

EVALUATION ON EFFECTIVENESS OF SCALED UP CONTROL INTERVENTION
TOWARDS MALARIA PREVALENCE AMONG CHILDREN IN CHIENGE
DISTRICT OF LUAPULA PROVINCE

By

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DECLARATION

I, Emmy Hamoonga, do hereby declare that this work is entirely mine and to the best of my knowledge, has not been submitted previously for an award or any other University for similar purposes. All sources I have used or quoted have been indicated and duly acknowledged by referencing. Further I declare that the views and opinions contained in this report do not in any way represent those of the University Zambia but of my own.

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APPROVAL

This dissertation of **Emmy Hamoonga** has been approved as partial fulfillment of the requirements for the award of the degree of Master in Public Health by the University of Zambia.

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ABSTRACT

In Chiengi District, more than 10 years after Scaled up malaria control interventions has not seen any drastic reduction in the number of morbidity and mortality of malaria cases. The study aimed at evaluating on effectiveness of scaled up control intervention towards malaria prevalence among children in Chiengi District. The independent variables included Diagnostic Methods of Malaria, Malaria Treatment and Preventive measures being implemented in the Control of Malaria. Records indicated that the prevalence of the burden of malaria among the under 5 children in Chiengi District was at 30%. Therefore, a cross sectional study or survey using the quantitative approach has helped to cover the prevalence of malaria in Chiengi District. The targeted populations of the research study are all the people who were caregivers to children who are susceptible to malaria in Chiengi District. The data that was collected used both the primary and secondary data sources. For primary data, a questionnaire was used which contained both closed and open ended questions and secondary data was collected from statistical records from health facilities. The primary data was processed and analysed using the Statistical Package for Social Sciences (SPSS) computer software version 20. The findings showed that mostly Rapid Diagnosis Test (RDT) is mostly used for testing malaria among the people. The caregivers delay in seeking medical treatment for children in the area which adverse effects treatment. Coartem is mostly used in treatment of malaria of which due to poor practices of not finishing the drugs has resulted into drug resistance among the people. The district has maintained free distribution of ITNs among the vulnerable group. The study noted, people uses the ITNs as fishing nets and children are left without sleeping under the net. The study showed that the proximity of residence to stagnant water and poor use of ITNs are the most dominant risk factors for malaria infection. The study showed that distribution of ITNs coverage is important factor to achieve significant reduction in malaria morbidity and mortality which demands sensitization to increase the levels of awareness of the people regarding the diseases through health education on scaled up control measures using different media, and community based organizations.

DEDICATION

The Research Report is dedicated to my Parents Mr. and Mrs. Hamoonga, my siblings, Russel, Victor, Ronnie, Remmy, Bright, Regina and Reuben and to my entire family and friends for believing in me and cheering me on. I love you all and may God Bless You all!

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Thanks and glory be to God the father, the son and the Holy Spirit in whom I'm preserved. Thank you God thus far you have brought me. Daddy and Mummy, what can I say, you are simply the best parents in the whole world, thank you for loving me and for giving me your best. I could never pay you back; my prayer is that you live long enough to see me through and guide me all the way. I love you too much. Dr. Choolwe Jacobs, thank you very much for supervising me and for all the helpful guidance you gave me throughout this work. Your help and encouragements are invaluable, May you continue being a blessing to many. Thank you and God bless. To the entire staff of University Zambia, thank you very much for your support and guidance all the way. May God bless.

ACRONYMS

ACTs	Artemisinin-based Combination Therapies
DHO	District Health Office
IPTP	Intermittent Preventive Treatment of Pregnant Women
IRS	Indoor Residual Spraying
ITNs	Insecticide Treated Mosquito Nets
MOH	Ministry of Health
SDG	Sustainable Development Goal
USAID	United States Agency for International Development
WHO	World Health Organization.
ZDHS	Zambia Health Demographic survey

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

1.1 Background

With scaled up control interventions in most districts of Zambia, it is expected that the malaria burden and deaths could have reduced to lower levels. However, new data from the World Health Organization revealed that the COVID-19 pandemic has disrupted malaria services, leading to a marked increase in cases and deaths (World Malaria Report, 2021).

According to the World Malaria Report (2020), it was estimated that there were 241 million cases and 627 000 deaths reported globally in the year 2020. Further, the report indicated that, there was a reduction in malaria incidence rate from 81 in 2000 to 59 in 2015 and 56 in 2019, before increasing to 59 in 2020. Globally, the number of malaria deaths reduced steadily over the period 2000–2019, from 896 000 in 2000 to 562 000 in 2015 and to 558 000 in 2019. However, in the year 2020, malaria deaths increased by 12% compared with the year 2019. The increases in malaria cases and deaths were attributed to the disruption of health services during the COVID-19 pandemic.

In the African region, between 2019 and 2020, the estimated number of malaria cases increased from 213 million to 228 million, and deaths from 534 000 to 602 000. Furthermore, malaria burden was heaviest in the World Health Organization (WHO) African Region accounting for about 95% of cases and 96% of deaths globally. About 80% of all malaria deaths in the African Region are among children aged under the age of 5 years. Since 2015, the rate of progress in both cases and deaths has stalled in many countries with moderate or high malaria transmission; the situation was made worse, especially in sub-Saharan Africa, by disruptions during the COVID-19 pandemic and other humanitarian emergencies (WHO, 2020).

Zambia remains a highly endemic malaria country, with the entire population considered to be at risk of contracting malaria. Risk is highest in the wetter, rural, impoverished provinces of Luapula, Northern, Muchinga and North Western with a prevalence of 11–30% as of 2018, and lowest in Lusaka Province with 0.1% and Southern Province with less than 0.1% prevalence (USAID, 2020). The country carries 2% of the global malaria case burden and 5.2% of the case burden in East and Southern Africa (WHO, 2019). Consequently, in the first half of 2020, the epidemiologic trends of malaria indicators worsened in Zambia. The National Malaria Elimination Centre (NMEC) reported a 30–50% increase in malaria cases, malaria deaths, and test positivity rates nationally, as compared with the years 2018 and 2019 (USAID, 2021).

Chienge district is one of the rural district in Luapula Province that has various Malaria elimination activities being implemented. The four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs), Indoor residual spraying (IRS), accurate diagnosis and Prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp) (Mukumbuta, 2017).

It is important to note that, over the last 2 decades, expanded access to WHO-recommended malaria prevention tools and strategies including effective vector control and the use of preventive antimalarial drugs have had a major impact in reducing the global burden of this disease. However, in the last few years, there has been a resurgence of malaria in some areas (WHO, 2020). It is important to note that in the past few years after the advent of Covid 19, malaria infections and vector densities have bounced back to their pre-intervention levels.

1.2 Problem Statement

More than 10 years after Scaled up malaria control interventions, it was expected that there should have seen a drastic reduction in the number of morbidity and mortality of malaria cases in Chienge District. The scenario on the ground shows are gloomy picture of an increase in the number of malaria cases in the district. For example, the data for Chienge

District on the confirmed cases of malaria shows an increase in the number of reported cases on an annual basis.

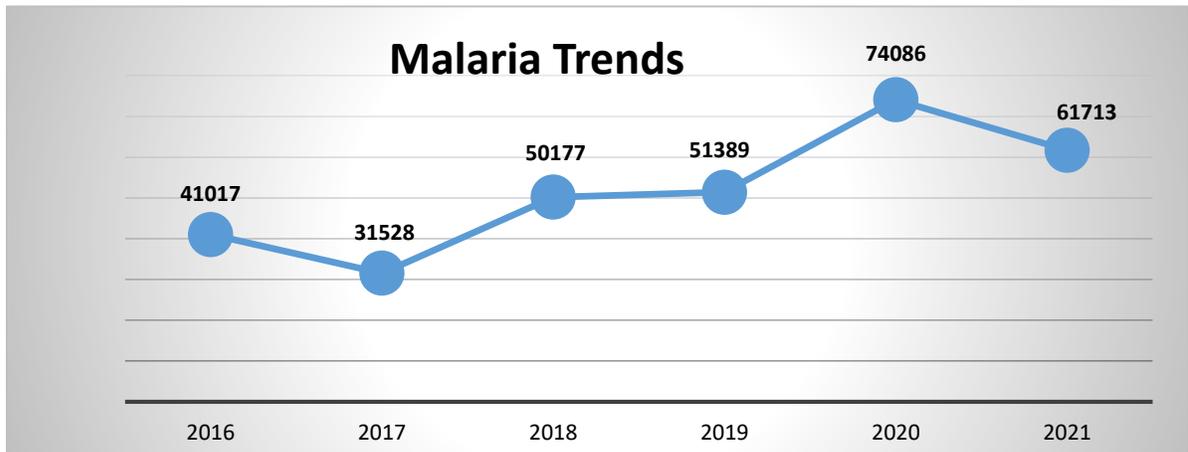


Figure 1.1: Malaria trends from 2016 to 2021 for Chiengi District (Source: Chiengi DHIS, 2022)

From figure 1.1 above, the confirmed malaria cases have been increasing as of 2017 in the district, amidst scaling up or implementation of malaria control interventions. There are several control interventions scaled-up from around 2010 to date, and these included: indoor residual spraying (IRS); distribution of long-lasting insecticide-treated nets (LLINs); case management with rapid diagnostic tests (RDTs); and artemisinin-combination therapy (ACT). These interventions have seen a reductions in malaria infection, illness, severe disease, and death across much of the country.

Nonetheless, in some parts of the country, inclusive of Chiengi District, there has been limited reduction of malaria cases and this may be termed as a resurgence of malaria. This has raised some serious concerns about whether these interventions being implemented were effective. On the other hand, the risk factors that lead to this malaria lethality in Chiengi District are not known.

The disease not only causes serious morbidity and mortality among the people but also impedes on development as most of the resources are spent on combating the disease. For example, cost on treatment and prevention is colossal and there is substantial loss of household incomes through sickness and absenteeism from work.

Therefore, this study seeks to assess the prevalence and understand the complexity of risk factors for malaria lethality or the persistent high burden of malaria following the scale-up of malaria control interventions in Chiengde District.

1.3 Conceptual Framework

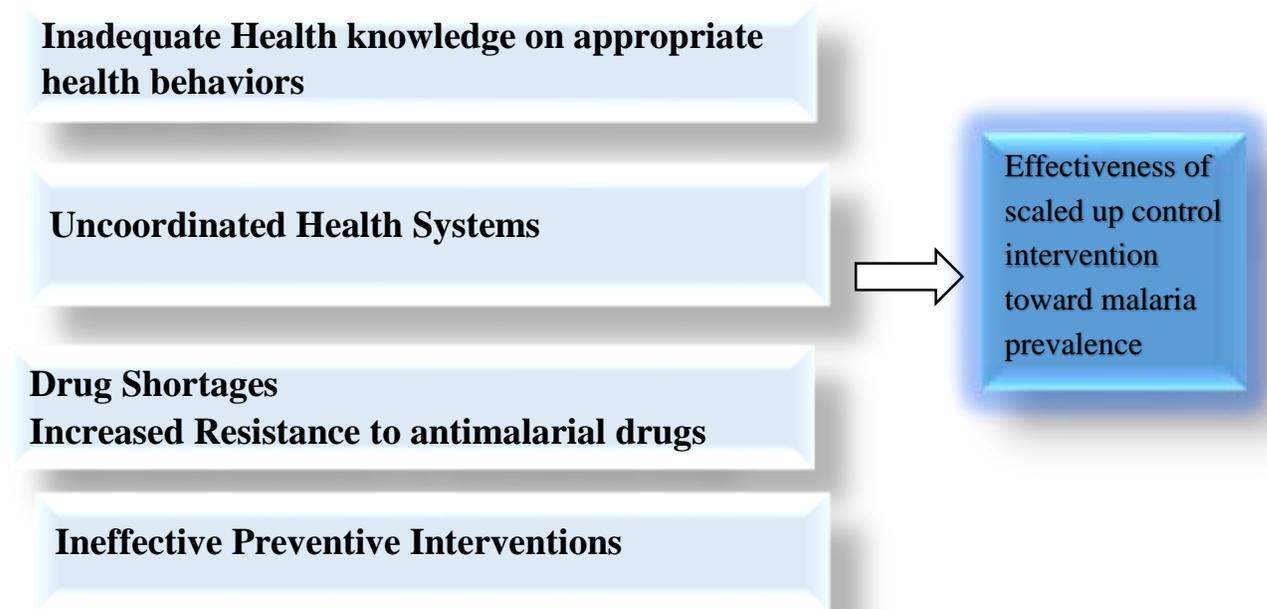


Figure 1.2: Conceptual framework

The illustration above shows the relationship between the dependent and independent variables. It shows the factors that can lead to the increase in malaria cases.

Trevethan (2017), defined health Knowledge as a theoretical construct that includes detailed and specific information about etiology, prevalence, risk factors, prevention, transmission, symptomatology and disease treatment, as well as on health services and patient rights. Further, it was reported that health knowledge plays a significant role in reducing risky behaviors and adopting protective and preventive practices among the populations (Munabe *et al.*, 2012). As such, “Health” depends on an individuals’ understanding of the factors that affect it and proper use of such “knowledge” in the prevention and treatment of a disease. The ability to use knowledge to promote health depends on our access to or awareness of reliable health information.

Climate change is defined as a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period -- typically decades or longer -- that may be attributed to natural internal processes, external forcing, or persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2001). In the most recent study, data has emerged that supports the link between the transmission of malaria and climate change, and some scientists have proposed that the world will experience higher transmission of the disease without significant action taken against climate change. Due to the complex relationship between malaria and climate change, gaps in knowledge still exist in the mechanisms of the linkage. However, climate change will increase the opportunities for malaria transmission in traditionally malarious areas, in areas the disease has been controlled, as well as in new areas which have been traditionally non-malarious (Fernando, 2022).

A report by WHO (2016), indicated that some of the main challenges to tackle malaria include gaps in access to available prevention methods, the limited number of interventions available and increasing resistance to medicines and insecticides. In addition, weak health systems presented a very high risk to malaria control and elimination. According to the World Malaria Report (2020), it was reported that weak health systems, lack of an effective vaccine, and the emergence of drug-resistant and insecticide - resistant parasites continue to complicate control efforts in hard-hit areas.

Appropriate preventive services for malaria control must be defined based on the specifics of the local malaria situation but might include consideration of cost-effective and sustainable vector control strategies. From a study that was conducted by reported that the median economic cost of protecting 1 person from malaria ranged from \$1.18 to \$5.70 with vector control and from \$0.53 to \$5.97 with chemoprevention. The median provider economic cost per case diagnosed was \$6.06 with rapid diagnostic test (RDT) and \$2.53 with microscopy, while it was per case treated \$9.31 and \$89.93 for uncomplicated and severe malaria, respectively (Conteh *et al.*, 2021). Furthermore, based upon a population at risk of malaria of about 830 million people, an estimated US\$ 66 billion will be needed to eliminate the disease from the African continent by 2030. These costs show that preventive measures are draining the coffers of most of the low income countries.

1.4 Significance of the Study

This study shall be advantageous for other scientist researches as it shall provide valuable information regarding issue of awareness of factors leading effectiveness of scaled up intervention control measures. The study shall be valuable to find the association between healthcare professional workers specifically public health workers and public health programs. This study can also provide information to those working in the area of infectious disease proficient in managing the fight against malaria in the area. The study shall be utilized to establish which scaled up intervention utilized is not effective in the fight against malaria in Chiengi District, Luapula Province. The research findings of the study will lead to identification of innovative ways of reducing the malaria transmission. The study findings shall be assimilated in the national policy and improve the practices, the existing Malaria control programmes interventions and utilization. The study shall report on the risk factors of malaria

1.5.1 General Objectives

To evaluate on effectiveness of scaled up control intervention towards malaria prevalence among children in Chiengi District

1.5.2 Specific Objectives

1. To assess the effectiveness of Diagnostic Methods of Malaria
2. To assess the effectiveness of Malaria Treatment
3. To assess the effectiveness of Preventive measures being Implemented in the Control of Malaria

1.6 Research Questions

1. How was the effectiveness of Diagnostic Methods of Malaria?
2. How was the effectiveness of Malaria Treatment?
3. How was the effectiveness of Preventive measures being Implemented in the Control of Malaria?

CHAPTER TWO

LITERATURE REVIEW

2.0 Literature Review

2.1 Introduction

This part of literature review is going to discuss the review in terms of the epidemiology of Malaria in children; prevalence and trends of malaria in children; factors associated with malaria prevalence in various settings; individual related factors and health system related factors. It is important to note that malaria has plagued mankind throughout history and remains one of the major challenges to global health. The disease contributes a considerable burden in endemic countries with premature deaths, disability from illness and it impedes on social and economic development (Binka, 2000). According to the World Malaria Report (2015), the global burden of the disease was estimated at 214 million cases and 438 000 deaths worldwide, with the African region accounting for 80% of the cases and 90% of the deaths. This shows that malaria is still a major public health problem world over and also in Zambia. In the recent past, there has been a reduction in the number of cases before the advent of COVID 19. The highest prevalence rates of malaria in Zambia have been reported in the following provinces; Luapula, Northern, North-western and Muchinga provinces with about a prevalence of 20% or higher, followed by the middle region of Eastern, Central, Copper-belt and northern parts of Western provinces of the country with an estimated prevalence of between 10- 20% and the least were Lusaka, Southern and the southern parts of Western provinces of the country with <10% of the prevalence (MOH, 2015). The important point to note is concerning the impact of malaria interventions, which might have a greater impact in high malaria prevalence regions. Therefore, the elimination of malaria is easier attained in regions of low prevalence rates. For example the malaria prevalence in Zambia is now at 15%, whereas the highest recorded prevalence of malaria is in Luapula province with 32.5 % (Zambia MIS, 2015).

2.2.1 Epidemiology of Malaria in Children

The WHO (2020), reported that nearly half of the world's population was at risk of malaria. The report observed that some population groups were considerably at higher risk of contracting malaria and developing severe disease. These population sub groups include; infants (Age 1 month to 1 year), children under 5 years of age, expectant mothers and people with HIV and AIDS, as well as people with a lowered immunity moving to areas with intense malaria transmission.

The under 5 year children are the most vulnerable group affected by malaria. They accounted for 61% of all malaria deaths worldwide (WHO, 2018). . In 2015, more than 200 million cases of malaria were reported, resulting in nearly half a million deaths. Most of malaria-associated deaths are caused by *P falciparum* species in sub-Saharan Africa, which kills about 1200 African children younger than the age of 5 years daily (Natasha, 2017). Although almost eradicated from industrialized nations, malaria continues to have a heavy toll on life and health services in substantial parts of the world. Almost half the world's population lives in countries where the disease is endemic, and almost every country in the world encounters imported malaria. Children are the worst affected, especially those that are aged between 6 months to 5 years.

In 2018, it was estimated that up to 79% of children under five in high-burden areas in Africa were diagnosed with malaria and had anemia (WHO, 2018). Malaria is the number one cause of morbidity, accounting for about 38% of all outpatients illnesses, and about 31% of all deaths in children under five (NMCP Annual Reports, 2015), with almost all cases (97%) were caused by *Plasmodium Falciparum* (Ghana-epi-report, 2014). According to the World Health Organization (WHO), the African Region accounted for 94% of all malaria deaths in 2018, and despite the relatively lower number of 180,000 deaths in that year, the region was still responsible for 85% of the deaths recorded (WHO, 2019).

A systematic study by Carneiro *et al.*, (2015), revealed that transmission intensity and seasonality in Sub-Saharan Africa found clinical malaria burden to be high in younger age groups. Further on, the study indicated that hospital admissions were also higher among

younger children, with higher levels of mortality among infants (Ibid, 2015). Another study done in Ghana showed that malaria accounted for 10.4 million of outpatient department (OPD) visits in 2016 and was responsible for an estimated case fatality rate of 0.32 among under five (GNMC, 2016). Lack of adequate housing, with unsealed windows and doors allowing free entry of mosquitoes, and living less than 25 m from a stagnant water body have also been found to be factors associated with increased exposure to malaria risk (Asante et al., 2011 and CDC, 2019).

In sub-Saharan African (SSA), children under the age of five years bear the highest burden of malaria (WHO, 2018). Every year the disease results in 300 million to 500 million clinical cases and causes more than one million deaths in children, which translates to a dying rate of nearly 3000 deaths per day in children under the age of 5 years (WHO, 2020). Furthermore, in Africa, some children suffer from acute attack of cerebral malaria that quickly leads to coma and deaths (UNICEF, 2015).

In Zambia, malaria is among the top causes of mortality and morbidity. Efforts to control, prevent and eliminate it have been intensified in the past two decades which has contributed to reductions in malaria prevalence and under-five mortality. However, there was a 21% upsurge in malaria prevalence between 2010 and 2015, of which the country was among the 13 countries who recorded an increase in malaria among 91 countries as monitored by the World Health Organization (Nawa *at el.*, 2019).

Another study done in Lusaka Province of Zambia from 2009 to 2013 showed that there was a significant reduction in the burden of malaria in the province during this period. However, malaria has continued to be a major cause of morbidity and mortality in the Province with Luangwa District as the most affected. In spite of malaria affecting everyone, children below five years of age were the most affected (Kalubula *at el*, 2015). In Zambia, malaria is still endemic with seasonal and geographical variations. It has for a long time remained the leading cause of morbidity and mortality in both the children and adults. Although malaria affects the whole population, the most vulnerable are children under the age of 5 years and pregnant women. Malaria accounts for up to 50% of all infant mortality and 20% of all maternal mortality in Zambia and presents severe social and economic

burdens on communities living in endemic areas (Masaninga *et al.*, 2013 and Chanda *et al.*, 2011).

The recorded prevalence of the burden of malaria among the under 5 children in Chiengde District was at 30% (CDHO, 2022). This is amidst different interventional activities that the district is implementing like the distribution of Insecticide Treated Nets (ITNs), Indoor Residual Spraying (IRS), and Health education dissemination activities have been done in the district to prevent and control the malaria burden, however, the disease remain one of the major public health problems and one of the leading causes of morbidity among the under 5 year children.

2.2.2 Prevalence and Trends of Malaria in Children

Despite a rigorous effort done to prevent malaria, it is still a major public health challenge worldwide causing a significant burden of illness and mortality (Tizifa *et al.*, 2018). Globally, an estimated 219 million malaria cases and 435,000 death occurrences have been reported in 2017. The burden of malaria is more devastating in children and pregnant women (WHO, 2019). Even though the expanded coverage of malaria prevention and case control service reduced mortality and morbidity, malaria is still a major threat especially to sub Saharan African countries (FDREMOH, 2010).

A study in Anambra State in showed that, out of a total of 2306 under-fives children, 1640 (71.1%) were diagnosed with malaria, and these were made up of 828 (50.5%) males and 812 (49.5%) females giving a male to female ratio of 1:1. Malaria cases were highest among 10-19month age group and lowest among 50-59month age group. There was a progressive decline in the proportion of malaria cases from 2012 to 2014. Fever (92%) was the most common presenting complaint, while the ACTs (61.4%) were the most commonly used drugs for treatment. Although the proportion of malaria cases in under-fives appeared to decline with each passing year, the disease still remained the commonest cause of all sicknesses and hospital admissions in this age group (Obunikem *et al.*, 2016).

Kenya is one of the major malaria endemic countries, making malaria the leading public health concern in the country. A study was undertaken on 7040 children aged 6 months to

12 years to find the prevalence of malaria and the associated determinants of malaria parasites among Kenyan children, the prevalence of malaria showed an upward trend in terms of age, with the highest prevalence among children aged 11–14 years. Prevalence was 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 also higher among children aged 10–14 years (Marufa *et al.*, 2017).

In Malawi, malaria is among the three most significant public health issues. Nearly 4 million people are diagnosed with the infection every year (NMCP and ICF, 2018). Malawi accounts for 2% of malaria cases worldwide and is among the top 15 countries with a high malaria burden (WHO, 2018). Children under 5 years and pregnant women are at a high risk for malaria morbidity compared to other groups in Malawi (Zgambo, 2014). Since 2005, the Malawi Government has been implementing comprehensive malaria control programmes that targets more than 85% of its population. The two main strategies have been preventing the malaria vector mosquitoes from biting people, and case management. Prevention efforts include promoting the use of insecticide-treated nets (ITNs) and indoor spraying of insecticide. Despite this effort, little progress has been made so far to reduce the burden of malaria in children under five in Malawi. A study by (Mahende *et al.*, 2016) showed that the prevalence of malaria among children detected by the gold standard microscopy technique was at 28% in 2012, and it increased to 33% in 2014 and then slightly dropped to 24% in 2017. Malaria morbidity among children is not evenly distributed across Malawi. According to the national data collected through malaria rapid diagnostic test (RDTs) and microscopy in 2017, the prevalence of child malaria is significantly high in rural areas (40.6 and 27.5%) compared to urban areas (6 and 4%), respectively. Further studies showed that the prevalence of malaria among children in central Malawi was high (39.7%) compared to children in southern (36.4%) and northern with (19.4%) (NSO, 2018). These studies suggest that geography plays a significant role in malaria prevalence among children.

In a similar study in Zambezia Province of Mozambique on the protective effects of (IRS) versus increased risk due to pig-keeping and house construction. The study showed that malaria infection among under 15 years of age remained high amidst the conventional

malaria vector control methods, such as IRS, were reported to have provided effective means of protection. Household ownership of farm animals, particularly pigs, and living in houses with a grass roof were independently associated with increased risk of infection, even after allowing for household wealth (Temu *et al.*, 2012).

In Zambia, the entire population is considered to be at risk of contracting malaria. Risk is highest in the wetter rural, impoverished provinces of Luapula, Northern, Muchinga and North Western which reported between 11-30% prevalence in 2018, and the lowest was Lusaka Province at 0.1%. Zambia is among the 20 countries with the highest malaria incidence and mortality globally. The country carries 2% of the global malaria case burden and 5.2% of the case burden in East and Southern African region (MOH, 2015). At district level, malaria incidence varies widely, from less than 50 cases to over 500 cases per 1000 population (Zambia Malaria Indicator Survey (MIS), 2018). Zambia has made significant progress in malaria control. There was a 26.8% reduction in cases between 2016 and 2019, from 202 to 148 per 1000 of the population at risk, while mortality rates fell by 5.4% from 0.47 per 1000 of the population at risk (MOH, 2015). Other encouraging trends identified in the 2018 MIS and HMIS (USAID, 2020) included, the infection rate in children under five years decreased from 22% in 2006 to 9% in 2018. Further, it was reported that 80% of households owned at least one insecticide-treated mosquito net (ITN), which is an increase from 38 percent in 2006. However, in the first half of 2020, the epidemiologic trends in malaria indicators changed and become worsened due to the advent of COVID 19. The National Malaria Elimination Center (NMEC) reported a 30-50% increase in malaria cases, malaria deaths and positivity rate nationally, as compared with 2018 and 2019 (USAID, 2021). The contributing factors to this scenario could have been the historically high rainfall patterns in some provinces, ageing insecticide-treated mosquito nets (ITNs) of which the last mass campaign occurred in 2017. Therefore, implementation of the malaria control measures should be sustained while also looking at other causes of fever for more accurate diagnosis and to reduce the burden of this disease in under five children.

2.2.3 Factors Associated With Malaria Prevalence

Among the risk factors associated with malaria are poor health system, non-provision of long-lasting insecticidal nets, inadequacy of health education and delayed treatment resulted in high prevalence of malaria. According to Bhatt (2015), long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) are the main vector control interventions deployed in sub-Saharan Africa to control malaria. It was estimated that 69% of the estimated 663 million malaria cases which were averted during the 15 years after the millennium were attributed to the use of LLINs. Despite the increase in LLIN access, in recent years malaria has increased in several sub-Saharan countries (WHO, 2018). A similar trend was reported in Tanzania with malaria prevalence in children under 5 years old decreasing from 18% in 2007 to 9% in 2011 and then increasing to 14% in 2015 (NBS, 2016).

2.2.4 Individual Related Factors

There are some individuals who believe that mosquitoes bite at any time and that malaria can be transmitted anywhere, such people disregard basic practice preventive measures and do nothing to protect themselves from exposure to mosquitoes. According to Cooke *et al* (2015), it was reported that despite the high percentage (70.5%) of individuals that reported that they knew how the disease was transmitted; inadequate practices still existed and were an important factor in the incidence of malaria. These practices primarily included remaining in the garden/field or having a bath after 5 P.M. The prevalence was higher in individuals who engaged in daily activities at the time of highest mosquito density (very early in the morning and in late afternoon after 5). Individuals who answered to be out in the field during times of high mosquito density had a higher prevalence when compared to those that stayed at home. A similar study carried out by Yaya *et al.* (2017) found that 97.4% of women in the study indicated knowing that sleeping under a net is the best practice to prevent malaria. Despite this, about one-fifth of the women (20.4%) reported not using any bed net for children during the night. This shows that knowing about the prevention methods, causes and symptoms of malaria is one thing but employing preventive practices is another. Chirebvu *et al* (2014), in their study found that factors that

contribute to individual exposure to mosquito bites was limited use of personal protection methods such as taking anti-malaria tablets and use of aerosols and repellents. The cost of these prevention tools was observed to be a limiting factor especially in communities that lived below the national poverty datum line. Similar observations were made in Nouma, Burkina Faso (Yamamoto *et al.*, 2010), where the use of aerosols was not a popular method because of the costs associated with such measures. Minimum use of these simple measures not only affect individual exposure to mosquito bites but is also an indicator of very low socioeconomic status, which in itself has been proposed as an important factor associated with malaria.

Regarding bed nets (insecticide-treated nets), the study that was carried out by Mwanje (2013) in Uganda found that sleeping under bed nets was the most prevalent method of malaria prevention and control (87%). Despite the high prevalence of bed nets, the study further revealed that many community members did not use nets properly. It reported that some people used bed nets as curtains in their homes. The study also stresses that majority of the residents in the district were unable to afford nets so they relied on those that were freely issued by the government. Similar findings were observed in the study carried out by Mahesh *et al.* (2014) in Kolar, a rural area of India. The study revealed that the majority (83.3%) of respondents had the practice of utilizing bed net while remaining (16.7%) had no practice of using. However, respondents regarded bed nets as protecting against mosquito bites, and they did not associate them with malaria prevention. Alternative self-protection practices against mosquito bites included using a range of products and methods, from the burning of any material to produce smoke, to the use of mosquito coils. Given the prominent role that bed nets play in the fight against malaria, it can be said that care was not taken to teach people of the importance and how to effectively use the bed nets.

2.2.5 Health System Related Factors

Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes. It is evidence based professional knowledge and is critical for achieving universal health coverage. As countries commit to achieving Health for all, it is imperative to carefully consider the quality of care and health services. To achieve a world free of malaria, access to health facilities as well as provision

of medicines plays a very important role in the reduction of malaria cases. However health systems in malaria endemic countries face a series of challenges such as the need to identify populations at risk and cover them with effective preventive interventions, accurately diagnose and report cases and treat malaria patients with timely and high quality care. Constraints to delivery of essential services do not only cause inefficiencies, but can also hinder progress in malaria control (Galactionova *et al.*, 2015, Webster *et al.*, 2007 and Rao *et al.*, 2013). The World Health Organization (WHO) Global Technical Strategic plans consider health systems' readiness to expand malaria programmes (WHO, 2015). The recent enthusiasm for malaria eradication has rekindled the dialogue and interest in whether present day health systems are prepared for this bold endeavor (Gates 2014 *et al.*; Feachem *et al.*, 2019 and WHO, 2019).

In Eastern African countries, different healthcare interventions have been adopted for reducing the high prevalence of malaria and related mortality. Several studies have established that the incidence of malaria is reduced due to the preventive measures taken for combating the burdens of this communicable and neglected disease (Byakika-kibwika *et al.*, 2009). However, it was recently documented that its prevalence continues to remain high and that its burden leads to increased mortalities (Byakika-kibwika *et al.*, 2009; Mutombo *et al.*, 2018 and Mutisgirl-Murewanhem *et al.*, 2015). Several factors were documented as predisposing malaria patients to poor treatment outcomes. These include impaired consciousness, respiratory pain, season, and hypoglycemia and jaundice (Byakika-kibwika *et al.*, 2009; Marsh 1995 and Jallow *et al.*, 2012). A review of the literature indicated that the prevalence of malaria has reduced in countries such as Burundi, Rwanda, Kenya, Tanzania, South Sudan and Uganda but studies indicated that the prevalence of mortality due to malaria remained high in these regions. A study in Uganda stated that severe malaria was an important factor for high rates of malaria mortality and factors included mean duration of illness before getting antimalarial treatment, insecticide sprays, lack of protective measures and season (Byakika-Kibwika *et al.*, 2009). The rainy season increased the risk of death in patients with severe malaria (Hajison *et al.*, 2019). Other factors associated with malaria include non-use of mosquito nets, respiratory diseases, seizures, hypoglycemia, incorrect drug administration, age, sex, delayed

diagnosis, malaria involving *Plasmodium Falciparum* and poor immunity (Ferrira *et al.*, 2019).

In Rwanda, malaria was a major public health burden that lead to mortality and morbidity among Rwandans, particularly children under five and pregnant women. In its improved health system, Rwanda has made efforts to fight malaria through increasing awareness among the communities and all stakeholders in malaria responses and providing malaria prevention and control in all districts. Due to these efforts, there is a decrease in cases of severe malaria from 18,000 in 2016 to 3,000 in 2020 (NISR, 2015).

A study in Nchelenge district, Luapula Province, of Zambia, showed that despite the high coverage with vector control interventions, the burden of malaria in the district remained high. (Mukonka *et al.*, 2014). It is one of the reasons that the Zambian government has implemented a formal, coordinated National Malaria Control Program to fight the disease. The national strategy laid out four proven interventions to fight malaria, namely, insecticide-treated nets, indoor residual spraying, rapid diagnostic tests, and combination therapy drugs. Therefore, this research aims at assessing the prevalence and risk factors for malaria lethality amidst scaled up control intervention in Chiengwe district of Luapula province.

2.3 Scaled up Malaria Control Measures

Malaria not only remains a leading cause of morbidity and mortality, but it also impedes socioeconomic development, particularly in SSA of which an estimate of 515 million cases of malaria, killing between one and three million people, the majority of whom are young children annually (WHO, 2000). therefore, scaled up intervention have been set in place to reduce the burden of malaria across the globe.

Different countries have shown different control interventions set to fight against malaria with a view to improve malaria control in which countries like Malawian National Malaria Control Programme was established in 1984 (Chanda *et al.*, 2015). They are programmes initiated across Malawi are to set policies, institute strategies, coordinate, monitor and evaluate activities, provide technical assistance and mobilize resources for malaria control. Malawi Ministry of Health (2014) stated that the first two national malaria strategic plans

(1984–1989 and 1990–1994) that the programme developed had a focus on effective disease management and the programme has been distributing insecticide treated nets to children younger than five years and pregnant women countrywide. The vector control interventions of the programme remained small in scope and scale until 2007 when LLINs were delivered on a large scale. The programme scaled up the coverage of indoor spraying and other scaled up control measures which include LLINs, approaches for management of larval sources and insecticide resistance.

According to Price and Nosten (2014) stated that the Lancet Commission on Investing for Health determined recommended that right investments in scaling up existing health interventions and in developing new prevention, treatment, and surveillance tools, the world could achieve a what was regarded as grand convergence by 2035 in which the total number of deaths would be universally low levels and economic benefits exceeding cost by a factor. Price and Nosten (2014) indicated that utilization of scaled up control measures such as LMICs have aggressively adopted new tools have seen of which the three is reduction in the number of people getting sick. However, adoption alone of new and existing tools with poor implementation will have little impact on disease transmission in the long term.

According to a study conducted in Somaliland by Khadra and Saynab (2019) stated that there are a number of scaling up control measures on effective drugs which are available to treat malaria but speedy diagnosis and immediate treatment are essential. Khadra and Saynab (2019) further stated that regardless of effective drugs available for treatment of malaria majority of deaths from severe malaria in children are caused by not getting to a clinic in time in which some forms of malaria can be fatal within days or even hours once they develop, but malaria can usually be cured if treated quickly. Many people get treated and survive while others still suffer lasting health problems. Many people living in remote areas with little or no access to health services, more mobile staff and health outposts would reduce the time between diagnosis and treatment, and save lives are needed to reduce on late treatment and administering of drugs to patients (Price and Nosten, 2014).

According to Hemingway *et al.* (2016) stated that the effectiveness of scale-up of existing interventions is required, which includes the early treatment of malaria cases with ACTs,

intermittent preventive treatment for pregnant women (IPTp), and interventions that reduce human–vector contact, such as indoor residual spraying (IRS) or use of long-lasting insecticide-treated bed nets (LLINs). Hemingway *et al.* (2016) stated that scaled up intervention shall require not only new approaches for scaling up existing strategies for malaria treatment and prevention to address areas of high malaria transmission and interrupt parasite transmission, but also novel tools to counter the growing threat of drug and insecticide resistance and better surveillance mechanisms to more efficiently target interventions to populations and areas of high risk of malaria transmission

Zambia as the country has enacted different interventions for malaria control with a view of reducing the disease burden, several malaria control interventions were scaled-up which include case management with rapid diagnostic tests (RDTs) and artemisinin-combination therapy (ACT), distribution of long-lasting insecticidetreated nets (LLINs) and indoor residual spraying (IRS) (Mukonka *et al.*, 2014). As of 2013, an estimate of 24 million LLINs were distributed and six million houses were covered with IRS using various chemicals (pyrethroids: lambda cyhalothrin, deltamethrin, alpha-cypermethrin; organochlorine: dichlorodiphenyltrichloroethane (DDT); carbamates: bendiocarb and organophosphates: pirimiphos-methyl) (WHO, 2013). (Mukonka *et al.*, 2014) state that the National Malaria Control Centre (NMCC) facilitated the implementation of these control strategies with awareness campaigns and provided information and education communication (IEC) using behaviour change communication (BCC) techniques at the community level which are implemented across the country including Chiengi District.

CHAPTER THREE

METHODOLOGY

3.0 Methodology

3.1 Study Design

The study design was cross sectional study or survey using the quantitative and qualitative approach. Some scholars define quantitative research as “the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that the observations reflect,” and qualitative research as “the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings of patterns and relationships” (Babbie, 1992; Jensen and Jankowski 1991; Patton, 1990).

The cross-sectional study design was used because it covered the prevalence and the risk factors for malaria lethality in Chienge District. Further, this study was chosen as it was cheap and easy to undertake. On the other hand, the study also considered retrospective data (i.e. data from 2016 to 2021) which was helpful in calculating the prevalence of malaria by reviewing health reports in sampled health facilities of the district. This helped to analyze the prevalence trends of malaria in the entire population for the stated period. To assess the retrospective trend of malaria prevalence in the study areas implementing IRS and LLINs vector intervention measures, a 6-year malaria retrospective data (2016–2021) was obtained from Chienge District Health Information System data base.

3.2 Study Setting

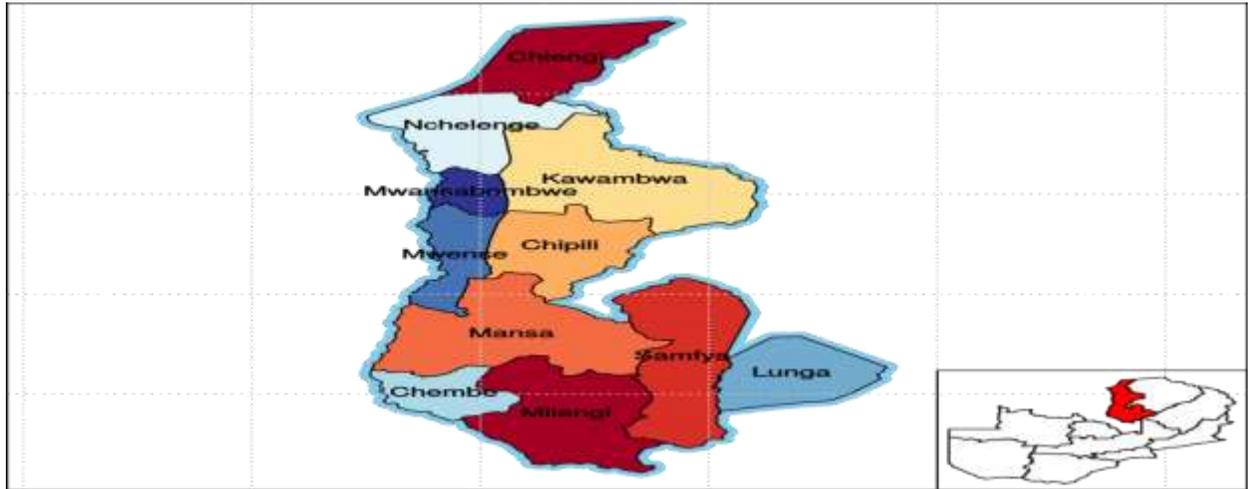


Figure 3.1: Map of Luapula Province of Zambia

Chiengi is one of the districts in Luapula Province of Zambia, which was formed out of Nchelenge District. The district is bordered by Kaputa District in the North, by Nchelenge in the South, and in the west, Chiengi shares the Lake Mweru with the Democratic Republic of Congo. The district has a human population of approximately 109, 000 and an annual growth rate of 2.8 (CSO, 2021). The district is located on latitude: $-8^{\circ} 37' 59.99''$ S and longitude: $29^{\circ} 09' 60.00''$ E. The district occupies an area of 14,058 square km.

The rain season for Chiengi District is between November to April of each year and the average annual rainfall is around 583.87 mm. Further, the average annual minimum and maximum temperatures are 25°C and 33°C , respectively. Malaria transmission peak time was during the rainy season, whilst the other months the transmission was moderately low and the malaria burden varies considerably from year to year. The people of Chiengi District were predominantly fishermen and they combine this with agriculture crop production for their livelihood. This population lived in fishing villages along the 70 km of the north-east shore of Lake Mweru which lies within the district.

The important consideration for Chiengi District as a study area was that it was found in the zone of the northern parts of Zambia namely Luapula, Northern, North-western and Muchinga provinces with the highest malaria prevalence of above 20% at the peak of the transmission season. Besides, the vision of the Government of the Republic of Zambia

states that, “A Nation of Healthy and Productive People”. The high recorded cases of malaria in the district which made people to be unproductive due to sickness and lost man hours and other devastating effects.

3.3 Study Population

A study population was the entire population in which the researcher was interested or the entire aggregation of cases that meets designated set of criteria (Polit and Hungler, 1997). The targeted populations of the research study are all the people who were susceptible to malaria in Chiengi District.

3.3.1 Inclusion and Exclusion Criteria

3.3.1.1 Inclusion Criteria

Inclusion criteria are basically features that the subjects or elements need to have to belong to the intended population (Burns, 2009). Under the inclusion criteria, in considered were all the adults who were above the age of 18 years and who signed consent form.

3.3.1.2 Exclusion Criteria

Exclusion criteria are those characteristics that could cause a person or element to be excluded from the target population (Burns, 2009), this study excluded people who did not seek health services related to malaria in the district. The other aspect was that any subject who did not sign an informed consent and those below the age of 18 years. Finally, Any person or subject who came for visiting and or on transit or not a permanent resident of Chiengi District.

3.4 Sampling

Wimmer and Dominick (1997: 61) defined a sample as “a subset of the population that was representative of the entire population”. Further, they stated that, “a sample that was not representative of the population, regardless of its size, was inadequate for testing purposes because the results cannot be generalized” (ibid, 1997: 61).

3.4.1 Sampling Method

This research used a simple random sampling in selecting the participants to take part in the study. A simple random sample was a randomly selected subset of a population. In this sampling method, each member of the population had an exactly equal chance of being selected. The random sampling literally means selection of the sample randomly from a population, without any specific conditions.

Therefore, all selected participants were enlisted on a piece of paper and allocated special identification numbers. Then a rotary method was used to pick the participants by the use of these special identification numbers. In the lottery method, the sample was chosen at random by using a computer program that simulated auto generation of numbers. These numbers that was generated was part of the sample. This process was repeated until the required sample size of 384 was met and the process was done without repeating the numbers.

3.4.2 Sample Size Determination

The sample size was estimated according to Krejcie and Morgan (1970). The following was the calculation of the sample size. The degree of accuracy was at 0.05 whilst the prevalence of Malaria in Chiengi was estimated at 0.5% of the total population.

$$S = \frac{X^2 NP(1 - P)}{d^2 (N - 1) + X^2 P(1 - P)}$$

Where

S was the Required Sample Size

N was the given population size

P was the Prevalence

d² was the degree of accuracy

X² was 1.96 Confidence level

$$S = \frac{1.96^2 190000*0.5(1-0.5)}{0.05^2 (190000-1)+1.96^2*0.5(1-0.5)} = 383.38684$$

Therefore, a minimum sample size of **384** was selected from the population.

3.5 Data collection and Tools

The data that was collected used both the primary and secondary data sources. For primary data, a questionnaire was used which contained both closed and open ended questions. The question was administered after obtaining consent from the respondents, to obtain information on demographic characteristics, socio economic status, house construction and quality, education, access to and use of LLINs and other malaria preventive measures and risk factors.

The secondary data was involved analyzing the records that are kept by the Chiengi District Health Office. The analysis was involve looking at the hard copies of the malaria registers and reports including RDT and microscopy testing records, and the District Health Information System (DHIS) data base also analyzed. A special checklist had been developed that was used in the extraction of the data; see annex 2.

3.6 Data Processing and Analysis

Primary data was processed and analysed using the Statistical Package for Social Sciences (SPSS) computer software version 20 0 (SPSS Inc., Chicago, IL, USA, 2011) software. This package was used due to its propensity to quickly analyse large volumes of data gathered through various methods of research. It also makes difficult analytical tasks easier and prevents one from making mistakes or even forgetting certain details or items. The package was also be used because of the ability of the software to easily and automatically convert data into statistical charts, percentages and mathematical manipulation that was easily dealt with using the in-built functions of the package. Microsoft excel was used to convert the charts produced by SPSS into well designed and appearing charts with colourful background. Data collected through detailed interview guides were content analysed and grouped into categories which was tabulated manually.

Then, the study findings was explained in words, tables, and graphs. Descriptive statistics (frequency and cross tabulations) was also be used. In terms of statistical analysis, chi-square tests and logistic regression analysis was used for statistical analysis to show a significant difference between variables. A P-value of <0.05 was considered as statistically significant. The risk factors are going to be analyzed using the multi regression analysis

and risk matrix index to identify the variables that have an influence in the malaria lethality. To confirm the outcome, the data collected were subjected to further analysis using Stata12 data analysis tool.

The analysis part of the prevalence, for the years 2016 and 2021 in Chiengi District was done through the secondary data which was collected and analyzed from the district. Thereafter, the prevalence was calculated for each of the years by use of the formula below:

The prevalence of malaria was calculated using the following formula:

$$\text{Prevalence of Malaria} = \frac{n}{T} \times 100$$

Where: n = the number of cases of malaria recorded in 2016 and 2021 respectively

T = the total population during the year under review.

To maintain the quality of generated data, it was checked for completeness and cleanness before starting the analysis.

3.7 Pilot Study

A pilot study was a mini-version of a full-scale study or a trial run done in preparation of the complete study. This was done in order to get an overview of the availability of the required information, as well as to assess the viability of the proposed methods and data collection tools of to be used in the study. The pilot study used 10% (39) of the calculated sample size translating in 39 participants and it was done in the neighboring town of Nchelenge to help assess the data collection tools to be used in the study as the area had similar problem.

3.8 Ethical Consideration

Ethical clearance for the study was obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC), after approval by the University of Zambia, Directorate of Research and Graduate Studies (DRGS) through the Assistant Dean- Post Graduate school of Public Health. Further, official permission was obtained from the Permanent Secretary, Ministry of Health, Provincial Health Office, Chiengi District Health

Office, and the local Health Centers including community leadership (Headmen and civic leaders). On the other hand, written informed consent was obtained from the study participants before enrollment. Detailed explanation of the study was done to participants which enabled them to participate voluntarily. Confidentiality and privacy was strictly be maintained at all times to protect the rights and dignity of people involved in the study.

3.9 Dissemination of Information

The information obtained from the data collection process was used to compile the final research report which was submitted to the Department of Public Health, University of Zambia, the Ministry of Health, Chiengwe General Hospital, Chiengwe District Office, UNZABREC and ERES Converge as proof of having carried out the research.

CHAPTER FOUR

INTRODUCTION

4.0 Introduction

The chapter presents the findings collected from the field as primary data on an assessment of prevalence, trends and risk factors for malaria among the residents of Chienge District. The findings have been presented into figures and tables. The study involved 384 participants who full willingly participated and signed consent form.

4.1 Socio-demography

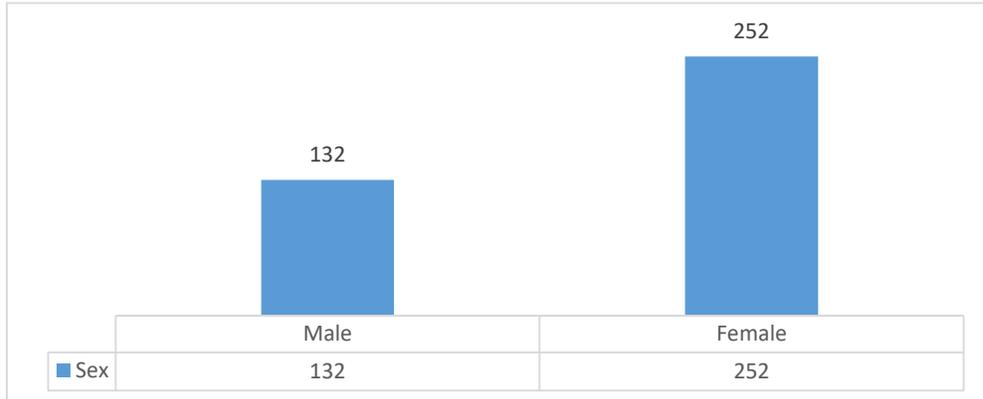


Figure 4.1: Participants sex

The figure above indicates the sex of the participants in the research of which 132 (34.4%) were male and the majority 252 (65.6%) were female. This portrays a picture that the study involved more women than men.

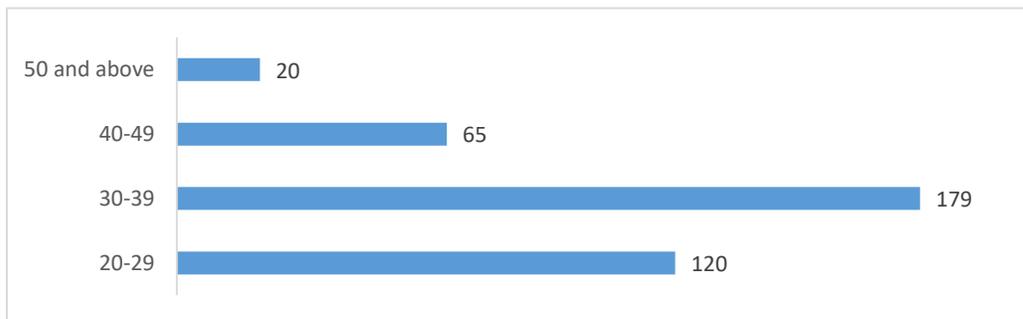


Figure 4.2: Participants age range

The study on participants age shows that, the majority 179 (46.6%) were in the age range between 30-39. 120 (31.2%) were in the age range between 20-29 and the minority 20 (5.2%) were 50 years and above.

Table 4.1: Participants level of education

	Frequency	Percent	Cumulative Percent
No formal education	31	8.1	8.1
Primary education	132	34.4	42.4
Secondary education	181	47.1	89.6
Tertiary education	40	10.4	100.0
Total	384	100.0	

The study on participants on level of education indicates that, 31 (8.1%) had no formal education, 132 (34.4%) reached primary level, 181 (47.1%) reached secondary level, 40 (10.4%) reached tertiary level. This showed that the illiteracy level in the area is low.

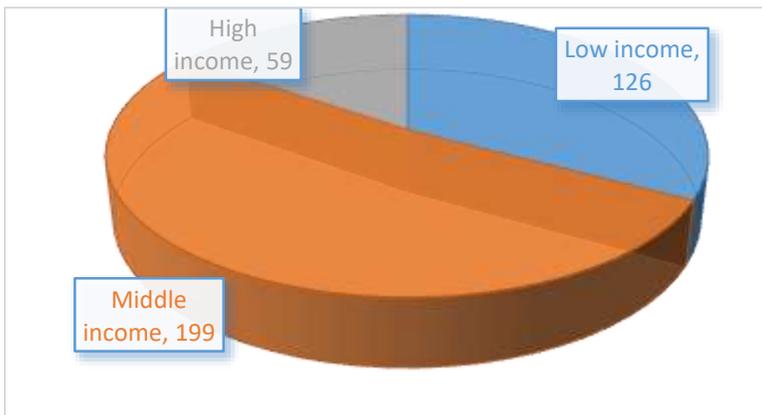


Figure 4.3: Participants level of income

The study on participants level of income showed that 126 (32.8%) were in low income level, 199 (51.8%) were in middle income level and 59 (15.4%) were in high income level.

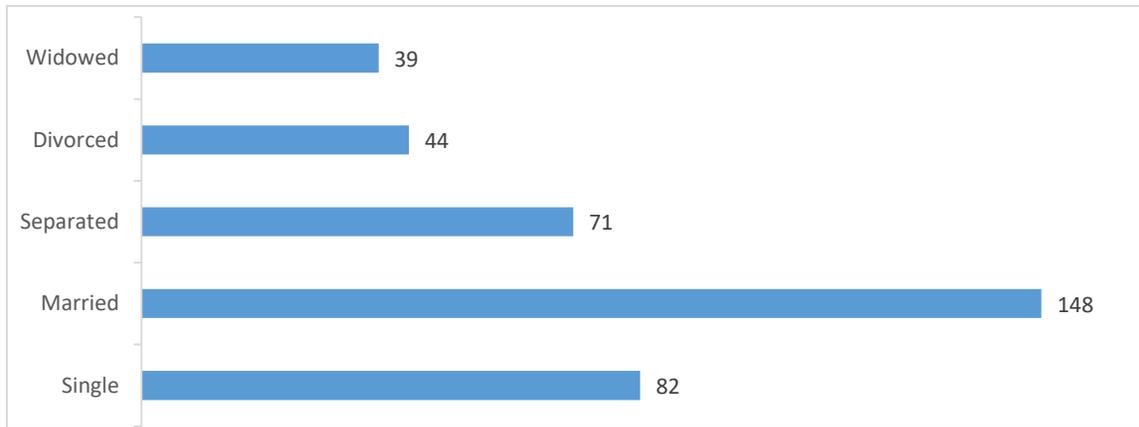


Figure 4.4: Marital status

The figure on participants marital status showed that 82 (21.4%) were single, 148 (38.5%) were married, 71 (18.5%) were on separation, 44 (11.5%) were divorced and 39 (10.2%) were widowed.

Table 4.2: Participants occupation

	Frequency	Percent	Cumulative Percent
Farmer	106	27.6	27.6
Fisher	156	40.6	68.2
Business	78	20.3	88.5
Other specifics	44	11.5	100.0
Total	384	100.0	

The table on participants occupation indicated that the majority 106 (27%) were farmers and 156 (40.6%) stated fishing. These are the major occupation accounting for 68.2% of the participants sources of income for the families.

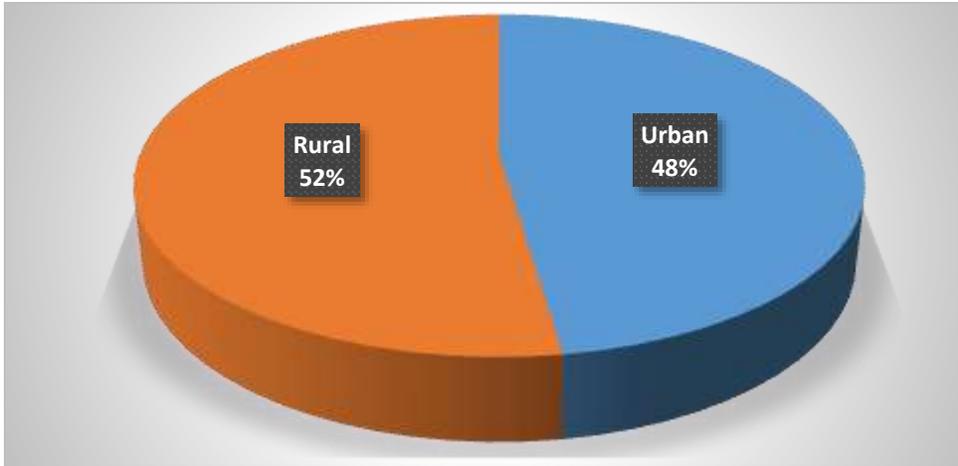


Figure 4.5: Residential area

On participants residential area showed that 183 (47.7%) were in peri-urban or urban and 201 (52.3%) were in rural.

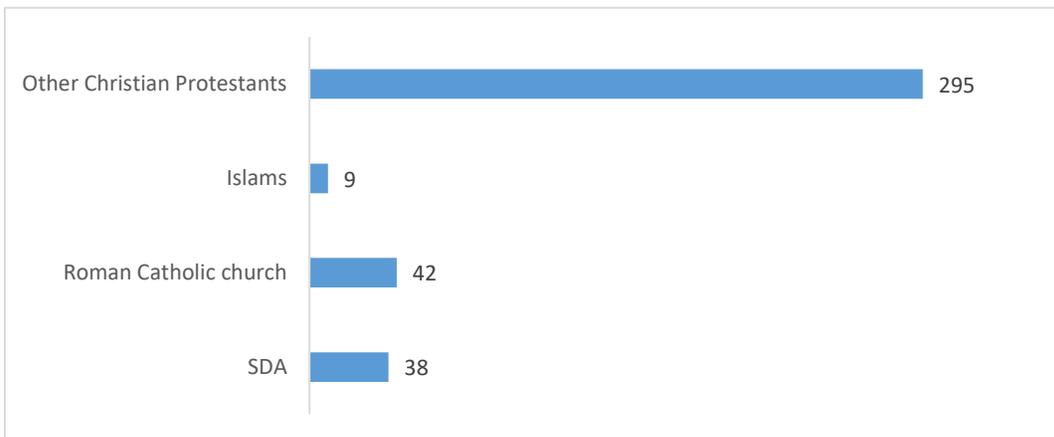


Figure 4.6: Participants denomination

On Participants denomination showed that 38 (9.9%) were SDA, 42 (10.9%) were Roman Catholic, 9 (2.3%) were Islams and the majority amounting to 295 (76.8%) were from other Christian Protestants.

4.2 Scaled up control intervention

Table 4.3: Having Scaled up control intervention for malaria in the area

	Frequency	Percent	Cumulative Percent
Yes	247	64.3	64.3
No	137	35.7	100.0
Total	384	100.0	

The study on having Scaled up control intervention for malaria in the area showed that 247 (64.3%) of the participants stated yes and 137 (35.7%) of the participants stated no. The study showed that they are has scaled up control intervention for malaria which is strictly followed to reduce the trends of malaria

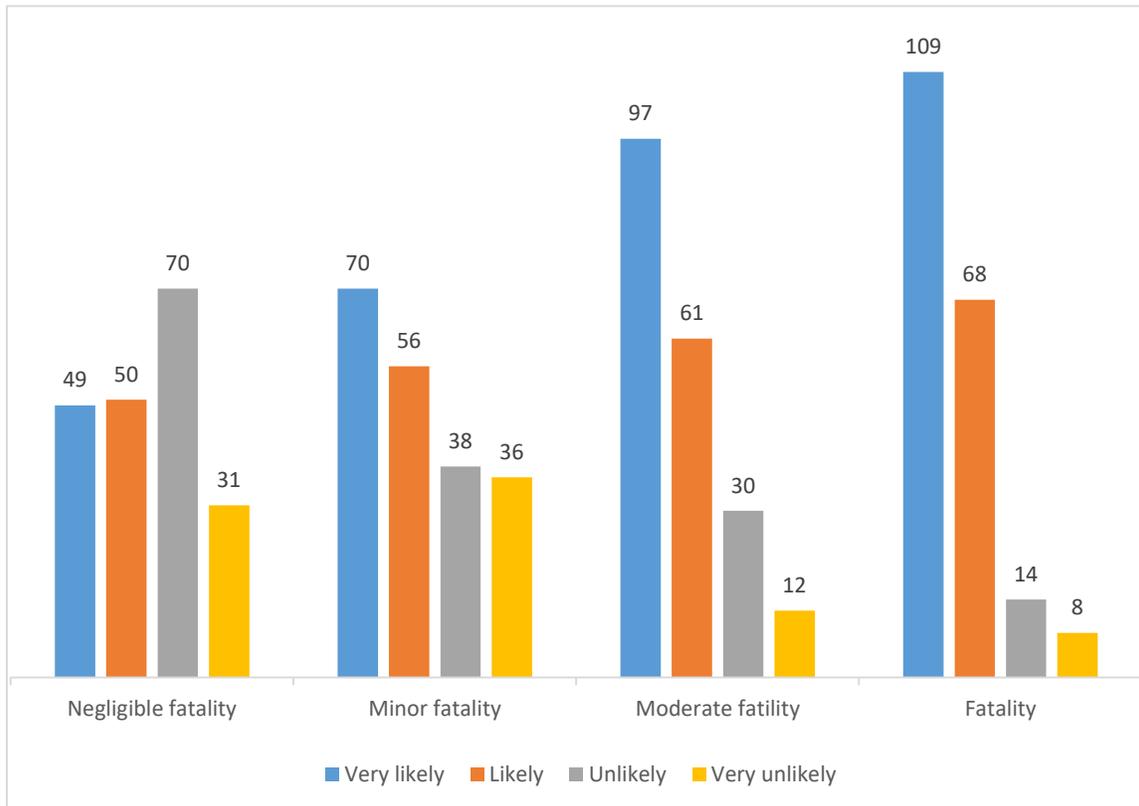


Figure 4.2.7: Risk factors for malaria lethality

Responses on likelihood consequences for malaria lethality on malaria fatality the of which the participants did not fully participant on the question due to lack of knowledge on estimation of the risk likelihood of malaria of which 200 participants participants on each variable on negligible fatality the majority 70 (35%) stated unlikely, 50 (25%) stated likely, 49 (24.5%) stated very likely. On minor fatality the majority 70 (35%) stated very likely and 56 (28%) stated likely to occur. On moderate fatality showed that the majority (48.5%) stated very likely and 61 (30.5%) stated likely occurs. On major fatality showed that 109 (54.5%) stated very likely to occur and 68 (34%) stated likely occurs.

4.3 Effectiveness of Diagnostic Methods of Malaria

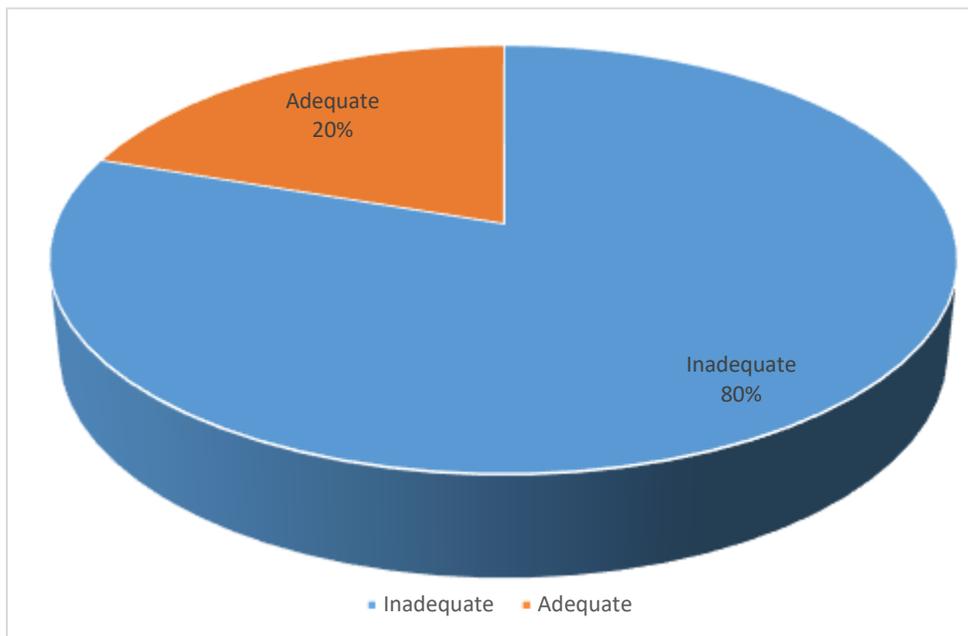


Figure 4.3.8: Rating of health personnel availability

The table on participants rating the number of health personnel available in health facilities to diagnose malaria showed that the majority 308 (80%) stated inadequate and only 76 (20%) stated adequate.

Table 4.4: Effectiveness of Diagnostic Methods of Malaria

Parameter		Frequency/Percentage		P-Value (Scaled up control intervention)
Ever suffered from Malaria in the last one month	Yes	339	88.3	0.000
	No	45	11.7	
Seeking health services at the health facility when sick	Yes	158	41.1	0.002
	No	226	58.9	
Tested for Malaria before commencement of treatment	Yes	257	66.9	0.025
	No	127	33.1	
Type of diagnostic test did the staff use	RDT	253	65.9	0.611
	Microscopy	131	34.1	
The outcome of the test	Positive	278	64.4	0.286
	Negative	106	27.6	
Aware that RDT is an effective method for testing malaria	Yes	301	78.4	0.163
	No	83	21.6	
Aware that microscopic diagnosis of malaria is effective	Yes	96	25.0	0.119
	No	259	67.4	
	I don't know	29	7.6	
Health facilities have well trained personnel to diagnose malaria	Yes	279	72.7	0.478
	No	64	16.7	
	I don't know	41	10.7	

The study on participants having ever suffered from Malaria in the last one month showed that, 339 (88.3%) stated yes. The p-value indicated was 0.000 which indicated that there

an association between malaria prevalence and likelihood of malaria fatality among the general public. On seeking health services at the health facility when sick showed that, 158 (41.1%) of the participants stated yes and 226 (58.9%) stated no. This showed participants do not understand malaria lethality. On participants having been tested for Malaria before commencement of treatment showed that 257 (66.9%) stated yes and 127 (33.1%) stated no. The p-value on the variable was 0.025 which was less than the level of significance for the study of 0.05. This indicated that there is an association between malaria prevalence and scaled up malaria control interventions implemented in the catchment area. On the type of diagnostic test which the staff used showed that the majority 253 (65.9%) stated RDT. The p-value indicated was 0.611 which more than the level of significance of 0.05. This showed that there was no association between malaria prevalence and malaria lethality and effectiveness of Diagnostic Methods of Malaria. On outcome of the test indicated that 278 (64.4%) of the participants recorded positive results. This showed that there are high records of malaria among the people. The p-value recorded was 0.286 which showed that there was no association between malaria prevalence and malaria lethality. On awareness that RDT is an effective method for testing malaria showed that, 301 (78.4%) stated yes. On aware that microscopic diagnosis of malaria is effective showed that the majority 259 (67.4%) stated no. On health facilities have well trained personnel to diagnose malaria showed the majority 279 (72.2%) stated yes. The p-value was 0.478 which was more than the level of significance. This concludes that there was no association between trained personnel doing the diagnosis and malaria prevalence in the catchment area.

Table 4.5: Effectiveness of Diagnostic Methods of Malaria Risk Estimate

		95% Confidence Interval	
		Lower	Upper
Odds Ratio for Scaled up control intervention (Yes / No)	3.123	1.649	5.912
For cohort Ever suffered from Malaria in the last one month = Yes	1.155	1.055	1.263
For cohort Ever suffered from Malaria in the last one month = No	.370	.212	.646
N of Valid Cases	384		

In the two dichotomous variables, a 2 x 2 contingency table or cross-tabulation the study computed risk ratios and odds ratios. The Odds Ratio for Scaled up control intervention (Yes / No) was 3.123, for lower at 95% Confidence Interval it was 1.649 and upper at 95% Confidence Interval was 5.912. The study odds on indicated that effectiveness of Diagnostic Methods of Malaria Risk Estimate was 1.649 which was less than cases which concluded that there was an Effectiveness of Diagnostic Methods of Malaria Risk Estimate in control intervention than the cases.

The risk ratio was interpreted to mean that malaria lethality are 1.155 times as likely to have lower malaria fatality for those who had malaria and .370 risk ratio is interpreted as who did not have malaria. The study odds on indicated that effectiveness of Diagnostic Methods of Malaria Risk Estimate was 1.155 which was less than cases which concluded that there was an Effectiveness of Diagnostic Methods of Malaria Risk Estimate in control intervention than the cases.

Notice that the 95% Confidence Interval for each ratio on the Lower and Upper bounds are either greater than 1.0 (i.e., 1.055 and 1.263) for those who said yes and less than 1.0 (0.212 and 0.646). This indicates that the risk ratios are statistically significant. A risk ratio of 1.0

would indicate that those who never had malaria are equally likely to have low malaria lethality as participants who had malaria.

The study on the trend in malaria prevalence among the participants did not uniformly change between 2016-2021. Prevalence of malaria was characterized by a slight change in either lethality or fatality. On the other hand, from 2016 to 2021, the prevalence showed an abrupt decrement and increment depending on the season of the year.

4.4 Effectiveness of Malaria Treatment

Table 4.6: Effectiveness of Malaria Treatment

Parameter		Frequency/Percentage	P-Value
Last one year, have you ever been treated for malaria	Yes	323	84.1
	No	61	15.9
What type of medication were you given	Coartem and panado	324	84.4
	Any other	60	15.6
Agree that coartem can eradicate malaria	Strongly Agree	151	39.3
	Neutral	233	60.7
Ever used herbal medication for the treatment of malaria in the last year	Yes	252	65.6
	No	132	34.4
Malaria drugs always available in your health facility	Yes	221	57.6
	No	135	35.2
	I don't know	28	7.3
Patients diagnosed with malaria always treated on time in health facilities	Yes	137	35.7
	No	213	55.5
	I don't know	34	8.9
Medical Stores Limited supply your district with anti-malaria drugs in good time	Yes	190	49.5
	No	194	50.5

The valuable was fully answered by 384 participants of which on last one year, having ever been treated for malaria showed that the majority 323 (84.1%) stated yes. The study showed a p-value of 0.007 which was less than the level of significance. This concludes that there is association between malaria lethality and prevalence among the people in the community. On what type of medication were given the majority 324 (84.4%) stated Coartem and panado. The study showed a p-value of 0.003 which translates that there is an association between malaria trend in lethality and malaria prevalence. On participants agreeing that coartem can eradicate malaria showed that 151 (39.3%) strongly agreed and 233 (60.7%) of the participants were neutral which showed a p-value of 0.031 which was less than the level of significance which concluded that there was an association between malaria lethality and malaria prevalence in the community. On having ever used herbal medication for the treatment of malaria in the last year showed that 252 (65.6%) stated yes. On Malaria drugs always available in the health facility showed that 221 (57.6%) of the participants stated yes and 132 (34.4%) stated no. On patients diagnosed with malaria always treated on time in health facilities showed that the majority 213 (55.5%) stated no and 137 (35.7%) stated yes. On medical Stores Limited supply the district with anti-malaria drugs in good time showed that 190 (49.5%) stated yes and 194 (50.5%) stated. No. The p-value for the valuable question was above the level of significance which concludes that there is no association.

Table 4.7: Effectiveness of Malaria Treatment Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Scaled up control intervention (Yes / No)	2.115	1.217	3.678
For cohort Last one year, have you ever been treated for malaria = Yes	1.135	1.026	1.257
For cohort Last one year, have you ever been treated for malaria = No	.537	.340	.847
N of Valid Cases	384		

The Odds Ratio for Scaled up control intervention (Yes / No) which was computed in the cross-tabulation was 2.115 of which at 95% Confidence Interval in the lower level was 1.217 and in the upper at 95% Confidence Interval was 3.678. The risk ratio was interpreted to mean that malaria lethality are 1.135 times as likely to have malaria fatality for those who had malaria and 0.537 risk ratio is interpreted as who did not have malaria. The study odds on indicated that effectiveness of Diagnostic Methods of Malaria Risk Estimate was 1.135 which was less than cases which concluded that there was an Effectiveness of Malaria Treatment in control intervention than the cases. Notice that the 95% Confidence Interval for each ratio on the Lower and Upper bounds are either greater than 1.0 (i.e., 1.026 and 1.257) for those who said yes and less than 1.0 (0.340 and 0.847). A risk ratio of 1.0 would indicate that those who never had malaria are equally likely to have low malaria lethality as participants who had malaria.

Table 4.8: Community health workers effective in treating malaria

	Frequency	Percent	Cumulative Percent
Yes	188	49.0	49.0
No	196	51.0	100.0
Total	384	100.0	

On Community health workers effective in treating malaria showed that 188 (49%) of the participants stated yes and 196 (51%) stated no.

Table 4.9: Community health workers effective in treating malaria Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.039 ^a	1	.843
Continuity Correction ^b	.008	1	.927
Likelihood Ratio	.039	1	.843
N of Valid Cases ^b	384		

The Crosstab above shows a 2X2 Pearson Chi-Square computation which indicated a p-value of 0.843 in Asymp. Sig. (2-sided). The study showed that there was no association between Scaled up control intervention and malaria prevalence amidst community health workers effective in treating malaria.

4.5 Effectiveness of Preventive measures in the Control of Malaria

Table 4.10: Effectiveness of Preventive measures in the Control of Malaria

Parameter		Frequency/Percentage	P-Value
Own an Insecticide Treated Mosquito net	Yes	198	51.6
	No	186	48.4
Sleep under a mosquito net last night	Yes	198	51.6
	No	186	48.4
Last time that government distributed free mosquito nets	Year- 2022	167	43.5
	Year- 2021	171	44.5
	I don't remember	46	12.0
Ever bought your own Mosquito net before using own money	Yes	198	51.6
	No	186	48.4
Think household distribution of Insecticide Treated Nets (ITNs) can prevent malaria	Yes	188	49.0
	No	154	40.1
	I don't know	42	10.9
Indoor Residual Spraying (IRS) is effective in preventing malaria	Yes	95	24.7
	No	156	40.6
	I don't know	133	34.6
Distance to the health facility hinders people in your community to go for malaria test	Yes	98	25.5
	No	184	47.9
	I don't know	102	26.6

Own an Insecticide Treated Mosquito net showed that 198 (51.6%) stated yes and 186 (48.6%) stated no. The p-value showed was 0.045 which was less than the level of significance. Sleep under a mosquito net last night showed that t 198 (51.6%) stated yes and 186 (48.6%) stated no. The p-value for the study was 0.045 which was less than the level of significance which entails that distribution of ITNs is an effectiveness of Preventive measures in the Control of Malaria. This showed that people utilization and ownership of ITNs has potential to reduce the number of cases of malaria. On participants last time that government distributed free mosquito nets indicated that 167 (43.5%) stated in 2022 and 171 (44.5%) stated in 2021. The p-value for the study was 0.144 which was more than the level of significance which indicated that there was no association between malaria prevalence and malaria cases in the area as even amidst distribution programme campaign the number of malaria cases continues. The study on participants ever bought your own Mosquito net before using own money indicated that 198 (51.6%) stated yes and 186 (48.6%) stated no of which the p-value for the study was 0.574 which was more than the level of significance which indicated that there was no association between malaria prevalence and malaria cases. On participants anticipation that household distribution of Insecticide Treated Nets (ITNs) can prevent malaria revealed that 188 (49%) stated yes and 154 (40.1%) stated no of which the p-value for the study was 0.022 which was indicating that there was an association between malaria cases and distribution of ITNs. On Indoor Residual Spraying (IRS) being effective in preventing malaria showed that 156 (40.6%) stated yes and 133 (34.6%) stated that they did not know the truth the p-value for the study was 0.008 which indicated that there was an association between malaria prevalence and effective measures implemented in the fight. On distance to the health facility hinders people in community to go for malaria test showed that 184 (47.9%) stated no and 102 (26.6%) stated did not know much.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.0 Introduction

The chapter discussed the findings collected as primary data from the field. The chapter was divided into sections based on the objectives of the study under discussion.

5.1 Socio-demography

The study findings on participants socio-demographic features indicate that many factors such as economic condition, type of dwelling and education had an influence adherence to malaria prevention and treatment which compromises the effectiveness of scaled up control measures implemented in Chiengde District. The trends and risk factors for malaria among the residents of Chiengde District are fatal due amidst the scaled up control measures of which the district may have more challenges preventing malaria infection due to overcrowding, lack of proper water supply and lack of appropriate drainage systems. The district strives to have zero malaria zone which has been achieved and between 2016-2022, many scaled up control measures were implemented. On education level, the study showed that there is knowledge on trans-mission and prevention of malaria but not much due to high levels conceptions about the transmission of malaria of which the people who had poor knowledge about malaria seemed to have poor treatment-seeking behavior. A similar study from Khadra and Saynab (2019) showed that countries such as Somaliland faces several difficult challenges when it comes to malaria due to Socio-demography feature of which the country does not have the monetary and human resources to achieve satisfactory coverage of health care for the whole population. Chamatambe (2020) revealed that Malaria is a leading cause of morbidity and mortality in Malawi due to demographic features in different palaces such as lack of knowledge and poor implementation of preventive measures. In the study, it was observed that participants who were near to mosquitoes breeding site was high and participants who live near to the health facilities and those who live at distant from health facilities did not have difference in malaria positivity.

5.2 Scaled up control intervention and malaria prevalence among the people

The study showed that Chieng District have continued to strive to achieve the World Health Organization (WHO) Global Technical Strategy for Malaria 2016–2030 (WHO-GTS) sets of the goal of universal access to malaria prevention, treatment and diagnosis which are aimed at reducing malaria-related morbidity and mortality or sick factors through early diagnosis and treatment of clinical and severe malaria, vector control with long-lasting insecticide-treated bed nets (LLINs) or indoor residual spraying (IRS) and chemoprevention for high-risk groups for the most vulnerable groups such as infants, children in areas of seasonal transmission, pregnant women. Regardless of the scaled up control interventions, the district have continued to record high records of malaria prevalence (WHO, 2015). This tarry with the findings from a study which was conducted by Chamatambe (2020) which showed that over 35% of all Out Patient Department (OPD) consultations are due to malaria for both children under five and adults. Malaria is also one of leading causes of in-patient admissions in hospitals of which was ranked as 4th leading cause of deaths of in under-five children globally and 5th cause of deaths of hospital in adults (Chamatambe, 2020). A similar study which was conducted in Ethiopia showed that the overall five years Malaria trend analysis of Central, North and West Gondar zones indicates that the incidence of confirmed outpatient and inpatient malaria cases were increased from 220,406 (22%) in July 2013– June 2014 to 249,474 (25%) in July 2015– June 2016 and decreased to 139,296 (14%) in July 2017–June 2018 which is still high regardless of scaled up measures.

5.3 Effectiveness of Diagnostic Methods of Malaria

The study showed that early diagnosis of malaria among the people was implemented regardless of poor results in reducing the number malaria cases among the people. The study noted that the National Malaria Policies and Strategies was early diagnosis of which between 2016 report-2022 report many amounting to 100% of suspected malaria cases are diagnosed using Rapid Diagnostic Tests (RDTs) or microscopy within 24 h of fever onset. The study utilization of RDTs was highly used in the district because it is fast and affordable method for malaria diagnosis of which it is easy to deploy in resource-limited

and hard-to-reach settings. The personnel training required is much less intensive as compared to microscopy and PCR. However, some community health workers are unable to perform the test in their communities and prescribe treatment or refer patients to healthcare centers as false negatives were becoming more common due to parasites with pHRP-2 gene deletion and prozone phenomenon in patients with high parasitemia (Wilson, 2012). Poor diagnosis of malaria among the people have high lethality among the people especially those who are not treated.

5.4 Effectiveness of Malaria Treatment

The study showed that coartem and panado is a common drug used for treatment in the area. However, some people in the area have resorted to utilization of herbal drugs due to poor access the health facilities to get free drugs. The study further showed that that taking both antimalarial and antibiotic treatments into account, RDTs are cost effective compared with presumptive treatment up to high levels of *P. falciparum* malaria prevalence among patients with febrile illness presenting to rural or peri-urban health facilities. The study showed that many people have little knowledge on signs and symptoms of malaria of which malaria being a febrile illness and clinical symptoms of uncomplicated malaria include fatigue, headaches, muscle aches, malaise, abdominal discomfort, fever, nausea and vomiting but people who do not the condition buys the drugs in drug stores to commence treatment without proper test. Specific diagnostic methods which are needed to differentiate between malaria and other febrile illnesses are not properly followed. The early diagnosis of malaria can prevent further progression and lower the severity of the disease. According to WHO (2019) stated that treatment is critical for children under five years of age who accounted for about 67% of the deaths in 2018 due to severe malaria worldwide. According to Afoma and Kumar (2020) stated that the most effective treatment of malaria is utilization of recommended drugs and ensuring that people comply with articulated time to have a proper treatment.

5.5 Effectiveness of Preventive measures in the Control of Malaria

The study showed that Chiengi District have implemented the strategies recommended by WHO on malaria control and elimination strategies which includes access to all

interventions aimed at reducing malaria prevalence of which the district was active in implementing improved case management, and scale-up of long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) and early diagnosis and treatment and environmental managements. However, regardless of intervention which have been implemented utilization of ITN was high, still IRS has not been largely implemented and known as one of the major vector control measures in household of study participants due to negative attitude toward the spraying indoors. The study showed that the act of spraying has not improved as there is still low coverage of IRS in the area and other interventions together with ITNs which have not reduced the burden and transmission of malaria especially among the high risk groups of the population such as under five children and pregnant women. According to a similar study conducted by Lankir *et al.* (2020) found similar findings of which the study concluded that a stronger malaria surveillance systems could be enabled in endemic regions, to prevent outbreaks and resurgences, to track progress, and to hold governments and the global malaria community accountable from the updated information. To attain zero malaria prevalence amidst scaled up intervention there is need of proving adequate information to prioritize the most affected areas by malaria in different years and months and also may give baseline information for further study (Sheet, 2016). The utilization of ITN is a powerful vector control tool for prevention of malaria transmission even the though the study revealed that those participants who slept under ITN decreased 3 times less the risk of malaria positivity compared to those who did not sleep under ITN.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

The chapter presented the conclusion and recommendations of the study. The study was generalized based on the primary data collected from the field. The study involved 384 from which the conclusion has been drawn.

6.1 Conclusion

The study concluded that the trends of total clinical and confirmed malaria cases between 2016-2022 did not decrease and the rate of infection and diagnosis, treatment and setting of control intervention effort were high. The study showed that the proximity of residence to stagnant water and the use of ITNs are the most dominant risk factors for malaria infection. Improved access to all malaria interventions is needed to interrupt the transmission at the community level with a special focus on the at-risk group. The study showed that distribution of ITNs coverage is important factor to achieve significant reduction in malaria morbidity and mortality. Chiengi District combined both mass distribution of nets and provision of free treatment of malaria. The use of insecticide treated bed-nets is instrumental in prevention of malaria among the people. To reduce the lethality of malaria among the people, there is continued providing of nets to at risk groups offer partial protection because majority who might be reservoirs for malaria parasites are exposed.

6.2 Recommendations

1. Chiengi District needs to establish methods of increasing the levels of awareness of the people regarding the diseases through health education can be a vehicle to transform ideas, health education scaled up control measures can be explained in the community through formal education in the school curriculum, different media, and community based organizations.

2. Chiengi District Malaria Elimination should strengthen the existing health care systems by providing manpower, equipment, drugs, capital and other necessary materials so that early diagnosis and prompt treatment would be easy.
3. There is need for homes and surrounding environment should be kept clean: sewages must be properly disposed, weeds must be cleared often and stagnant water in gutters and cans should be kept dried.
4. The district administration should engage local leaders in their attempt to operationalize the district health plan Local community involvement is critical to any malaria prevention plans whether national or local in scope.
5. The health facilities needs to make sure that RDTs available at the health post and in local pharmacies and retail shops in resource limited settings

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APPENDICES

Appendix 1: Budget

ITEM	QUANTITY	UNIT COST (K)	TOTAL COST (K)
Research Assisstant	60	10	600
Note book	2	20	40
Data analysis tools	1	1350	1350
Back up External Drive	1	500	500
Pens	4	2.5	10
Printing out of Final Report	10	80	800
Binding of Final Report	10	150	1500
Ethical Clearance from UNZABREC (fee)	1	250	250
Ethical Clearance from UNZABREC (transport)	2	500	1000
Transport refund to Key informants	160	20	3200
Transport Hire for Data collection	20	100	2000
Transport to and from Chiengi District	10	150	1500
Airtime	1	200	200
Lunch	160	20	3200
Miscellaneous	1	1000	1000
TOTAL			17,150

Appendix 2: Action Plan

No.	ACTIVITY	DATE	RESPONSIBLE OFFICER	PERSON / DAYS
1	Preparing proposal, submission	June	Principle Investigator	1 x 30 days
2	Adjusting research instruments	July	Principles Investigator	1 x 7 days
3	Application for ethical approval	July/ August	Principles Investigator	1 x 30 days
4	Data collection from the participants	Sept/ October	Principle Investigator	2 x 30 days
5	Studying and analyzing the data	November	Principle Investigator	1 x 21 days
6	Writing report	December	Principle Investigator	1 x 7 days
7	Submitting Report	January 2023	Principle Investigator	1 x 3 days

Appendix 3: Time Frame

	2022	2022	2022	2022	2022	2022	2022	2023
	June	July	August	Sept	Oct	Nov	Dec	Jan
Preparing proposal, submission								
Adjusting research instruments								
Application for ethical approval								
Data Collecting from the District								
Studying and analysing the data								
Writing report								
Submitting report								

Annex 1: Questionnaire

Section A: Demographic Characteristics

Qtn #	Question	Response Category	Code
Qt. 1	Respondents Gender	1. Male 2. Female	[] []
Qt. 2	How old are you?	_____	
Qt. 3	What is your current marital status?	1. Single 2. Married 3. Separated 4. Divorced 5. widowed	[] [] [] [] []
Qt. 4	What is your level of Education?	1. Tertiary 2. Secondary 3. Primary 4. Never gone to school	[] [] [] []
Qt. 5	What is your occupation?	1. Farmer 2. Fisher 3. Business 4. Others Specify _____	[] [] [] []
Qt. 6	Area of residence?	1. Uburn 2. Rural	[] []
Qt. 7	What is your of Level of income?	1. < K1000 per month 2. K1001 – K5000 3. > K5001	[] [] []
Qt. 8	What is your religion?	1. Catholic 2. Christian Protestant 3. Other	[] [] []

Section B: Effectiveness of Diagnostic Methods of Malaria

Q No.	Question Description	Response Categories	Codes
Qt. 9	Have you ever suffered from Malaria in the last one month	Yes No	[] []
Qt. 10	Did you go to the health facility to seek medical attention	Yes No	[] []
Qt. 11	Where you tested for Malaria before commencement of treatment	Yes No	[] []
Qt. 12	Which type of diagnostic test did the staff use on you?	RDT Microscopy Others Specify _____	[] []
Qt. 13	What was the outcome of the test	Positive Negative	[] []
Qt. 14	Do you think microscopic diagnosis of malaria is effective?	Yes No Don't know	[] [] []
Qt. 15	Do you think Rapid Diagnostic Test (RDT) is an effective method for testing malaria?	Yes No Don't know	[] [] []
Qt. 16	Do you think health facilities have well trained personnel to diagnose malaria?	Yes No Don't know	[] [] []
Qt. 17	How do you rate the number of health personnel available in health facilities to diagnose malaria?	Adequate Inadequate	[] []

Section C: Effectiveness of Malaria Treatment

Q No.	Question Description	Response Categories	Codes
Qt. 18	In the last one year, have you ever been treated for malaria?	Yes No	[] []
Qt. 19	If yes to the question above, what type of medication were you given	_____ _____	
Qt. 20	Have you ever used herbal medication for the treatment of malaria in the last one year?	Yes No	[] []
Qt. 21	Do you agree that coartem can eradicate?	Strongly Agree Agree Disagree Strongly Disagree Neutral	[] [] [] [] []
Qt. 22	Are malaria drugs always available in your health facility?	Yes No	[] []
Qt. 23	Are patients diagnosed with malaria always treated on time in health facilities?	Yes No	[] []
Qt. 24	Does Medical Stores Limited supply your district with anti-malaria drugs in good time?	Yes No	[] []
Qt. 25	Are community health workers effective in treating malaria	Yes No	[] []

Section D: Effectiveness of Preventive measures being Implemented in the Control of Malaria

Q No.	Question Description	Response Categories	Codes
Qt. 26	Do you own an Insecticed Treated Mosquito net?	Yes No	[] []
Qt. 27	Did you sleep under a mosquito net last night?	Yes No	[] []
Qt. 28	When was the last time that government distributed free mosquito nets?	Year 2022 Year 2021 I don't remember	[] [] []
Qt. 29	Have you ever bought your own Mosquito net before using your own money?	Yes No	[] []
Qt. 30	Do you think household distribution of Insecticide Treated Nets (ITNs) can prevent malaria?	Yes No Don't know	[] [] []
Qt. 31	Do you think Indoor Residual Spraying (IRS) is effective in preventing malaria?	Yes No Don't know	[] [] []
Qt. 32	Do you think distance to the health facility hinders people in your community to go for malaria test?	Yes No Don't know	[] [] []
Qt. 33	Do you think training and equipping community health workers with preventive drugs is effective in malaria prevention?	Yes No Don't know	[] [] []
Qt. 34	Do you think timely distribution of malaria supplies in health facilities is effective in preventing malaria?	Yes No Don't know	[] [] []

Qt. 35	In the past 6 months, have you ever used other personal protective methods against malaria	Yes No	[] []
Qt. 36	If the answer to q35 is yes, what type of personal protection method did you use?	Coils Repellents Insecticide Spray Traditional repellent	

End of Interview

Thank you for participating.

Annex 1: Checklist for Capturing Malaria Details

Year Being Assessed _____

Malaria Testing	RDT	Microscopy	Total
Tested < 1 Year			
Tested 1-4 Years			
Tested > 5 Years			

Malaria Confirmed Results	OPD 1st Attendance	IPD Discharges	Total
Positive/Confirmed < 1 Year			
Positive/Confirmed 1-4 Years			
Positive/Confirmed > 5 Years			

Clinical Diagnosed Malaria	OPD 1st Attendance	IPD Discharges	Total
Positive/Confirmed < 1 Year			
Positive/Confirmed 1-4 Years			
Positive/Confirmed > 5 Years			

Malaria Treatment	RDT	Microscopy	Total
Confirmed Cases Treated with Anti-Malarials < 1 Year			
Confirmed Cases Treated with Anti-Malarials 1-4 Years			
Confirmed Cases Treated with Anti-Malarials > 5 Years			

Malaria Treatment Clinical Cases	RDT	Microscopy	Total
Clinical Cases Treated with Anti-Malarials < 1 Year			
Clinical Cases Treated with Anti-Malarials 1-4 Years			
Clinical Cases Treated with Anti-Malarials > 5 Years			

Risk factors of malaria

Likelihood		Very Likely	Likely	Unlikely	Highly Unlikely
Consequences	Fatality	High	High	High	Medium
	Moderate fatality	High	High	Medium	Medium
	Minor fatality	High	Medium	Medium	Low
	Negligible fatality	Medium	Medium	Low	Low

Annex 2 Participant Consent Form

Assessing Prevalence and Risk Factors for Malaria Lethality Amidst Scaled up Control Intervention in Chienge District of Luapula Province.

I have read (or been explained to) the information sheet concerning the study and I have understood what it is all about. All the questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

Further, the researcher has explained to my satisfaction the purpose of the study and the possible risks involved.

I know that:

- My participation in the project is entirely voluntary.
- I am free to withdraw from the investigation or project at any time I so wish without any penalty and I am free not to answer questions that may compromise the patient’s confidentiality.
- Any information about me will not have identifiers and will be destroyed at the end of the project and that any confidential information will be seen only by the researchers and will not be revealed to anyone else without my consent.
- The results of the research may be published or used for reports but I will not be identified.

I agree to take part in this project

.....
Initials	Signature/Thumb print	Date

.....
Researcher	Signature	Date

Contact telephone Number : 0973790592

.....
Witness	Signature/Thumb print	Date





NATIONAL HEALTH RESEARCH AUTHORITY

Paediatric Centre of Excellence, University Teaching Hospital, P.O. Box 30075, LUSAKA
Chalala Office Lot No. 18961/M, Off Kasama Road, P.O. Box 30075, LUSAKA

Tell: +260211 250309 | Email: znhrasec@nhra.org.zm | www.nhra.org.zm

Ref No: NHRA000456/09/02/2023

Date: 09th February, 2023

The Principal Investigator,
Ms, Emmy Hamoonga
University of Zambia
Lusaka, Zambia.

Dear Ms Hamoonga,

Re: Request for Authority to Conduct Research

The National Health Research Authority is in receipt of your request for authority to conduct research titled “**Assessing Prevalence and Risk Factors for Malaria Lethality Amidist Scaled up Control Intervention in Chienge District of Luapula Province**”.

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised;
2. Progress updates are provided to NHRA quarterly from the date of commencement of the study;
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours

Sincerely,

Prof. Godfrey Biemba
Director/CEO
National Health Research Authority