c, Kanchumbala s/c, namanyonyi s/c, Namagumba s/c and Nakaloke town council having seven wards. It serves a total catchment population of 29,297 and 4,746 children under age of five years. The health center has a total of nineteen (19) staff who include; 2 clinical officers, 2 nursing officers, 3 enrolled nurses, 4 enrolled midwives, 2 laboratory technicians, 1 laboratory assistant, 1 health assistant, 1 nursing assistant, 1 information officer, 1 askari, and 1 cleaner. About 80 patients are seen on a daily basis in outpatient's department antenatal not inclusive. The health unit offers the following services; outpatient services, antenatal and maternity services, immunization and child health services, school and community outreaches, HIV/AIDS and ART clinics, tuberculosis testing and treatment services, Family planning, safe male circumcision, health education and STI screening and testing.

3.3 Populations

The target population was all the caretakers plus children under five years in Nakaloke town council Mbale district.

Accessible population included children under the age of five years and their caretakers who attended in Nakaloke health center III

Study population included caregivers and children under the age of five years who met inclusion criteria.

3.4 Sample size determination

The sample size was determined by calculations using the Kish and Leslie formula

$$N = \frac{Z^2 P (1-p)}{D^2}$$

Where;

N = Total number of subjects required in the sample.

Z = a standardized normal deviate value that correspond to the level of statistical significance equal to 1.96.

P = estimate of prevalence of malaria in children under age 5 years in Uganda which is 19.7% according to Danielle Roberts and Mathew Glenda 2016-study on malaria prevalence in under 5 years.

D = margin of error which corresponds to the level of precisions of results desired= 0.05

$$N = \frac{(1.96)^2 0.197(1-0.197)}{(0.05)^2}$$

N = 243.

3.5 Eligibility criteria.

- Children under the age of five who sought treatment at the health unit.
- Children with suspected signs and symptoms of malaria.
- Children who came with a fever of 38 degrees and above.
- Children with no history of anti-malaria drugs in the past 2 weeks.
- Children whose guardians consented to participate in the in the study.

3.6 Sampling method

This study employed the consecutively sampling method to enroll all the care givers of children below the age of five years to participate in the study. All the children below five years who came in OPD were first seen by the clinician and those who had the signs and symptoms were sent to the laboratory for testing using mRDT and microscopy. The care givers of these children sent to the laboratory were requested to participate in the study and those willing were enrolled until when the sample size was reached. The children Who tested positive were used to determine the sample size.

3.7 Study variables

The variables were the dependent and independent variables.

3.7.1 Dependent variable

The prevalence of malaria among children under five years old in Nakaloke health was the dependent variable.

3.7.2 Independent variables

- Caregiver factors which included, age of care giver, health seeking behaviors, knowledge about the disease, education level, marital status, occupation, attitude and practice.
- Environmental factors included; drainage system, bushy surroundings, garbage heaps, climate and altitude.
- House hold factors included, number of house hold members, type of house, social economic status, sleeping patterns, place of residence, use of ITNs.

3.8 Data collection methods

3.8.1 Source of data

Caretakers of children under 5 years were the primary source of data in this study.

3.8.2 Study tool/ instrument

A structured questionnaire was used to collect raw information on social demographic factors, care giver factors e.g. Knowledge about, the transmission and prevention of malaria, utilization and coverage of insecticide treated nets, environmental factors, and household factors. This was administered to the eligible participants were parents or guardians of children under the age of five years and were interviewed. The questionnaire comprised comprise of both closed and open ended questions in English language.

3.8.3 Research assistants/ training

Study involved four research assistants who were trained on the research objectives, data collection plus eligibility, and they have to be fluent the local language because interpretation may be of importance to some individuals who cannot read. These comprised of enrolled nurses and midwives who helped the researcher to implement the program, collect and process field data for the fulfillment of the survey objectives, to ensure accuracy of data and avoid bias and distorted information and manage resources as well as time deadlines of the survey or study.

3.8.4 Pilot study/ pretesting of questionnaire

The tool of this study was piloted in a nearby health facility where it was administered to about 12-15 respondents. The pilot study was done to ensure that the questions were not ambiguous so as to generate the desired information with minimum bias.

3.8.5 Procedure for data collection

The researcher was introduced to the in-charge of the health center who then introduced her to the staff and the patients. The study was then explained to them to identify those who were eligible for the study. The children who were eligible for the study were seen by the clinical officer(s) who requested for microscopy or mRDT tests in the laboratory to screen those with positive and negative results respectively. The care givers of the children who were subjected to the test were interviewed by the research assistants using the questionnaire that were provided as they waited for the children to be tested. The questions were interpreted by the research assistants in local languages both Lugishu and Luganda respectively. The children who tested positive were used to determine the prevalence of malaria in children under the age of five years attending Nakaloke health center III. The prevalence was the number of children who tested positive over the total number of children who engaged in the study.

3.9 Data management

The research assistants were supervised by the researcher during the data collection procedure. Data collected was kept under key and lock. Once data collection was done, the questionnaires were assigned codes before entry into Epidata 3.1 software. After the entry data was exported to SPSS 20 software for cleaning and analysis.

3.10 data analysis plan

This included; descriptive analysis, and bivariate analysis.

Descriptive analysis:

Data concerning categorical variables was summarized and presented in frequency tables, bar graphs. Computing means, standard deviation was used to summarize data of numerical variables.

Bivariate analysis:

The association between proportions of the under five children who tested positive and those who tested negative was compared using a chi square. The relationship between independent

variables and dependent was analyzed using chi square. Independent variables with P-value less than 0.05 were considered to influence the prevalence of malaria among children below age five.

3.11 Quality assurance

- Pretesting of the questionnaire to minimize and avoid errors with duplication.
- Training and use of research assistants to ensure accuracy in the information given by all is not duplicated and to avoid bias in the study.
- Supervision of data collection by the researcher.
- Data was coded entered in Epidata software and cleaned in SPSS before analysis.

3.12 Ethical issues

The researcher got a clearance letter from the university and the research approval committee to go and carry out research in Nakaloke health center III. Permission to carry out research from Nakaloke health center III was sought from the DHO, Mbale district, the LCs of Nakaloke and other authorities from the town council and the in charge of the health unit. A written consent to carry out research was obtained from the respondents before the questionnaire was administered. In a small meeting with the administration the researcher explained the objectives of the study. In the course of the study participants were allowed to ask questions and assured of the confidentiality. Participants who did not have interest were allowed to withdraw from the study and because it was not to affect their health. The questionnaires were confidential to each individual and the information that was obtained was strictly confidential and for only academic purposes not any other reason.

CHAPTER FOUR: RESULTS

4.0 Introduction.

This study shows the findings of each specific objectives of the study on the prevalence of malaria among children aged below 5 years in Nakaloke HC III. The objectives include care takers demographic factors, care givers knowledge and attitude, and house hold factors on prevalence of malaria.

4.1 Demographic factors:

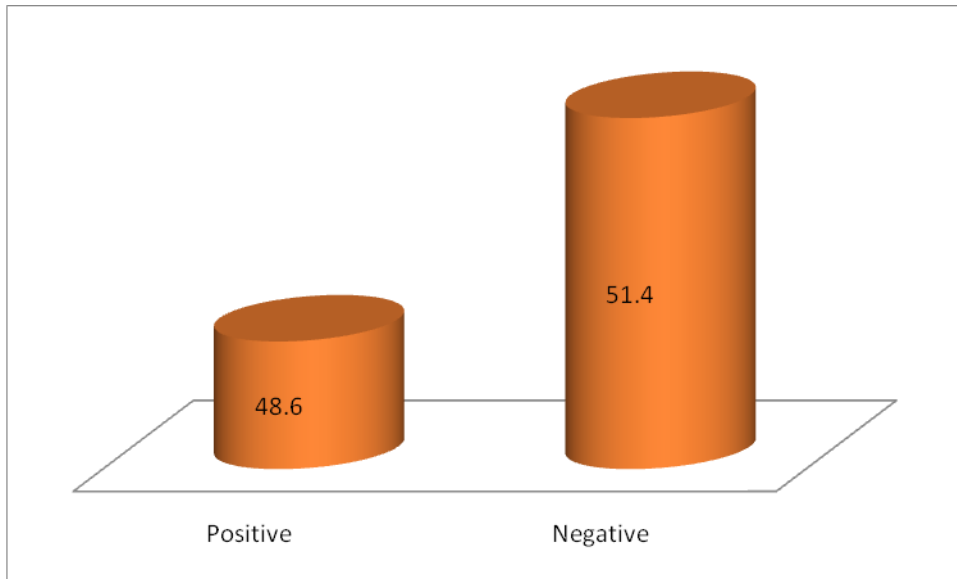
Table 1: Demographic characteristics of 243 caretakers of children aged below 5 years Nakaloke HC III

Variable	Category	N	Percent
Gender	Female	187	77.0
	Male	56	23.0
Age	15-24	55	22.6
	25-34	92	37.9
	35-44	74	30.5
	≥45	22	9.1
Marital status	Single	44	18.1
	Married	145	59.1
	Separated	36	14.8
	Widowed	18	7.4
Level of education	None	46	18.9
	Primary	81	33.3
	Secondary	81	33.3
	Tertiary	35	14.4
Location	Close to a swamp	107	44.0
	Not close to a swamp	136	56.0

The total number of respondents was 243 and majority 187(77.0%) were females, 94(37.9%) were between the ages of 25-34years, 145(59.1%) were married, most, 81(33.3%), had both primary and secondary level of education and 136(56.0%) did not stay close to a swamp as reflected in table 1.

Prevalence of malaria:

Figure 2: Prevalence of malaria among 243 children below age 5 years in Nakaloke HC III



A total of 243 children below age 5 years who attended Nakaloke HC III coming from different locations of the town council were subjected to malaria diagnostic tests using both mRDT and microscopy. Of the 243 children, 118(48.6%) tested positive and 125(51.4%) negative as shown in figure 1.

Care taker factors: part 1*Table 2: Caretaker factors (demographic) influencing prevalence of malaria among 243 children below 5 years in Nakaloke HC III.*

Variable	Positive	Negative	χ^2	p-value
Gender				
Female	91(77.1)	96(76.8)	0.003	0.953
Male	27(22.9)	29(23.2)		
Age				
15-24	18(15.3)	37(29.6)	7.637	0.054
25-34	51(43.2)	41(32.8)		
35-44	37(31.4)	37(29.6)		
≥45	12(10.2)	10(8.0)		
Marital status				
Single	20(16.9)	24(19.2)	1.002	0.801
Married	70(59.3)	75(60.0)		
Separated	20(16.9)	16(12.8)		
Widowed	8(6.8)	10(8.0)		
Level of education				
None	26(22.0)	20(16.0)	2.600	0.457
Primary	37(31.4)	44(35.2)		
Secondary	41(34.7)	40(32.0)		
Tertiary	14(11.9)	21(16.8)		
Location				
Close to a swamp	59(50.0)	48(38.4)	3.314	0.069
Not close to a swamp	59(50.0)	77(61.6)		

All caretaker demographic factors showed no statistically significant relationship with prevalence of malaria among children below age 5 years as indicated in table 2.

Care taker factors: part 2.

Table 3: Caretaker factors (Knowledge) on malaria transmission and prevention influencing prevalence of malaria among 243 children below 5 years in Nakaloke HC III.

Variable	Positive	Negative	χ^2	p-value
Ever heard about malaria				
Yes	114(96.6)	119(95.2)	0.306	0.580
No	4(3.4)	6(4.8)		
Mode of transmission				
Mosquitoes	101(85.6)	110(88.0)	0.308	
Fly/animals	17(14.4)	15(12.0)		
Prevention of malaria				
Sleeping under nets				
Yes	113(95.8)	121(96.8)	0.183	0.669
No	5(4.2)	4(3.2)		
Wearing of long sleeved clothes				
Yes	52(44.1)	51(40.8)	0.295	0.606
No	66(55.9)	74(59.6)		
Spraying with insecticide				
Yes	80(67.8)	90(72.0)	0.510	0.475
No	38(32.2)	35(28.0)		
Destroying breeding places				
Yes	100(84.7)	103(82.4)	0.243	0.622
No	18(15.3)	22(17.6)		
Closing windows early				
Yes	84(71.2)	88(70.4)	0.018	0.893
No	34(28.8)	37(29.6)		
Use repellants				
Yes	29(24.6)	42(33.6)	2.390	0.122
No	89(75.4)	83(66.4)		
Clearing bushes				
Yes	102(86.4)	99(79.2)	2.226	0.136
No	16(13.6)	26(20.8)		
Time mosquito bites				
Day time	7(5.9)	9(7.2)	2.164	0.539
Night time	64(54.2)	67(53.6)		
Day and night	45(38.1)	43(34.4)		
I don't know	2(1.7)	6(4.8)		

No care taker factors on knowledge about the transmission and prevention of malaria was significantly related to the prevalence of malaria among children below the age of five years in Nakaloke HC III as shown in table 3.

Care giver factors: Part 2: cont.

Table 4: caretaker factors (knowledge) on signs and symptoms of malaria in children below 5 years in Nakaloke Health center III

Variable	Positive	Negative	χ^2	p-value
Malaria symptoms				
High temperature	111(94.1)	118(94.4)	0.012	0.912
Yes	7(5.9)	7(5.6)		
No				
Loss of energy				
Yes	79(66.9)	98(78.4)	4.023	0.045
No	39(33.1)	27(21.6)		
Vomiting				
Yes	102(86.4)	112(89.6)	0.576	0.448
No	16(13.6)	13(10.4)		
Sweating				
Yes	42(35.6)	48(38.4)	0.250	0.651
No	76(64.4)	77(61.6)		
Headache				
Yes	75(63.6)	92(73.6)	2.847	0.092
No	43(36.4)	33(26.4)		
Joint pains				
Yes	36(30.5)	53(42.4)	3.698	0.054
No	82(69.5)	72(57.6)		
Loss of appetite				
Yes	102(86.4)	109(87.2)	0.031	0.861
No	16(13.6)	16(12.8)		
Chills				
Yes	74(62.7)	78(62.4)	0.003	0.960
No	44(37.3)	47(37.6)		
Convulsions				
Yes	81(68.9)	77(61.6)	1.324	0.250
No	37(31.4)	48(38.4)		

With the care take knowledge of the signs and symptoms of malaria, loss of energy (P=0.045, $\chi^2=4.023$) was significantly associated with prevalence of malaria in children below five years. However other factors were not significantly associated with malaria prevalence as shown in table 4.

Care giver factors: part 3.

Table 5: Caretaker factors (attitudes) influencing prevalence of malaria among 243 children below 5 years in Nakaloke HC III

Variable	Positive	Negative	χ^2	p-value
I think malaria is serious and threatening disease.				
Yes	108(91.5)	114(91.4)	0.008	0.928
No	10(8.5)	11(8.8)		
I think the best way to prevent myself from getting malaria is to avoid m				
Yes	92(78.0)	106(84.8)	1.879	0.170
No	26(22.0)	19(15.2)		
I believe sleeping under a mosquito net during the night is one way to pr				
Yes	106(89.8)	115(92.0)	0.347	0.556
No	12(10.2)	10(8.0)		
Am sure that I can treat the child if he or she gets malaria				
Yes	53(44.9)	61(48.8)	0.368	0.544
No	65(55.1)	64(51.2)		
In my opinion children and pregnant mothers are at greater risk of getting				
Yes	99(83.9)	101(80.8)	0.400	0.527
No	19(16.1)	24(19.2)		
I think that one can recover from malaria without any treatment.				
Yes	28(23.7)	39(31.2)	1.697	0.193
No	90(76.3)	86(68.8)		
I think that it is dangerous if malaria medicine is not taken completely				
Yes	105(89.0)	110(88.0)	0.058	0.810
No	13(11.0)	15(12.0)		
I think that I should go to the health center to have my child's blood test				
Yes	112(94.9)	110(88.0)	3.677	0.055
No	6(5.1)	15(12.0)		

Care taker attitudes towards prevention of malaria did not have significant influence on prevalence of malaria as presented in table 5.

Table 6: Household factors influencing prevalence of malaria among children below 5 years

	Positive	Negative	χ^2	p-value
Type of house				
Permanent house	43(36.4)	59(47.2)	2.885	0.236
Semi-permanent house	58(49.2)	51(40.8)		
Grass thatched	17(14.4)	15(12.0)		
Number of people in a house				
≤6	66(55.9)	69(55.2)	0.013	0.909
>6	52(44.1)	56(44.8)		
Source of light				
Firewood	6(5.1)	10(8.0)	8.560	0.036
Candle	15(12.7)	29(23.2)		
Lantern	59(50.0)	42(33.6)		
Electricity	38(32.2)	44(35.2)		
Nature of rooms				
Small	65(55.1)	73(58.4)	0.272	0.602
Big	53(44.9)	52(41.6)		
Time to go to bed for children				
6:00pm-7:00pm	33(28.0)	31(24.8)	1.051	0.591
8:00pm-9:00pm	76(64.4)	80(64.0)		
≥10:00pm	9(7.6)	14(11.2)		
Use mosquito net				
Yes	98(83.1)	107(85.6)	0.299	0.585
No	20(16.9)	18(14.4)		

Prevalence of malaria among children below five years varied significantly with over different types of source of light used in the house ($\chi^2 = 8.560$, $p=0.036$) as shown in table 6.

Table 7: Environmental factors influencing prevalence of malaria among children below 5years in Nakaloke Health centre III

Variable	Positive	Negative	χ^2	p-value
Water drainage				
Good	66(55.6)	71(56.8)	0.019	0.892
Bad	52(44.1)	54(43.2)		
Clear stagnant waters				
Yes	93(78.8)	90(72.0)	1.515	0.218
No	25(21.2)	35(28.0)		
Have bushes around the house				
Yes	62(52.5)	52(41.6)	2.918	0.088
No	56(47.5)	73(58.4)		
Have garbage heaps				
Yes			4.322	0.038
No	49(41.5)	36(28.8)		
Monthly income	69(58.5)	89(71.2)		
≤135,000/=			0.084	0.772
>135,000/=	62(52.5)	68(54.4)		
	56(47.5)	57(45.6)		

The prevalence of malaria among children below 5 years was dependent on whether garbage heaps in the environment were cleared or not ($\chi^2=4.322$, $P=0.038$ as indicated in table above).

CHAPTER FIVE: DISCUSSION OF THE RESULTS.

5.0 Introduction

This chapter presents a brief discussion of the study results based on the findings in relation to the specific objectives of the study on the prevalence of malaria and the associated risk factors among children below five years in Nakaloke HCIII that took place in the months of August and September 2017.

5.1 Prevalence of malaria among children below the age of five years:

The study findings showed that almost half of the children in this study were found to be sick with the parasite causing malaria which indicated a high prevalence of malaria among children below five years in Nakaloke health center III which was the study area. This is almost three times a higher prevalence compared to the national prevalence of 19.7% (Danielle Roberts and Matthew G. 2016) in their study that was carried out in Uganda.

The probable reasons for the high prevalence is probably failure to effectively use preventive measures despite the caregivers having good knowledge on prevention and transmission of malaria. Measures like possession of ITNs cannot determine how it is effectively used to prevent the mosquito bites at night. Also caregiver's knowledge about malaria does not determine their effective application of these measures and their attitudes towards their utilization. This may be the other reason for the high prevalence of malaria in the study area. Future studies therefore need to assess the caregiver's knowledge on malaria in relation to the utilization of preventive measures as this was not investigated in this study.

Comparing with the sample size and the population in obtaining the data the prevalence in the study area remained high compared to the national prevalence which is at 19.7% (Danielle Malaria indicator survey (2014-2015) malaria remains the number one killer disease in children below 5 years despite its decrease in prevalence to 19% and this has remained constant since 2009 when it dropped from 42% to 19% being highest in the east central region. (Dr. Myers Lugemwa, MOH).

The high prevalence of malaria has led to a high public expenditure both in the health system and the individual house holds on procurement of anti-malaria drugs, low productivity where care takers are seen spending a lot of time attending to the sick children, high school drop outs, poverty, retardation among children and the increased morbidity and mortality due to severe anemia, hypoglycemia and cerebral malaria as the common causes of death in children

as compared to adults- though this was not investigated but can be proved from other studies or information for example the WHO over view on malaria indicates that children below five years were the most affected with malaria disease and this accounted for 69% of deaths among children in 2015.(WHO update 2016). Strategies like improving the general prevention and control measure of malaria infections by involving all the stake holders in the community and the community at large to implement the measures and not stopping at only having the knowledge on malaria.

5. 2 Caretaker factors influencing the prevalence of malaria:

Considering the findings of the study on the care takers factors, demographic factors had no statically significant relationship with malaria prevalence among children below age five years. Caretaker's knowledge on malaria prevention; control and transmission were not significantly associated with malaria prevalence among these children. The findings of this study are not different from the study that was done in Malawi were a MIS indicated an increase in prevalence ($P > 0.05$) 33% in 2014 in children below 5 years of age despite the caretakers knowledge on prevention, transmission and control of malaria infection. (Maggie Zgambo et al)

Loss of appetite and loss of energy among the signs and symptoms of malaria were significantly related to high malaria prevalence. The caretaker's attitude towards the prevention of malaria was not significantly associated with malaria prevalence according to the study. This is contrary to the study carried out in Nigeria were caregivers did not have enough knowledge on how malaria is prevented, controlled and even transmitted (L.Ovadje and Jerome Nriagu 2016).

In another study that was carried out in Okomesi- Ekiti state (Oluwasango et al 2016) caregivers had good knowledge 99.7% on the prevention and transmission of malaria.

Though the caregivers had enough knowledge and good attitudes on malaria prevention, it still showed that little was done on the side of preventive measures and this could be associated with the care takers social economic status and this can be compared to a study that was done in Gambia which showed that children from families with low social economic status were more likely to suffer from malaria compared to those with a high social economic status. (Sonko ST.et. al2014)

There could be new breeding sites that have not been identified for example congested rooms, under chairs, in birth rooms in case of self-contained houses or houses that have birth

rooms near residents with stagnant waters may be acting as breeding sites for mosquitos therefore there is need for further investigation on the same. The other probable reason may be lack of a boosting method of prevention like IRS which had not been implemented in the study area as in other areas were similar studies have been done before for example in Botswana were significant progress has been noticed in the reduction of malaria prevalence in children below age of five through a sustained provision of both LLINs and IRS. (Simon C. et. Al 2013). In the similar study that was conducted in Uganda children who suffered from malaria were 7.6 times in households that were not sprayed compared to those from sprayed households. There is need for implementation of IRS in Nakaloke households as this is one of the recommended WHO strategies for eliminating malaria infection.

Other reasons for the caretaker factors that could be influencing the prevalence of malaria in children below five years would include sharing of drugs among the sick children, long distances to the health units, use of local herbs and delay in seeking for medical treatment. This is related to a study in Nigeria where 37% of caregivers preferred using herbs and only 17% could visit the dispensary for treatment of malaria (Oluwasango A.O et. Al 2016).

Caretaker's lack of knowledge on signs like loss of energy and loss of appetite as signs of malaria can affect proper diagnosis and treatment seeking for children who might present with no other signs other than these two signs and this can lead to severe disease of complicated malaria increasing on hospital admissions and even mortality rates. There is need for proper and intense health education on the signs and symptoms of malaria so that none of the signs is neglected by the caregivers.

5.3 Environmental factors influencing the prevalence of malaria in children below age five years:

With the environmental factor influencing malaria prevalence, garbage heaps was seen to be significantly associated with malaria prevalence among children below age of five years. A lot is needed to be done as this has been proved with other studies as being a breeding site of mosquitoes for example a study that was carried out in Bata district, Equatorial Guinea were care givers (24.77%) responded that garbage was a breeding site for mosquitoes both urban and rural (Maria Romay- Barja et al).

In a similar study which was done in Bolifamba –Cameroon also proved that garbage heaps among other environmental factors like stagnant waters, swampy/bushy surroundings were highly associated with malaria infection (Serphin Nkwesechu et al 2015).

Being a town council and seen to be a crowded place and over populated there is no free space for people to dispose their garbage so it is heaped around the house holds increasing or creating a favorable site for mosquitoes to breed and bite children. There is need for an organized system of environmental control programs to improve garbage disposal by the town council team and also households should be sensitized on storage before it is disposed to a specified destination. Proper use of preventive measures like sleeping under bed nets is another strategy to avoid mosquito bites to the children.

5.4 Household factors influencing malaria prevalence in children below age five years:

Malaria prevalence in children below age of five years in the study area varied significantly over the different type of sources of light used in the individual households as presented earlier in the results. This probably is due to failure of caretakers to utilize the preventive measures available with a miss conception that mosquitoes don't bite when there is light and they do bite only in the dark. This is contrary to the study done in Uganda where Children in households without electricity were more than one and a half times more likely to have malaria than those children in households with electricity (OR 1.756, 95 % CI 1.072–2.877). (Danielle Robert and G. Mathews, 2016). Caretakers should be encouraged to use the preventive measures despite the type of source of light they use in their households. They should ensure that the children sleep under the mosquito nets regardless of the available type of source of light in the household.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS:

6.0 Conclusions

- The prevalence of malaria among children below age five was very high with as almost half of the sample size of children were tested positive with a proportion (48.6), negative (51.4).
- Knowing that malaria causes loss of energy and loss of appetite were the only caretaker factors that influenced prevalence of malaria.
- Source of light was the only household's factors that significantly influenced prevalence of malaria among children below five years.
- Similarly occurrence of malaria among children below five years was significantly influenced by presence or absence of garbage heaps in the home environment.

6.1 Recommendations

The following recommendations can help control high malaria prevalence in among children below five years of age attending Nakaloke HCIII.

Re enforcement of communication strategies and information dissemination to change individual and community behavior and attitudes towards the control and prevention of malaria and insist that they should not only have knowledge of the transmission and control but put in practice or implement the acquired knowledge practically both individually and as a community at large. This should be delivered by well and appropriate trained community health workers, VHTs, health unit staffs in the local languages that are most understood and mainly to vulnerable households

Efforts should be made for these care takers to know and understand every sign and symptoms of malaria especially those that significantly contributed to the high prevalence of malaria for example loss of appetite and loss of energy which are serious signs of severe malaria.

The town council administrators should find a way of how to dispose garbage to avoid heaps around the households and also find and strategize a way of involving the entire town council community and the surrounding communities on how to avoid garbage in their households as this is another suitable breeding site for mosquitoes.

The town council authorities should liaise with the district officials to lobby for electrify as a better source of light in the house as variant source of light was seen to be significantly influencing malaria prevalence in children below age of five years.

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APPENDIX 1: CONSENT FORM

Dear respondent, greetings, I am Kituyi Irene a student of International Health Sciences University Kampala pursuing a bachelor's degree in Nursing Science. I am requesting you to participate in this study which is about the prevalence of malaria and the associated factors amongst the children under age five who attend in outpatients of Nakaloke health center 111. I acknowledge that the information taken from you will be kept confidential and strictly for research purpose and academics only and the data collected will be under key and lock and only handled by the authorized research team. This study will not take long and you have a right to say yes or no to your answer.

Respondent:

I agree to participate in this research study and accept to be interviewed orally in privacy by the research assistant who will record my responses and I will allow my child/ children to participate where blood will be drawn from him/ her/them for investigation for presence of malaria parasites. My participation is entirely voluntary and I may decline to answer any question or stop participation in the study at any one time.

Signed..... Date.....

Investigator..... Date.....

APPENDIX 11 QUESTIONNAIRE

Survey questionnaire:

Title: The prevalence of malaria and the associated factors among children under the age of five years in Nakaloke health center III Nakaloke town council in Mbale district.

Date.....

Enumerator.....

SECTION A: PREVALENCE OF MALARIA:

What is the diagnostic test result?

1. Positive.
2. Negative.

SECTION B:

Social demographics factors:

Qn: name of village.....

.Qn: gender of interviewee.....

1. Female()
2. Male. ()

Qn: how old are you?

- 1.15-24
2. 25-34
3. 35-44
4. \geq 45

Qn. Marital status:

1. Single.
2. Married.
3. Separated/divorced.
4. Windowed.

Qn. What is your high level of education achieved?

1. No formal education.
2. Primary level.
3. Secondary level.
4. Tertiary.

SECTION C:

Knowledge about the disease and health seeking behaviors:

Qn. Have you ever heard about malaria?

1. Yes.
2. No.

Qn. Malaria is transmitted by: (tick one correct answer).

1. Rat.
2. Dog.
3. Mosquito
4. Fly.
5. Cockroach.
6. I don't know.

Qn. How can we prevent and control malaria: (circle yes or no).

1. Sleeping under bed nets – Yes/No.
2. Wearing long sleeved clothes. -Yes/ No.
3. Spraying with insecticide. –Yes/No.
4. Destroying breeding places.-Yes/No.
5. Closing windows early.- Yes/No.
6. Using repellants. Yes/No.
7. Clearing bushes.-Yes/No.

Qn. When do mosquitoes bite?

1. Day time.
2. Night time.
3. Both day and night.
4. I don't know.

Qn. What are the most common signs and symptoms of malaria infection seen in children?

1. High temperature/fever. - Yes/No.
2. Loss of energy.- Yes/No
3. Vomiting. - Yes/No.
4. Sweating.-Yes/No
5. Headache. - Yes/No.
6. Joint pains. -Yes/No.
7. Loss of appetite. - Yes/No.
8. Chills. Yes/No.
9. Convulsions.-Yes/No.

SECTION D:

Treatment seeking behaviors:

Qn. Do you usually take any child who has fallen sick due to malaria to health care facility?

1. Yes
2. No.

Qn. Was the child given anti malaria?

1. Yes.
2. No.

Qn. How soon after suspecting malaria would you seek for treatment?

1. One day. (Within 24 hours). ()
2. 2-3 days. ()
3. 4-6 days. ()
4. 7 days or more. ()

SECTION D:

Attitudes towards malaria infection:

Qn. I think malaria is serious and threatening disease.

1. Yes.
2. No.

Qn. I think the best way to prevent myself from getting malaria is to avoid mosquito bites.

1. Yes.
2. No.

Qn. I believe sleeping under a mosquito net during the night is one way to prevent myself from getting malaria.

1. Yes.
2. No.

Qn. Am sure that I can treat the child if he or she gets malaria.

1. Yes.
2. No.

Qn. In my opinion children and pregnant mothers are at greater risk of getting malaria.

1. Yes.
2. No.

Qn. I think that one can recover from malaria without any treatment.

1. Yes.
2. No.

Qn. I think that it is dangerous if malaria medicine is not taken completely.

1. Yes.
2. No.

Qn. I think that I should go to the health center to have my child's blood tested as soon as I suspect that I have malaria.

1. Yes.
2. No.

SECTION E:

Household factors:

Qn. What type of house do you sleep in?

1. Permanent house. (Burn bricks with cement).
2. Semi-permanent. (Un burnt bricks, mud poles).
3. Grass thatched with mud and poles.

Qn. How many people live in your household?

1. ≤ 6 people.
2. > 6 people.

Qn. What is the main source of light in your dwelling (tick only one).

1. Fire wood.
2. Candle.
3. Paraffin lantern.
4. Electricity.

Qn. What is your estimated monthly income?

1. ≤ 135.000 .
2. > 135.000 .

Qn. What is the nature of your rooms?

1. Small rooms.
2. Big rooms

Qn. What time do children under five go to bed?

1. 6.00pm-7.00pm.
2. 8.00pm-9.00pm.
3. 10.00pm above.

Qn. Does your household possess a mosquito net(s)?

1. Yes.
2. No.

Qn. Did you and your household members sleep under a mosquito net(s)?

1. Yes.
2. No.

SECTION F:

Environmental factors:

Qn. Do you have good water drainage system around your house?

1. Yes.
2. No.

Qn. Do you usually clear stagnant waters in broken pots, containers and ditches around your house?

1. Yes.
2. No.

Qn. Do you have bushes around your house?

1. Yes.
2. No.

Qn. Do you often clear bushes around your house?

1. Yes.
2. No.

Qn. Do you have garbage heaps very close to your home?

1. Yes.
2. No.

Qn. Where is your residence located?

1. Close to a swamp.
2. Not close to swamp.

Qn. What is the altitude of the area where your home is located?

1. Low altitude.
2. High altitude.

Thank you for your participation.

End.

APPENDIX III: INTRODUCTORY AND CORRESPONDENCE LETTER

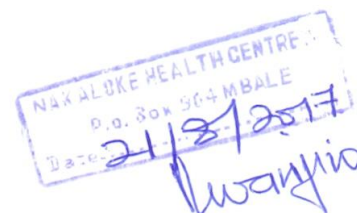


making a difference in health care

Office of the Dean, School of Nursing

Kampala, 14th August 2017

THE DHO, MBALE DISTRICT
HEALTH OFFICE - MBALE DISTRICT
Ch. NAKALOKHE HEALTH
CENTER III.



Dear Sir/Madam,
RE: ASSISTANCE FOR RESEARCH

Greetings from International Health Sciences University.


This is to introduce to you **Kituyi Irene Rose**, Reg. No. **2015-BNS-TU-JAN-017** who is a student of our University. As part of the requirements for the award of a Bachelors degree in Nursing of our University, the student is required to carry out research in partial fulfillment of the award.

The topic of research is: **Malaria Prevalence and Associated Factors Among Children Under Five Years Attending Nakaloke health Center III in Mbale District.**


This therefore is to kindly request you to render the student assistance as may be necessary for the research.

I, and indeed the entire University are grateful in advance for all assistance that will be accorded to our student.

Sincerely Yours,


Ms. Agwang Agnes
Dean, School of Nursing



Wanyio
Please help


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