

**USE OF INSECTICIDE TREATED NET IN THE PREVENTION OF  
MALARIA AMONG JIGGERY AND TEA WORKERS IN KISII COUNTY  
KENYA**

**MASTA ONDARA OMWONO  
Q57/23705/2013  
DEPARTMENT OF COMMUNITY HEALTH AND EPIDEMIOLOGY**

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UNIVERSITY.**

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**DECLARATION**

This thesis is my original work and has not been presented for a degree in any other University.

Signature..... Date.....  
Masta Ondara Omwono  
Q57/23705/2013

**Supervisors:**

This thesis has been submitted for review with our approval as University Supervisors.

Signature..... Date.....  
Dr. Justus O. S. Osero (PhD)  
Department of Community Health (KU)

Signature..... Date.....  
Prof Alloys S.S. Orago (PhD)  
Department of Pathology (KU)

## **DEDICATION**

This thesis is dedicated to my dear parents, Samuel and Bathsheba, my beloved wife Rose and our children, Michelle, Nigel and Joy for their support to me during its development.

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**ABBREVIATIONS AND ACRONYMS**

<b>AMREF</b>	African Medical and Research Foundation
<b>CDC</b>	Centre for Disease Control and prevention.
<b>FGD</b>	Focused Group Discussion
<b>GTZ</b>	Germany Agency for Technical Cooperation
<b>ITNs</b>	Insecticide Treated Nets
<b>MCP</b>	Malaria Control Program
<b>MOH</b>	Ministry of Health
<b>NGOs</b>	Non-Governmental Organizations
<b>RBM</b>	Roll Back Malaria
<b>UNICEF</b>	United Nations Children's Fund
<b>WHO</b>	World Health Organization
<b>NMS</b>	National Malaria Strategy
<b>MDGs</b>	Millennium Development Goals
<b>KMIS</b>	Kenya Malaria Indicator Survey
<b>IGAs</b>	Income Generating Activities

**DEFINITION OF OPERATIONAL TERMS**

- Household:** One or more people who live in the same dwelling and also share meals together or share living accommodation
- Jaggery worker:** Employees hired to make sugarcane concentrates to produce sukari nguru.
- Morbidity:** Frequency of infection
- Nguru:** A brown product of sugarcane concentrates.
- Poverty:** State in which family's income is too low to be able to buy food, shelter and clothing that are deemed necessary.
- Prevalence:** Is the proportion of a population found to have a condition typically a disease or a risk factor.
- Tea workers:** Employees hired to pick tea in small scale and taking it to tea buying centers for collection to the factory.

**ABSTRACT**

Insecticide- treated nets (ITNs) if used correctly are the most powerful malaria control intervention tools which have been recommended by most governments in the world. Yet up to date, use is still very low in some places with only three percent of African sleeping under an ITN and about 20 percent sleeping under any kind of net. Worse still, malaria continues to be the leading cause of mortality and morbidity among the Jaggery and tea workers in both sugar cane and tea industry. The main aim of this study was to assess the use of ITNs among the Jaggery and tea workers in the prevention of malaria in the South Mugirango Sub County, Kisii County. The specific objectives include; to establish the demographic and socioeconomic characteristics, to determine knowledge on the use of ITNs, to examine the perception of the ITNs use, to establish the level of ITNs use and to identify the factors that influence the ITNs use among the Jaggery and tea workers. The study adopted descriptive cross sectional design whereby both cluster, proportionate, purposive and snowball sampling approaches were used to get the sample size of 209 respondents from the Jaggery and tea workers to be interviewed. Data was collected using questionnaires, key informant interview and focused group discussions. Qualitative and quantitative data were transcribed; coded and categorized to come up with the emerging themes. Data was analyzed using SPSS version 20.0. Chi-Square was used to determine the relationship between variables. The results show low levels of ITNs use due to lack of knowledge and low level of income as (52.2%) of respondents did not know the difference between ITNs and non-treated nets. It was found that 56% of respondents were males with 44% being females. Most of the Jaggery and tea workers were aged between 29-39 years and 40-50 years with 41% and 26% respondents respectively. Education was significantly related ( $p < 0.001$ ) with ITNs use whereby 82.4% of non- users were found to have no education at all. Gender and occupation were significantly related with ( $p < 0.001$ ) and ( $p < 0.003$ ) and the use of ITNs respectively. Economic factors were also associated with ITNs use. The cost, accessibility and house structure were related with ( $p < 0.010$ ) and ( $p < 0.001$ ) and the use of ITNs respectively. The study found that weather was significantly related ( $p < 0.001$ ) with the use of ITNs among the Jaggery and tea workers. The study concludes that demographic and socio-economic characteristics were statistically associated ( $p < 0.001$ ) with the use of ITNs. Furthermore, knowledge, perception, level of use and factors such as accessibility and affordability were statistically related and influence ITNs utilization among the Jaggery and tea workers. This study recommends implementation of programs and policy formulation to empower the Jaggery and tea workers in education and economically through income generating activities to strengthen their resource base. Study results are useful in addressing ITNs utilization among the Jaggery and tea workers in the prevention of malaria in Kisii County, Kenya. It will also help the Kisii County government to redirect more resources to malaria prevention. Therefore, this study recommends the future research in the informal sector as well as low income earners as they were found to be the most malaria vulnerable group.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background to the study

Globally, malaria is a leading cause of morbidity and mortality, particularly in Tropical Africa, where at least 90 percent of malaria deaths occur (UNICEF, 2009). More than three quarters worldwide malaria deaths occur in people living in malaria countries in Sub-Saharan Africa. It was estimated that there were about 207 million cases of malaria in 2012 with 627000 deaths (WHO, 2013). Malaria continues to be a significant cause of morbidity and mortality worldwide. Adults living in malaria endemic areas develop some level of partial immunity to malaria as a result of repeated exposures to parasite antigens. This naturally acquired partial immunity involves both humoral and cellular immune responses and appears protective against symptomatic disease, but not against malaria infection (WHO, 2008).

About half of African countries have waived taxes and tariffs on nets, netting material and insecticides. Since 2002, African countries have started scaling up free of charge or highly subsidized provision of mosquito nets. As a result, there has been a substantial increase in mosquito net coverage in African countries (UNICEF, 2009).

In Kenya, malaria accounts for 25-40 percent of all outpatient visits at health care facilities. Up to 20 percent of all hospital admissions and 15 percent of in-patient deaths are due to malaria. About 30-40 percent of all fevers seen in health centers in Africa are due to malaria with huge seasonal variability between rainy and dry seasons. At the end of the rainy season, it is less than 10 percent and more than 80 percent as the rainy season winds up. Therefore, on its part, Kenya Vision 2030 includes among its health sector objectives the intention to reduce the proportion of

inpatient malaria fatality to 3 percent (Republic of Kenya, 2010). One of the most effective tools for malaria prevention is the insecticide treated mosquito net (ITN). Consistent use of ITNs can reduce malaria transmission by up to 90 percent (Gimning, *et al*; 2008) and avert as much as 44 percent of all causes mortality (Lengeler, 2010).

There is also evidence that if more than 80 percent of households in an area sleep under an ITN, malaria transmission is significantly reduced, which can benefit people who do not use an ITN themselves (CDC, 2008). A simple mosquito net treated with an insecticide is a proven and cost effective way to repel or kill mosquitoes carrying the parasite that causes malaria. Net treatment with pyrethrin concentrate solution can change the net from a simple physical barrier into a physical and chemical barrier that can repel or kill the female anopheles mosquito, which is responsible for transmitting malaria parasite. Treated net in such solution can be effective up to 12 months before subsequent retreatment.

In Kenya, National Malaria Strategy (NMS) covering the period 2009–2017 was developed in line with the Government's first Medium-Term Plan of Kenya Vision 2030 and the Millennium Development Goals (MDGs), as well as Roll Back Malaria partnership goals and targets for malaria control (Republic of Kenya, 2009). In the year 2012 alone, there were 9 million malaria cases. In malaria endemic areas there was one ITN(s) for every five Kenyans and at least one net is recommended to every two people according to the malaria national strategic plan. ITNs ownership had stagnated since 2007 and 12 percent own more than one. The proportion of households with at least a net doubled from 13 percent in 2000-2001 to 26 percent in 2004-2005 (Republic of Kenya, 2008).

Randomized controlled trials in Kenya, Ghana, the Gambia and Burkina Faso have demonstrated that wide scale use of ITNs can reduce mortality by around one-fifth, saving an average of 6 lives for every 1,000 people in the general population (Lengeler, 2010). In an area of intense perennial transmission in Western Kenya, ITN use reduced episodes of clinical malaria and anemia by greater than 60 percent (Kariuki, *et al*; 2010) and reduced by nearly one third the incidence of sick child visits to peripheral health facilities.

The prevalence of malaria varies from region to region, 1-20% in the highlands seasonal malaria transmission, prevalence in endemic areas with 20-40% in the lake region all the year round. However, some studies have indicated low utilization of ITNs among the Jaggery and tea workers. There is a wide gap between net possession and use; hence in 2012 alone, there were over 9 million malaria reported cases whereby 3 in every 4 Kenyans contracted malaria; with 28 million Kenyans living in endemic areas with the highest disease burden being Nyanza and Western. Whereas the targets set by governments is to ensure the entire population sleeps under an ITN (Republic of Kenya MOH, 2012). Given the fact that malaria continues to be the major cause of mortality and morbidity in Kenya, yet ITNs have been made accessible to the Kenyan population, the mortality rates due to malaria are expected to decline which has not yet been realized. Therefore, it is upon this background that this study explored the demographic and socioeconomic, knowledge, perception, level of ITNs use and the factors that influence the ITNs use among the Jaggery and tea workers in the South Mugirango Sub County, Kisii County, Kenya.

## **1.2 Statement of the problem**

In 2012, one in every 20 deaths from malaria worldwide occurred in Kenya resulting into over 300,000 deaths. Therefore, the extent to which nets are owned and 3 in every 4 Kenyans are at risk of contracting malaria and these leaves us with a lot of questions whether net are put to proper use. Nearly half of patient seeking outpatient services in Kisii County have been found to suffer from malaria. Health facilities in Kisii County continue to be recording high percentage of people with malaria. The Ministry of health is concerned as to whether mosquito nets provided are put to proper use in areas most affected in the South Mugirango Sub County (Republic of Kenya MOH, 2017).

In South Mugirango there has been a challenge to ITNs appropriate use among the Jaggery and tea workers. Among the Jaggery and tea workers, a substantial number of households owned the ITNs, but malaria morbidity and mortality was high among the out-patient and in-patient attendance respectively in the health centers. Therefore, ownership rates have not been equal to the rates of use due to low level of knowledge. Expanded ownership of ITNs can only make a substantial reduction in malaria morbidity and mortality if the nets are used properly by the Jaggery and tea workers. It is from this background the study sought the reasons behind the ITNs inappropriate use among the Jaggery and tea workers in the South Mugirango Sub County, Kisii County, Kenya.

## **1.3 Justification of the study**

The reasons behind high prevalence of malaria among the Jaggery and tea workers who were provided with ITNs but still recorded high morbidity and mortality rates in

South Mugirango, has not been documented. Despite the malaria prevention interventions, there are still cases of malaria among the Jaggery and tea workers and the current rate is unknown. Many of the malaria implementing partners have only concentrated on the under-fives and expectant mothers. This study brings information from the Jaggery and tea workers to establish use of ITNs and problems encountered with them with possible solutions.

The study assessed ITNs use among the Jaggery and tea workers in South Mugirango Sub-County with special emphasis on socio-demographic, knowledge, perception, level of use and the factors that influenced its use. There are hardly any data in Kisii County showing ITNs use in the prevention of malaria among the Jaggery and tea workers. The study therefore, provides data that can be used for planning malaria programs and ITNs use among the Jaggery and tea workers in the South Mugirango Sub County, Kisii County, Kenya.

#### **1.4 Research Questions**

1. What are the demographic and socioeconomic characteristics among Jaggery and tea workers on ITNs use in the prevention of malaria?
2. What is the level of knowledge among the Jaggery and tea workers on ITNs use in the prevention of malaria?
3. What are the perceptions on ITNs use among the Jaggery and tea workers?
4. At what levels do Jaggery and tea workers use ITNs in the prevention of malaria?
5. What are the factors that influence ITNs use among the Jaggery and tea workers in the prevention of malaria?

## **1.5 Null Hypothesis**

1. There is no relationship between knowledge and ITNs use among the Jaggery and tea workers in the prevention of malaria in Kisii County.
2. There is no association between demographic and socio economic characteristics among the Jaggery and tea workers and ITN use on malaria prevention in Kisii County.

## **1.6 Objective of the study**

### **1.6.1 General objective**

To assess the use of insecticide treated mosquito nets (ITNs) in the prevention of malaria among the Jaggery and tea workers in Etago Division, South Mugirango Sub County, Kisii County, Kenya.

### **1.6.2 Specific objectives**

1. To establish the demographic and socio economic characteristics among the Jaggery and tea workers on the use of ITNs in malaria prevention.
2. To assess the level of knowledge among the Jaggery and tea workers on ITNs use in malaria prevention.
3. To assess perceptions among the Jaggery and tea workers on ITNs use in the prevention of malaria.
4. To establish the level of ITNs use among the Jaggery and tea workers in the prevention of malaria.
5. To determine the factors that influence ITNs use among the Jaggery and tea workers in the prevention of malaria.

### **1.7 Significance of the study**

The study findings explain to those in the Ministry of Health sector on ITNs use in the prevention of malaria among the Jaggery and tea workers living in Etago Division South Mugirango Sub County, Kisii County. It also explains to the understanding of the factors that affect ITNs use as a Malaria Prevention Strategy and the challenges facing the Jaggery and tea workers. The study also forms a basis for addressing some problems faced and come up with policies and practices that would assist in improving ITNs use.

The study is useful to the Kisii County Government to redirect more resources to the malaria control program and help reduces the man hours lost due to malaria among the Jaggery and tea workers living in the Etago division of South Mugirango, Kisii-County. This study forms a basis from where other research studies can be carried out by other researchers. The study can be used as a point of reference by other researchers. The study is useful to NGOs to find solutions to the problems of ITNs use which have not yet been addressed. The study would help the Jaggery and tea workers on how to reduce malaria prevalence with consistent use of ITNs.

### **1.8 Limitation of the study**

The main limitation of this study was the timing of the assessment as this was influenced by some factors such as weather conditions and heavy downfall of rain. To mitigate for heavy rainfall and weather conditions, research assistants were encouraged to wear heavy clothing and gumboots and carry with them umbrellas to reach all the Jaggery and tea workers.

## 1.9 Scope of the study

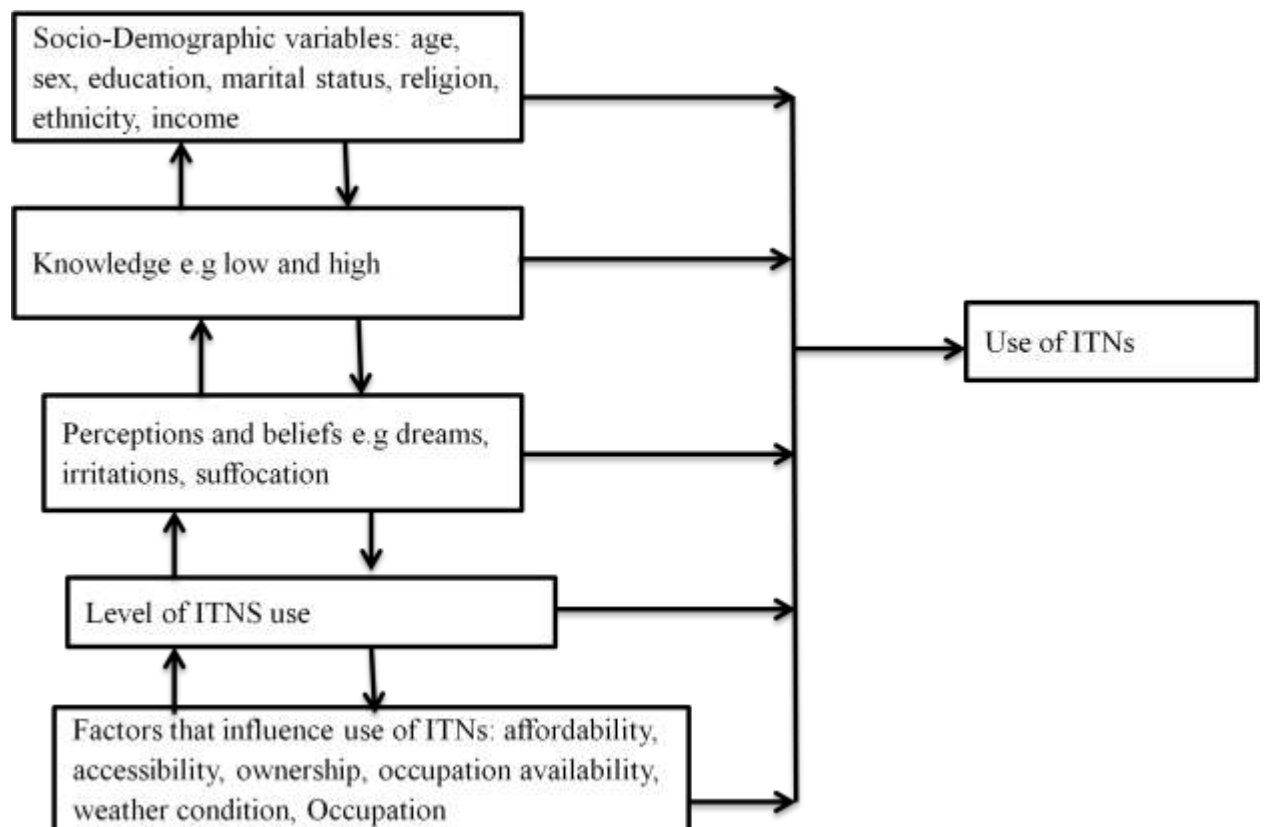
The study focused on ITNs use in the prevention of malaria among the Jaggery and tea workers aged 18-49 years from the Etago Division of South Mugirango Sub County, Kisii County, Kenya.

### 1.1.0. Conceptual Framework

The constructed conceptual framework below shows the interrelationship between independent and dependent variables. The dependent variable; use of ITNs are dependent on both socio-demographic, knowledge, perceptions levels of ITNs use and the human and environmental factors as can be seen in the schema.

Independent variables

Dependent variables



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This section provides a background understanding on other research studies that have been carried out regarding Insecticide Treated mosquito Net use (ITNs). It focuses on the socio-demographic characteristics, knowledge, perception, level of ITNs use and the factors that influence ITNs use in the prevention of malaria among the Jaggery and tea workers in the South Mugirango Sub- County, Kisii County Kenya. The purpose of this literature review was to identify important knowledge gaps that needed to be filled.

### **2.2 Global Malaria situations**

It is believed that by the end of 2013 approximately half of the world's population was at risk of malaria transmission. Of all these malaria cases and deaths, most of them occurred in sub-Saharan Africa. However, Asia, Latin America, and to a lesser extent the Middle East and parts of Europe were also affected with specific risk groups as that with low immunity, immigrant workers and international travelers from non-endemic areas due to lack of immunity (WHO, 2013). Malaria is endemic throughout most of the tropics. More than three billion people worldwide are exposed yearly and over 240 million develop malaria (WHO, 2008).

From the year 2000 to 2010, the number of reported annual malaria cases in 34 malaria-eliminating countries decreased by 85 percent, from 1.5 million in the year 2000, to 232,000 in the year 2010 (WHO, 2011). The common species that causes

malaria is *P. falciparum* that is spread by female Anopheline mosquito, which bites between dusk and dawn (Filler, *et al*, 2011).

Another rare mechanism for transmission include: congenitally acquired disease, blood transfusion, sharing of contaminated needles and organ transplant But *P. vivax* and *P. knowlesi* can also cause severe disease. Malaria deaths peaked at 1.82 million in 2004 and fell to 1.24 million in 2010 (714,000 children <5 years and 524,000 individuals  $\geq$ 5 years); over 80 percent of the deaths occur in sub-Saharan Africa (WHO, 2012; Lancet, 2012).

### **2.3 Malaria in Africa**

It is estimated that in December 2013, there were about 207 million cases of malaria in 2012 (with an uncertainty range of 135 million to 287 million) and an estimated 627 000 deaths (with an uncertainty range of 473 000 to 789 000). Malaria is caused by *Plasmodium* parasites. The parasites are spread to people through the bites of infected *Anopheles* mosquitoes, called "malaria vectors", which bite mainly between dusk and dawn. There are four parasite species that cause malaria in humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium ovale*. *Plasmodium falciparum* and *Plasmodium vivax* are the most common. *Plasmodium falciparum* is the most deadly.

In recent years, some human cases of malaria have also occurred with *Plasmodium knowlesi* – a species that causes malaria among monkeys and occurs in certain forested areas of South-East Asia). With 43 countries with ongoing malaria transmission, Africa accounts for the majority of estimated malaria cases (80%) and

deaths (90%), but only about 13% of the world's population. Recent data, however, indicate that effective programs have helped reduce newly reported cases by at least 75% in eight countries (WHO, 2013).

#### **2.4 Malaria in Kenya**

In Kenya, malaria accounts for 30 percent of all outpatient cases and it causes high morbidity and mortality with negative effects on other sectors of the national economy as well for the Jaggery and tea workers (Oyediran & Achola, 2009). Malaria is responsible for the majority of days lost due to ill health. More recently, environmental changes such as the El Nino phenomenon and changed rainfall patterns have added to the complicated malaria picture (Republic of Kenya, 2010).

In 2012 over 9 million cases were reported with disease burden being highest in Nyanza and Western with 42 and 41 percent respectively, with Nairobi and North Eastern having fewer cases of 5 percent and 4 percent (Republic of Kenya, 2012). In malaria endemic areas it was found that there are one insecticide treated net to every five Kenyan due to stagnation of net ownership since 2007. The Government of Kenya spent 31 percent of its national budget with an estimated cost of Ksh30.7 billion on 43 percent of its out-patient, while in 2011-2012 financial year Ksh. 10.1 billion was the national malaria control budget with 10.2 percent went to prevention and public health administration (Republic of Kenya, 2009).

#### **2.5 Malaria in Kisii**

In Kisii, an area classified as highland, there has been an upsurge of malaria cases in the past 20 years. In 1998 a malaria outbreak led to numerous deaths. Land in this

region has been extensively fragmented due to population pressure which has brought about important ecological changes affecting the malaria vector, the mosquito. More importantly, these changes may have influenced the transmission rate of the malaria parasite leading to an increase in malaria prevalence in the community. As a result, morbidity and mortality resulting from malaria are high. High morbidity reduces labor contributions to agricultural activities and ultimately agricultural output as patients cannot effectively contribute their labor to farm work. Further, the healthy individuals have to take time off to care for the sick and, when death occurs, to bury the dead in an earlier study on lay people's anti-malaria behavior (Nyamongo, 1998). The aim of this study is to examine socio-demographic characteristics, knowledge, perception, level of ITNs use and the factors that influence the ITNs use in South Mugirango Sub County Kisii County and to establish whether there is a relationship between independent and dependent variables.

### **2.5.1 Transmission**

Malaria is transmitted through the bites of infected *Anopheles* mosquitoes. The intensity of transmission depends on factors related to the parasite, the vector, the human host, and the environment. About 20 different *Anopheles* species are locally important around the world. All of the important vector species bite at night. *Anopheles* mosquitoes breed in water and each species has its own breeding preference; from shallow collections of fresh water, sugar cane fields, tea fields, banana gardens, rice fields to kitchen gardens with broken containers containing stagnant water as the risk factors.

Transmission is more intense in places where there is a conducive environment for the mosquito parasite to complete its development stages inside the mosquito and where it bites human beings, hence that is why about 90 percent of the world's malaria deaths occur in Africa.

Transmission also depends on climatic conditions that may affect the number and survival of mosquitoes, such as rainfall patterns, temperature and humidity. In many places, transmission is seasonal, with the peak during and just after the rainy season. In Kisii the transmission occurs during the months of April to June during the long rainy seasons and from November to December every year.

Malaria epidemics can occur when climate and other conditions suddenly favors transmission in areas where people have little or no immunity to malaria. They can also occur when people with low immunity, migrate into areas with intense malaria transmission, for instance to find work, or to settle there permanently away from their former settlement.

Human immunity is another important factor, especially among adults in areas of moderate or intense transmission conditions. Partial immunity is developed over years of exposure, and while it never provides complete protection, it does reduce the risk that malaria infection will cause severe disease. It is for this reason, that most malaria deaths in Africa occur across the whole population and the entire population is at risk of contracting malaria.

### **2.5.2 Symptoms**

Malaria is an acute febrile illness caused by an infected female *Anopheles* mosquito bite. In individuals with low immunity, symptoms may start appearing 7-10 days after the infective *Anopheles* female mosquito bite. The first symptoms – fever, headache, chills and vomiting – may be mild and difficult to recognize as malaria if differential diagnosis is not carefully done to rule out other diseases that presents with fevers. If not treated within 24 hours, *P. Falciparum* malaria can progress to severe illness often leading to death. Jaggery and tea workers with severe malaria frequently develop one or more of the following symptoms: severe anemia, nausea, general body weakness with eventual development of cerebral malaria and frequent multi-organ involvement.

In malaria endemic areas, persons may develop partial immunity, allowing asymptomatic infections to occur. Both *P. vivax* and *P. ovale*, cause clinical relapses within weeks to months after the first infection, even if the patient has left the malaria zones. These new episodes arise from dormant liver forms known as hypnozoites (absent in *P. falciparum* and *P. malariae*), special treatment – targeted at these liver stages will be of essence for a complete cure.

### **2.5.3 Malaria prevention and control methods**

Other preventive strategies include; improved sanitation, clearing of bushes around the compound, burning mosquito coils, screening of buildings, regular anti-malarial taking and closing windows early not staying outside at night and the use of Mosquito repellents to keep the *Anopheles* species a way from biting.

## **2.6 Insecticide Treated Net use in the South Mugirango Sub County**

ITNs reduce malaria morbidity and mortality, but use is limited due to affordability, accessibility, availability and lack of knowledge and perception of its use. In the study carried out in Nigeria by (Onwejekwe, *et al*, 2004) it was found out that accessibility was found appallingly low with 10–12 percent of houses, owning at least one untreated net in Nigeria and negligible coverage of treated nets.

Therefore, the South Mugirango Sub County is not an exception from the low coverage due to affordability problems as a result of economic status related to net ownership. Furthermore, people may not value the (ITNs) nets as others use them as tea carrying baskets to the tea buying centers and in their kitchen gardens as horticulture green houses. It is possible that the perceived malaria cause could be different, hence this study will sought to find out whether there is a relationship between variables and ITNs use in malaria prevention.

## **2.7 Summary gaps in insecticide treated nets use to be investigated**

World over, it has been known that ITNs reduce both morbidity and mortality caused by mosquito vectors. Therefore, the South Mugirango Sub County is not an exception. The high malaria prevalence could be due to low ITNs coverage problems as a result of accessibility, affordability and economic status related to net ownership or the Jaggery and tea workers may not value the nets as others use them as tea carrying baskets to tea buying centers and in their kitchen gardens as horticulture green houses, while the Jaggery workers use them in making Jaggery shades as they make sugar substrates for Sukari- Nguru. It is possible that the perceived malaria cause could be

different, hence this study sought to find out the interrelationship between independent variables and ITNs use in malaria prevention.

### **2.8 Knowledge of ITNs use among the Jaggery and tea workers**

Knowledge on malaria prevention among the Jaggery and tea workers in the South Mugirango Sub County is not known. In a study carried in Mali, 93 percent of individuals identified malaria as the most common disease in their village, 98 percent recognized malaria based on clinical symptoms while 87 percent on treatment methods, however, knowledge on malaria prevention was more limited. ( Rhee, *et al*; 2010 ) . This current study examined knowledge that will affect the use of ITNs and possible solutions within the programmes in South Mugirango Sub County in the prevention of malaria.

### **2.9 Perceptions and beliefs on ITNs use among the Jaggery and tea workers**

Insecticide treated nets (ITNs) are the most important malaria prevention strategy. As a mosquito control intervention, they are effective in preventing malaria morbidity and mortality among the Jaggery and tea workers in highly endemic areas. The ITNs reduce overall transmission, and protect all individuals within communities. Insecticide treated mosquito bed nets have been advocated for as the most preventive tools against malaria, especially in sub-Saharan Africa (WHO, 2010).

On the perceptions about Malaria Prevention many people perceive malaria to be caused by rain, cold weather or drinking cold water and not by mosquitoes ( Nuwaha; 2010 ). This study focused on socio- demographic characteristics, knowledge, perception, level of ITNs use and the factors that influence its use among the Jaggery and tea workers in South Mugirango Sub-County, Kisii County, Kenya.

## **2.10 Levels of insecticide treated net use among the Jaggery and tea workers**

Various factors influence the use of bed nets, including cultural, behavioral and demographic factors, ethnicity, accessibility, gender relations and seasonality of malaria. Although ITNs are effective, local perceptions, acceptance and use of ITNs, as well as the use of other preventive methods, are invaluable in malaria control programs. It is believed that ITNs are used at household levels, but can as well be used at work sites, especially where the Jaggery workers make sugar concentrates at night to act as mosquito repellants.

## **2.11 Factors that influence ITNs use among the Jaggery and tea workers**

### **2.11.1 Affordability of ITNs**

According to the policy and strategy for ITNs, over 80 percent of people living in malaria endemic areas in Kenya are supposed to sleep under an ITN. Therefore, if the government can subsidize the tariffs on the netting materials then the majority of the Jaggery and tea workers may purchase their ITNs and use can be guaranteed and as they can be able to obtain their netting materials from the shopping centers around where they work (Republic of Kenya, 2010). The government of Kenya in collaboration with Merlin NGO in Kisii County has put in place programs that target ITNs distribution to increase the coverage by 2017. This study is in line with the Kisii County Government strategic plan (2013-2017) . If prices will be reduced or kept low it is my assumption that every Jaggery and tea worker will sleep under an ITN and malaria prevalence will be low.

### **2.11.2 Accessibility of ITNs**

To improve accessibility of ITNs to the Jaggery and tea workers in rural areas, distribution should be carried out by both the sub county government health services and private health facilities. However, NGOs and Community based organization should be involved in ITN promotion and distribution in the peri-urban and urban areas of the Kisii County so that every Jaggery and tea workers can benefit.

### **2.11.3 Ownership and ITNs use**

During the launch of Roll Back Malaria(RBM) the most important indicators for monitoring progress towards the set target for the proportion of households which owned one or more nets and the proportion of those who slept under a net, net ownership is important to assess its use and suggest program modifications where there are knowledge gaps. However, use is a very important indicator that can generate the desired epidemiological impact (Macintyre, 2012).

Therefore, there is a gap between net possession and use among the Jaggery and tea workers in the South Mugirango Sub- County, Kisii County. Net ownership has been found to be lowest among the poorest households (UNICEF, 2009), thus possibly linking possession to the cost of the net (Guyatt, 2009).Some studies predicted that if the net material tariffs are reduced from 40 percent to 5 percent would increase the demand of its ownership by average of up to 18 percent( Simon, 2006).

Demographic characteristics like age, education, income, marital status, size of the house and ethnicity were also assessed to establish on how they influence ITNs use. The current study explored more on the socio- demographic characteristics like sex,

income, and occupation in addition to education and age, whether they were having any relationship with the ITNs use among the Jaggery and tea workers besides low level of knowledge, perception and levels of use in the area under study.

## **2.12 Summary of literature review**

This section has reviewed literature related to the topic of study. Malaria remains a big global challenge. The Jaggery and tea workers are among the most affected due to the number of days lost from work due to malaria infection. Due to lack of knowledge on ITNs use has led to increased number of malaria cases. However, there is limited information on the prevalence of malaria among the Jaggery and tea workers. This study sought to assess ITNs use in the prevention of malaria among the Jaggery and tea workers in the South Mugirango Sub- County, Kisii County, Kenya.

## **CHAPTER THREE: MATERIALS AND METHODS**

### **3.1 Introduction**

This chapter discusses the methods used in the study. The following areas are discussed here below; research design, variables, location of the study area and study population, inclusion and exclusion criteria, sampling techniques, sampling and sample size determination, research instrument, pre-test, validity and reliability of the research instrument, data collection techniques and the logistical and ethical consideration.

### **3.2 Research design**

The study adopted a descriptive cross-sectional study design where 209 both male and female Jaggery and tea workers were purposively interviewed about the use of ITNs. Questionnaires were administered by ten research assistants to assess ITNs use. The questionnaires and observation checklist were pre-tested by ten research assistants with form four qualifications at Nyamondo Sub-Location. This study identified the Jaggery workers and for the purpose of comparison it also identified another group of tea workers, to determine their socio- economic and demographic characteristics, knowledge, perception and beliefs, level of ITNs use and the factors that influenced its use among the Jaggery and tea workers. Both quantitative and qualitative methods were used. The quantitative methods were used to establish social-demographic factors which affected the use of ITNs among the Jaggery and tea workers. It was also used to show an association between the social, demographic characteristics of respondents and ITNs use among the Jaggery and tea workers in Kisii County. Qualitative methods were used to investigate perceptions, attitudes,

beliefs and knowledge on ITNs, and established factors affecting use of ITNs. The key informant interviews were used to obtain views and the perception on quantitative data of ITNs use.

### **3.3 Study variables**

These were the characteristics in the population under study such as socio-demographic characteristics, knowledge and perception, level of ITNs use and factors that influenced the ITNs use among the Jaggery and tea workers in South Mugirango. The respondents' socio- demographic variables i.e .age, occupation, education, economic status, religion, marital status, sex and living arrangement were included.

#### **3.3.1 Independent variables**

These were variables that were used to assess and measure the use of ITNs among the Jaggery and tea workers such as demographic and socioeconomic, knowledge, perception, level of ITNs use and the factors that influenced ITNs use such as affordability, accessibility, ownership, weather condition and occupation

#### **3.3.2 Dependent variables**

These were the use of ITNs among the Jaggery and tea workers in the prevention of malaria. They were measured by asking the respondents whether they had sought the ITNs and used them in the last six months to establish whether there was a relationship between the independent variables and ITNs use among the Jaggery and tea workers. The responses were coded using sub themes in qualitative manner before being transcribed and analyzed.

### **3.4 Location of the study area**

The study was conducted in South Mugirango Sub-County, 0° 49'60''S Latitude and 34°39'0'' E Longitude, Etago division, Kisii County. Kisii County has a total population of 1,152,282 with 245,029 households and covers an area of 1,317.4sq km. Kisii County is divided into nine sub-counties with 45 electoral wards. The Population densities 874.7 people per sq km and 51 percent of the population live below the poverty line. Kisii County is endowed with natural resources such as soapstone and arable land. The main economic activities include the, subsistence agriculture, vegetable farming small scale trade dairy farming tea and coffee growing, sugarcane growing, commercial business and soapstone carving.

### **3.5 Study population**

This study focused on the use of ITNs among the Jaggery and tea workers in the prevention of malaria in the Etago Division of South Mugirango Sub County Kisii County. This particular Division is endowed with sugarcane and tea growing respectively.

#### **3.5.1 Inclusion**

The selected Jaggery and tea workers aged 18-49 years who gave consent were interviewed. The other criteria included those with sound mind, heads of households and those that gave consent to be interviewed.

#### **3.5.2 Exclusion**

The Jaggery and tea workers who declined taking part and those under 18 and above 49 years in the study were not interviewed.

### **3.6 Sampling techniques.**

Kisii County was purposively selected and has nine Sub-Counties. South Mugirango Sub-County was selected by simple random sampling whereby both the Jaggery and tea workers were clustered. Then the study participants were proportionately sampled with use of probability. The South Mugirango Sub-County has six county assembly wards namely: Tabaka, Boikanga, Bogetenga, Borabu/Chitago, Moticho, Getenga of which Borabu was randomly selected. Borabu/Chitago has also six sub-locations namely; Monianku, Nyamondo, Botabori, Kiagware, Amakara and Boige from where Boige and Botabori were also randomly selected. Then 209 participants, both the Jaggery and tea workers were systematically sampled from a list of KTDA Kenya Tea Development Authority and from Sugar Cane out grower farmers for the interview on the use of ITNs in the prevention of malaria in homes and sites of work. Participants in three focused group discussions were purposively selected from among Jaggery and tea growers composed of three groups from Jaggery and three from tea workers. The key informant interviews were conducted and included tea and Jaggery field officers, public Health Officer and Administration officer in-charge of the division and village heads. The sample size was calculated for the Jaggery and tea workers who were assessed with ITNs use, using the formula below.

### **3.7 Sample size determination**

$$N = z^2pq/d^2$$

n= desired sample size

Z =standard normal deviate (1.96) that corresponds with 95%confidence level

P= prevalence of the condition under study (prevalence of malaria in Kisii was 14.5% (Kenya Malaria Indicator Survey (KMIS), 2010).

$$q = 1-p$$

d = the degree of accuracy desired (0.05) was used

$$N = \frac{1.96^2 \times 0.145 \times 0.855}{0.05^2}$$

$$0.05^2$$

$$N = 190$$

10% of the sample was added to cater for non-responses and was added to make 209. The estimated sample was 209 subjects.

### **3.8 Research instruments**

The data was collected using; interview schedule, structured interview and key informant interview guide, Focused Group Discussion (FGDs), structured questionnaire and observation checklist, interview schedule were in parts, socio demographic characteristics, knowledge, perceptions and beliefs, level of ITNs use and factors influencing its use among the Jaggery and tea workers.

### **3.9 Pre-testing of data collection tools.**

Pre-testing of 10% was done at Nyamondo Sub- Location in South Mugirango Sub-County Kisii, Kenya which was 19 respondents and this was never included in the final sample. This helped the researcher to identify potential problem in the proposed study and inconsistency in the research instruments. The key informant was also pre-tested on some village elders who were randomly selected and omitted from the sample.

### **3.10 Validity and reliability**

The reliability of the research instruments was concerned with the degree to which the research instruments give way the same result. Reliability of the respondent's

instruments of the questionnaires was established through a test re-test method for uniformity of data collection. The panel of public Health Officers examined the tools to ensure that the questionnaires covered the objectives of the study. Therefore, the research was conducted with pre-tested instrument of the questionnaire.

### **3.11 Data collection techniques**

Ten research assistants were involved in data collection after comprehensive training. Administration of questionnaires was done to collect quantitative data through an interviewer administered approach. Qualitative data were collected through focused group discussions and key informants interview.

### **3.12 Data analysis**

Both the quantitative and qualitative data were cleaned before, during and after leaving the respondents. The researcher checked for uniformity, accuracy, consistency, legibility and comprehensibility. It was coded and tabulated using SPSS program version 20. The Chi - Square test was calculated using variables such as age, sex, level of education and income to establish the relationship between various variables. Some of the dependent variables such as knowledge, level of use, the factors that affect the use and perception on use of ITNs. Data was analyzed using SPSS version 20, on qualitative data the tentative themes and code categories were either confirmed or new ones formulated during data collection. After data collection, data were analyzed using SPSS program to bring together similar views from different respondents together on the following sub themes, knowledge, perception, level of use and factors that affect the use of ITNs among the Jaggery and tea workers. Chi-Square was used to test whether there was a relationship between socio- demographic,

knowledge, perception, level of use and factors that influenced ITNs use among the Jaggery and tea workers and developed a report which was presented in forms of graphs tables and figures.

### **3.13 Logistical and Ethical considerations**

Study approval was given by the Kenyatta University graduate school. Then Ethical clearance was sought from Kenyatta University ethical review committee with authorization from, the National Commission of Science, Technology and Innovation. These letters were presented to the Kisii County Commission, the Head of Health Service Kisii County and to the Director of Education Kisii County who introduced me to the South Mugirango Sub County and the Chief Administrative Officer, Nyamondo sub-location of whom who introduced me the village heads. With the assistance of village heads, 10 sites were selected each from Botabori and Boige, Etago division of both the Jaggery and the tea workers. The interviews were conducted in homes of respondents and sites of work. Structured interviews were taking about 10 minutes while the in-depth interviews were also lasting for about 30 minutes. To have tampered proof results the lap top had a password. In regard to ethical considerations, the rights of individuals consent and institutions were respected.

## **CHAPTER FOUR: FINDINGS**

### **4.1 Introduction**

This chapter presents all the results of the study such as demographic and socioeconomic characteristics, knowledge, perception and beliefs, level of ITNs use and the factors that influence its use among the Jaggery and tea workers.

### **4.2 Demographic and socioeconomic characteristics of the Jaggery and tea workers**

A total of 209 Jaggery and tea workers consented to be interviewed and their data was included in the analysis as can be seen in table 4.1 which details the demographic of the study population.

#### **4.2.1 Gender of the Jaggery and tea workers**

In this study as seen in table 4.1 it was found out that there were more males 116 (56%) than female workers 93 (44%) in both the Jaggery and tea industry.

#### **4.2.2 Age of the Jaggery and tea workers**

The mean age of the respondents was 34 years with (SD) =6.2years and ranged between 18 and 50 years. Most of the Jaggery and tea workers as can be seen table 4.1 were between the ages 29-39 years at 85 (41%) while those aged between 18-28 years were 69 (33%) with 55 (26%) aged between 40-50 years.

#### **4.2.3 Marital status of the Jaggery and tea workers**

On marital status as seen in table 4.1 it was found out that 95 (45%) were married with 42 (20%) being single or living alone, while 29 (14%) were divorced with 23 (11%) being widowed and the rest 11 (5%) having no response with a few 9 (4%) living together without any formal arrangement.

#### **4.2.4 Level of education of the Jaggery and tea workers**

On the level of education as can be seen table 4.1 the study revealed that 88 (42%) had secondary education with 62 (30%) having had college education while 29 (14%) had primary education with 16 (7%) having vocational while 14 (7%) had no education at all. This means that those without education were found to be the lowest users of ITNs.

#### **4.2.5 Occupation of the Jaggery and tea workers**

This study revealed that more than half of the respondents as it can be seen in table 4.1 116 (56%) were tea workers while 87 (42%) were Jaggery workers with only 6 (2%) percent being engaged with other small scale activities.

Most 74 of 116 of the tea workers were found using the ITNs in carrying tea to the tea buying centers and the reasons were said that nets and netting material were portable and easy to carry compared with the baskets.

It was also found that 42 (20%) of the Jaggery workers cited the reasons for non-use of ITNs was that they worked at night and used the ITNs in making Jaggery shades with the remains from sugar cane to shelter them from adverse conditions like rain and hot sunshine during working hours.

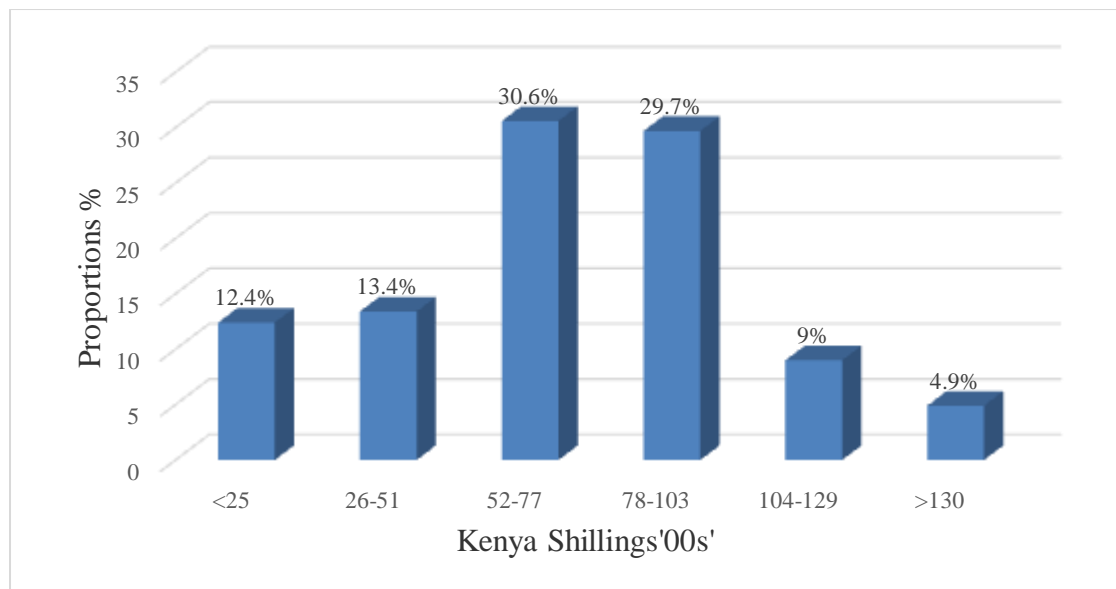
**Table 4.1: Characteristics of the Jaggery and tea worker**

<b>Variables</b>	<b>Frequency N</b>	<b>Proportions %</b>
Gender		
Male	116	56
Female	93	44
Age		
18-28 years	69	33
29-39 years	85	41
40-49 years	55	26
Marital status		
Single	42	20
Married	95	45
Widowed	23	11
Divorced	29	14
Living together	9	4
No response	11	5
Education level		
No Formal education	14	7
Primary	29	14
Secondary	88	42
College	62	30
Vocational training	16	7
Occupation		
Jaggery worker	87	42
Tea worker	116	56
Others	6	2

The above table 4.1 shows the characteristics of the Jaggery and tea workers. In relations to gender most of the respondents 116 (56%) were male with 93 (44%) being female. More of the Jaggery and tea workers age 85 (41%) ranged between 29-39 years. On marital status it was found that 95 (45%) were married while (42) 20 % were single. The study revealed that 88 (42%) had secondary education with only (62) 30 % had a college education. From their occupation, it was also revealed that most of the workers were engaged in tea farming while (87) 42 % were also sugarcane farmers.

#### 4.2.6 Level of income of the household

Almost all the households accessed some income as it can be seen in figure 4.1 below. Household income was found to be contributing factors to ITNs use among the Jaggery and tea workers. About 12.4% earned less than Kshs 2500 while 13.4% earned Kshs 2600-5100. Only 30.6% of the household earned between Kshs5200-7700, 62 (29.7%) earned Kshs7800-10300, 19 (9%) earned Kshs10400-12900, with 10 (4.9%) earned more than Kshs13000.



**Figure 4.1: Household income level of the Jaggery and tea workers**

The average income per household was Kshs77 ± 26.50. From FGDs it was revealed that workers in the Jaggery and tea industry earned very little to sustain them and have an extra to purchase ITNs.

### 4.3 Knowledge about ITNs among the Jaggery and tea workers

**Table 4:2: Knowledge on treated and non-treated nets against ITNs use**

Variables	ITN Use		P-Value
	Yes n (%)	No n (%)	
<b>Treated and non- treated nets</b>			0.001***
Yes	98(51.0%)	2(11.8%)	
No	94(49.0%)	15(88.2%)	
<b>Type of net</b>			0.044***
Conical net	113(58.9%)	12(70.6%)	
Ordinary net	11(5.7%)	2(11.8%)	
ITNs	54(28.1%)	0(0.0%)	
None	14(7.3%)	3(17.6%)	
<b>Retreated nets</b>			0.315
Yes	51(26.6%)	3(17.6%)	
No	141(73.4%)	14(82.4%)	

\*P<0.05; \*\*P<0.01; \*\*\*P<0.001; \*\*\*\*P<0.0044

Knowledge was measured on whether nets were treated or not, type of nets used and whether they had been retreated. The respondent were asked from among the users whether they knew what ITNs were 98 (51%) mentioned that they knew what ITNs were and they said that they protect against mosquito bites while 15 (88.2%) of the non- users said they did not know what ITNs were as it can be seen table 4.2. In regard to knowledge, only treated and non treated nets and type of net were found to be statistically significant with  $p < 0.001$  and  $p < 0.044$  respectively.

58.9% of the users were able to identify the type of nets they were using .The majority 70.6% of non –users were unable to tell the type and the study revealed that 17.6% were found to have none in their household. Among the users 73.4% were found that they had not re-treated their nets.

Therefore a 32 year old respondent said:

*"I work in the Jaggery industry the whole night. An ITN is useless for me, because use long clothing at night to prevent me from mosquito bites."*

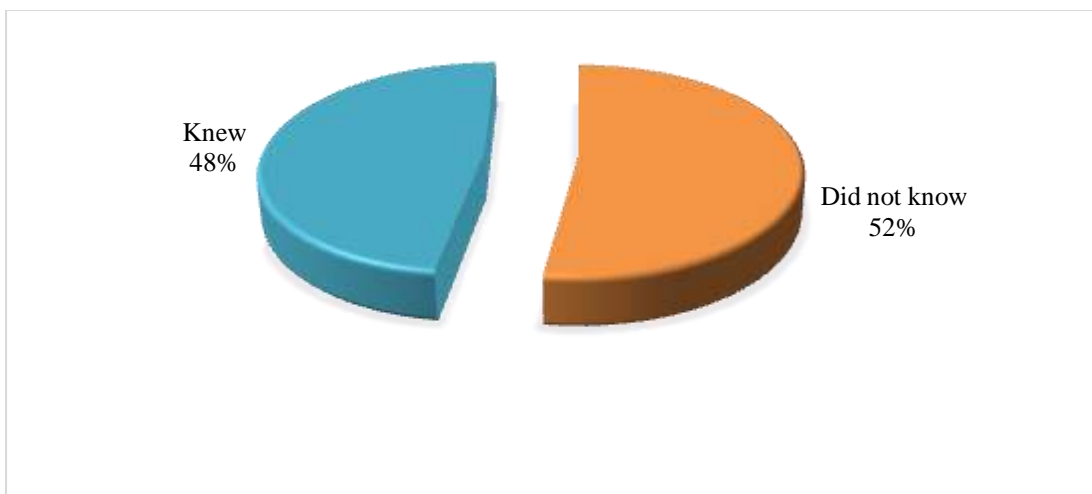
**Table 4.3: Knowledge about ITNs among the Jaggery and tea workers**

Variable	Frequency	Proportions %
Had knowledge	54	26
Had no knowledge	155	74
Total	209	100

The majority 74% as it can be seen in table 4.3 did not have knowledge about ITNs among the Jaggery and tea workers. Also, those who knew ITNs said that these were the nets which had been treated or retreated with repellent chemicals that keep away mosquitoes from biting.

#### 4.3.1 Level of knowledge on treated and non- treated nets

The majority 109 (52.2%) did not know the difference between treated and non-treated nets while 100 (47.8%) were able to differentiate between the two as they mentioned that new ITNs have a smell of chemicals and when used immediately opened make someone feel irritated, hence this could affect its utilization as it can be seen in figure 4.2 below.

**Figure 4.2: The level of knowledge on treated and non- treated net**

### 4.3.2 Number of mosquito nets in their places of residence

On the number of mosquito nets 63 (30%) had more than three nets, while 52 (25%) had three nets with 36 (17%) and 41 (20%) having two and one net respectively in the target population as it can be seen in table 4.4 below.

**Table 4.4: Number of mosquito nets in household**

Number of net	Frequency	Proportions %
>Three	63	30
Three	52	25
Two	36	17
One	41	20
None	17	8
Total	209	100

This study assessed the Jaggery and tea workers on the number of mosquito nets in their household. It was revealed that 30% of the respondent had more than three nets while 25% had three with 20% and 17% having one and two nets respectively. Only 8% had none in their households.

### 4.3.3 The type of net used by Jaggery and tea workers in the house

The respondents were asked about the type of net used and they cited the following; conical net 59.5%, ordinary net 6.2%, ITNs 25.8% and 8.1% had none as can be seen in the table 4.5 below.

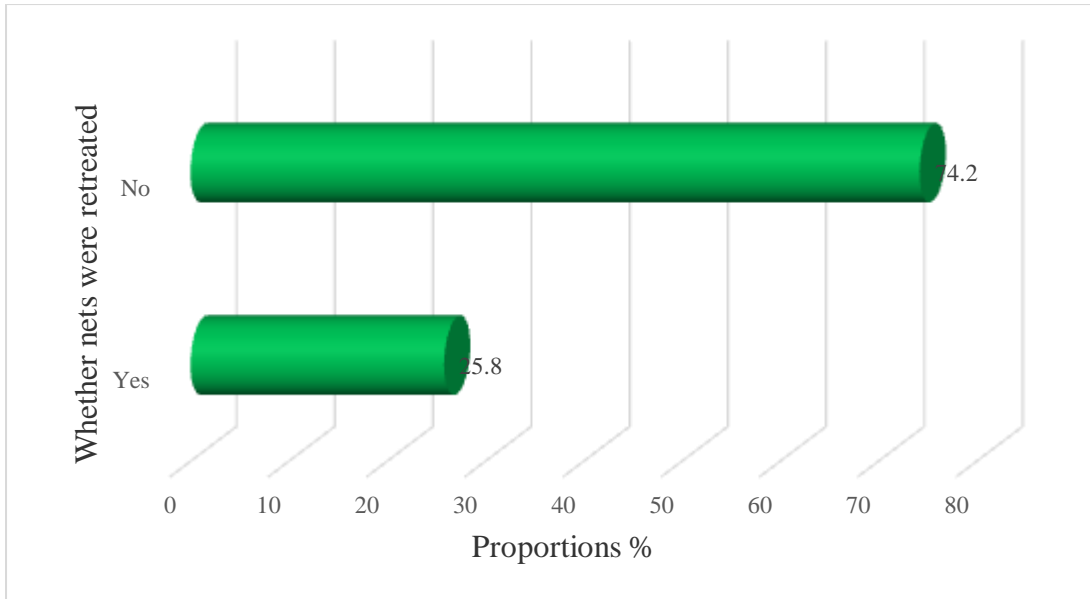
**Table 4.5: Type of net used by-the Jaggery and tea workers in the house**

Type of net	Frequency N	Proportions %
Conical net	125	59.5
Ordinary net	13	6.2
ITNs	54	25.8
None	17	8.1
Total	209	100

The majority 59.5 % mentioned that they used a conical kind of nets as it was easy for them to hang with 25.8% having used ITNs, while 8.1% had none. Only 6.2% used ordinary nets of any kind which were not treated. It was noted in this study that those who never used treated net both conical 125 (59.5%), ordinary nets 13 (6.2%), and those 17 (8.1%) who had none visited the hospital more than three times in the last six months having suffered from malaria episodes compared to those 54 (25.8%) who used ITNs the reason being that those nets were not able to repel the biting mosquitoes.

#### **4.3.4 Whether nets had been re-treated**

The respondents were asked whether their nets had been retreated to establish their knowledge and awareness on the chemicals used and the length of time for retreatment and where they can be treated as it is illustrated in figure 4.3 below.



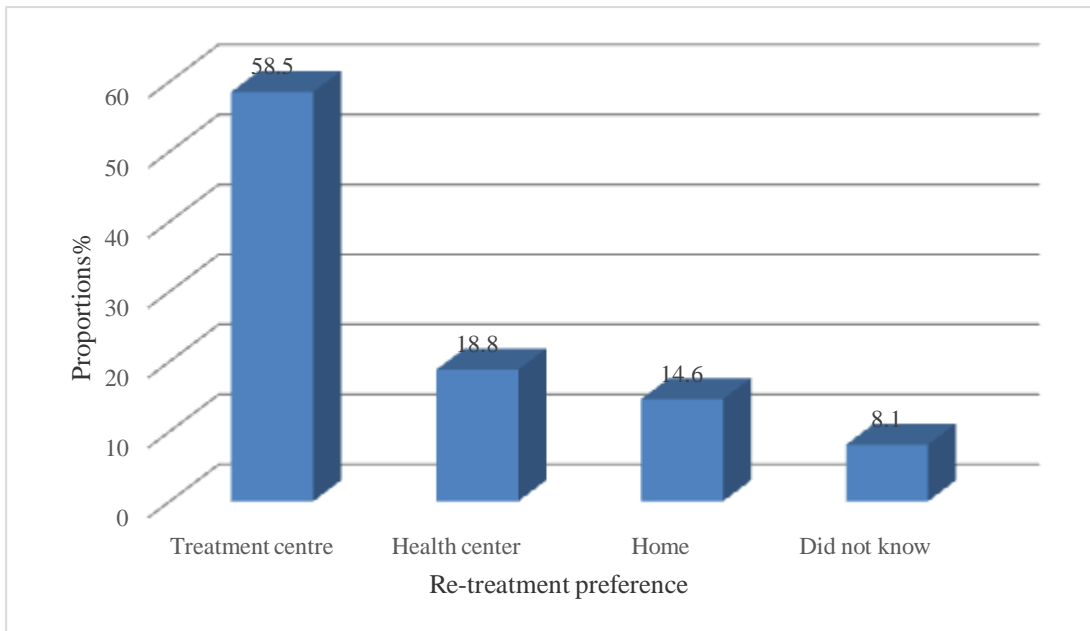
**Figure4.3: Whether nets had been re-treated**

From this study it was noted that 155 (74.2%) of the respondents as it can be seen in figure 4.3 cited that the net had not been re-treated while 54 (25.8%) said that the nets had been re-treated. Those 25.8% who re-treated their nets were aware and when to treat the nets compared to 74.2% who did not know even the type of chemicals used in the treatment. These led to one of the tea workers to comment that;

*"I wish to receive the treatment materials and to be shown how I can soak the net with Insecticide and to know how it is done so that I can use the net consistently".*

#### **4.3.5 Where they preferred to re-treat the nets**

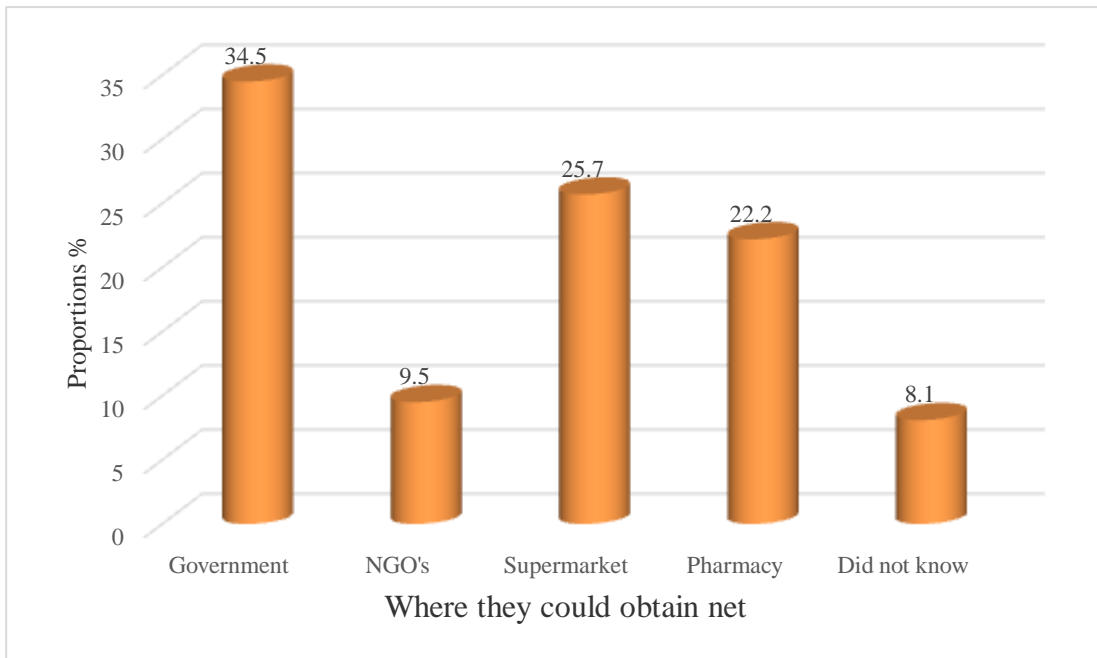
The respondents were asked where they could prefer to re-treat the net and the reasons for the preference. The results are illustrated in the figure 4.4 below.



**Figure 4.4: Where they could prefer to re-treat the nets**

#### **4.3.6 Where the Jaggery and tea workers could obtain the nets**

On where they obtained net(s) currently used the respondents cited the following sources as seen from the figure 4.5 below. On where they could prefer to re-treat the nets 122 (58.5%) said treatment center with 39 (18.8%) said they could prefer to take them to the health Centre. The reasons for preference were because they did not know the chemicals and how-to use them. Only 12 (14.6%) said they could also prefer to do it from home and this was because they had knowledge on chemicals used and where they could purchase them from. A few 17 (8.1%) were not aware and the reasons being that they had none.



**Figure 4.5: Where the Jaggery and tea workers could obtain nets**

Only 72 (34.5%) of the respondent cited that they could obtain from the government, while 54 (25.7%) said the supermarket as well as 46 (22.2%) also said from the pharmacy and 20 (9.5%) said from the NGOs as presented in the above figure 4.5. From the information above it was clear that the respondent were aware of where they could obtain the net. This study also found out that 17 (8.1%) were not aware and they did not even have the nets in their households.

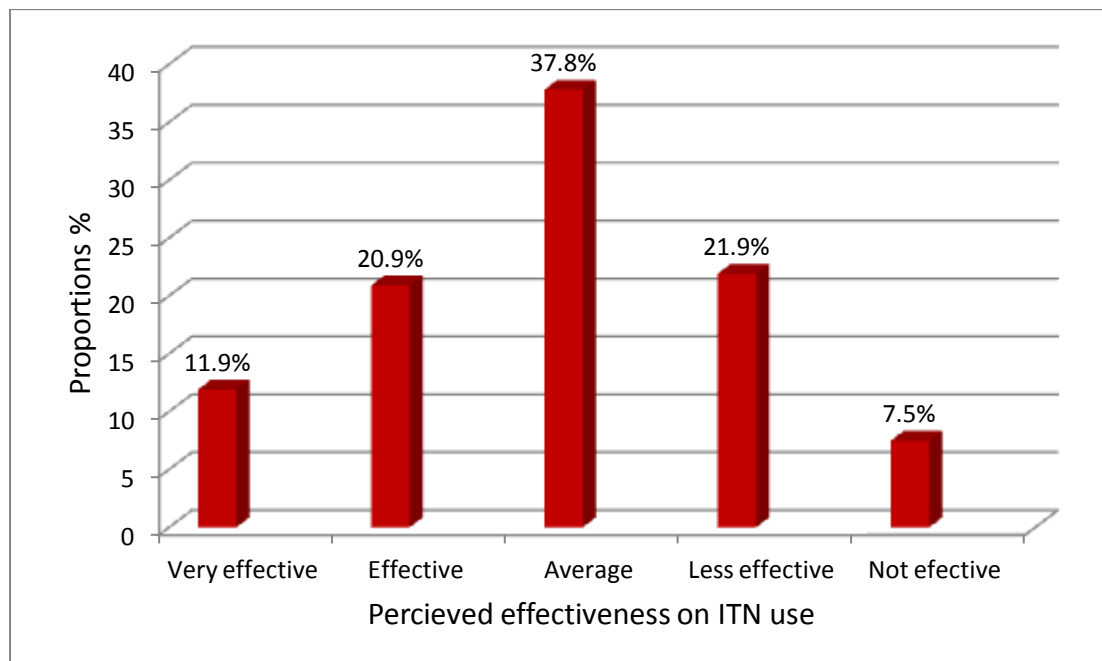
#### **4.4 Perception of ITNs use among the Jaggery and tea workers on malaria prevention**

ITNs are perceived to be a mosquito control intervention in preventing malaria morbidity and mortality among the Jaggery and tea workers in highly endemic areas. Most of the Jaggery and tea workers 109 (52%) perceived malaria to be caused by mosquitoes while 25 (12%) perceived that it is caused by rain. Also 16(8%) perceived it that eating sugarcane caused malaria with 27 (13%) had perceived dirty

environment to have been the cause. This study further established that 66 (31.5%) perceived ITNs to cause suffocation while 43 (20.5%) also perceived to cause irritation with 53 (25.3%) perceiving it to cause dreams as it can be seen in table 4.7 below.

#### 4.4.1 Perceived effectiveness of ITNs use on malaria prevention

On the perceived effectiveness about ITNs use among the Jaggery and tea workers a five range scale was used. The scale ranged from not effective to very effective to establish their feelings on ITNs. 78 (37.8%) said nets were average in malaria prevention 45 (21.9%) said less effective while 43 (20.9%) and 25 (11.9%) said that they were very effective and only 16 (7.5%) said not effectively as seen in the figure 4.6 below.



**Figure 4.6: Perceived effectiveness on ITNs use**

The Perceived risk of malaria and benefits of the nets by the population also drives demand. Only 37.8% perceived ITNs to be average in the control of mosquito bites with 20.9% perceiving it to be effective. The rest 29.4% said that they were less and not effective respectively.

#### **4.4.2 Perceived benefits and barriers related to use of ITNs among the Jaggery and tea workers**

On this question there were multiple responses as the majority 153 (73.1%) said that ITNs were necessary in preventing malaria among the Jaggery and tea workers. However, the minority 56 (26.9%) of respondents perceived ITNs as not necessary as can be seen table 4.6 below.

**Table 4.6: Perceived benefits related to use of ITNs**

<b>Perceived benefits of ITNS</b>	<b>Frequency</b>	<b>Proportion %</b>
Necessary	153	73.1
Not necessary	56	26.9
Total	209	100

It was noted from this study that as much the respondents said it was necessary; utilization was still low as many suffered several malaria episodes. This was due to the fact that some still believed that they cause irritation and dreams as seen in table 4.7 below. Participants and key informants knew that mosquito nets were a useful preventive measure against malaria and that pregnant Jaggery and tea workers and children were supposed to sleep under nets since they are the most vulnerable groups. However, the availability and use of the nets in this area were found to be very low. One of the respondent commented:

*“For us here, we do not use mosquito nets... I also do not have one” (28-year-old pregnant Jaggery worker commented.*

#### 4.4.3 Perception of ITNs use, beliefs and mode of malaria transmission

**Table 4.7: Perception of ITNs use, beliefs and mode of malaria transmission**

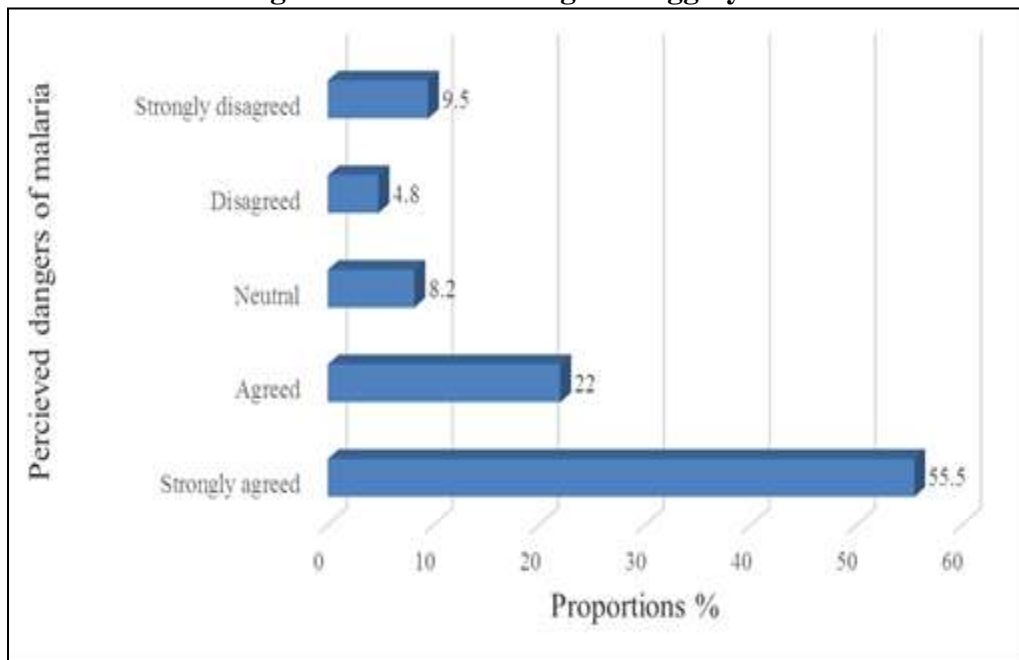
Perception of ITNs use, beliefs and mode of malaria transmission	Response	Frequency	Proportion %
Cause of malaria (unprompted)	Mosquito	109	52
	Dirty environment	27	13
	Stagnant water	32	15
	Eating sugar cane	16	8
	Rained on	25	12
What are ways of preventing malaria?	Through net	116	55.5
	Malaria drugs	46	22
	Clean environment	20	9.5
	Use of ITNs	17	8.2
	I don't know	10	4.8
Reasons for not sleeping under net	Cause suffocation	66	31.5
	Cause irritation	43	20.5
	Cause dreams	53	25.3
	No mosquito	21	10.3
	I don't have	18	8.6
	I forgot	8	3.6

On perception of ITNs use, beliefs and mode on cause of malaria transmission 109 (52%) said mosquito, 32 (15%) said stagnant water while 27 (13%) said dirty environment. Only a few 16 (8%) and 25 (12%) said eating sugar cane and rain respectively.

Also the respondents were asked about ways of preventing malaria to establish their perception 116 (55.5%) said through nets 46 (22%) said through anti malaria drugs while 20 (9.5%) said clean environment with a few 17 (8.2%) said through the use of ITNs and only 10 (4.8%) said they didn't know table 4.7 above.

The respondents were then asked the reasons of not sleeping under net to establish their perception 66 (31.5) percent said that it causes irritation, 53 (25.3%) said it causes dreams, 43 (20.5%) said suffocation, and a few 21 (10.3%) said there were no mosquito while 18 (8.6%) did not have a net and the rest 8 (3.6%) said they forgot. To the perceived cause of malaria in particular, 52% said mosquito. This finding is in contrast to a study by (Alii, *et al*; 2003) in Western Kenya which showed that though people know what causes malaria, they still do not use ITNs as it can be seen in table 4.7 above.

#### 4.4.4 Perceived dangers of malaria among the Jaggery and tea workers



**Figure4.7: Perceived dangers of malaria among the Jaggery and tea workers**

The respondents as seen in figure 4.7 above were asked to what extent they agreed or disagreed that malaria is a dangerous disease. The majority 116 (55.5%) strongly agreed that malaria is dangerous while 46 (22%) agreed that it cause death. A few 17 (8.2%) were neutral while 10 (4.8%) disagreed. Those who strongly disagreed 20

(9.5%) said that rainy conditions were the causes of malaria and these led to the number of days lost. This study revealed that those who were neutral were found not having any ITNs.

#### **4.5 Levels of ITNs use among the Jaggery and tea workers**

The level of ITNs use was measured by the type of the house structure as it can be seen in table 4.8 below.

**Table4.8: Type of house, number of people sleeping in the house**

Type of house	Frequency	Proportions %
Grass thatched	24	11.48
Mud	59	28.23
Semi-permanent	79	37.80
Permanent	47	22.49
Total	209	100.00

The above table 4.8 shows the type of house structure where the Jaggery and tea workers lived. This study summarized the above to show their statistical information and significance as it can be seen in table 4.9 below. The different kinds of household structures, number of rooms and the number of people sleeping there may favor or deter the use of mosquito nets especially hanging nets. Respondents were asked about the kind of household structure they stay in to establish on how these structures affected ITNs use. The majority 79 (37.80%) were living in semi-permanent houses and these were attributed from their economic activities.

##### **4.5.1 Number of rooms for the Jaggery and tea workers.**

The level of ITNs use was also measured by the number of rooms they had to establish any sleeping arrangement made with Jaggery and tea workers.

One of the respondents who was 35 years old tea worker said;

*‘‘The net is too short to cover the bed, and in most cases I use it to carry tea to buying center.’’*

**Table 4. 9: Number of rooms and people sleeping in the house**

Number of rooms	Frequency	Proportions %
One	43	20.57
Two	70	33.49
Three	47	22.49
Four	29	13.88
>Four	20	9.57
Total	209	100

It was found from this study as it can be seen table 4.9 that 33.49% had two rooms with also 22.49% having three while 20.57% had one and 13.88% had four with 9.57% having more than four rooms. One of the respondent living in two rooms quoted that;

*‘‘I hang an ITN in four corners of the bed poles and pulled the net to cover the mattress every morning I leave the bed covered to prevent mosquitoes from entering, (42 year old tea worker)’’ said.*

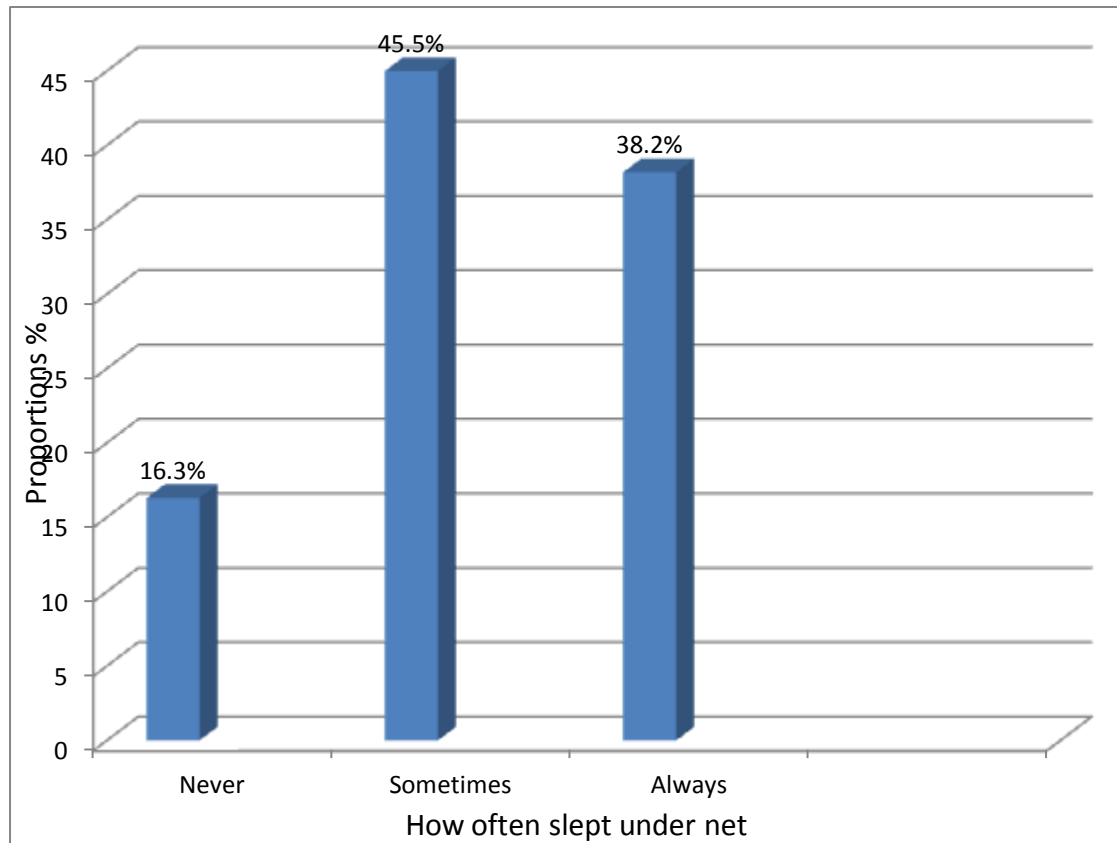
Therefore, it was revealed from this study that more of the Jaggery and tea workers lived in two rooms and these were due to their low level of income.

#### **4.5.2 How often the Jaggery and tea workers slept under a net**

The respondents were asked about how often to establish their consistency in the net use. Those who never and sometimes slept under the net because of fear of

suffocation they suffered from malaria episode and they frequently visited the hospital for malaria treatment. One of the Jaggery workers commented that;

*‘‘The (ITNs) create warmth that cause sweating, irritation and sometimes suffocation, (29year old, Jaggery worker)’’ said.*



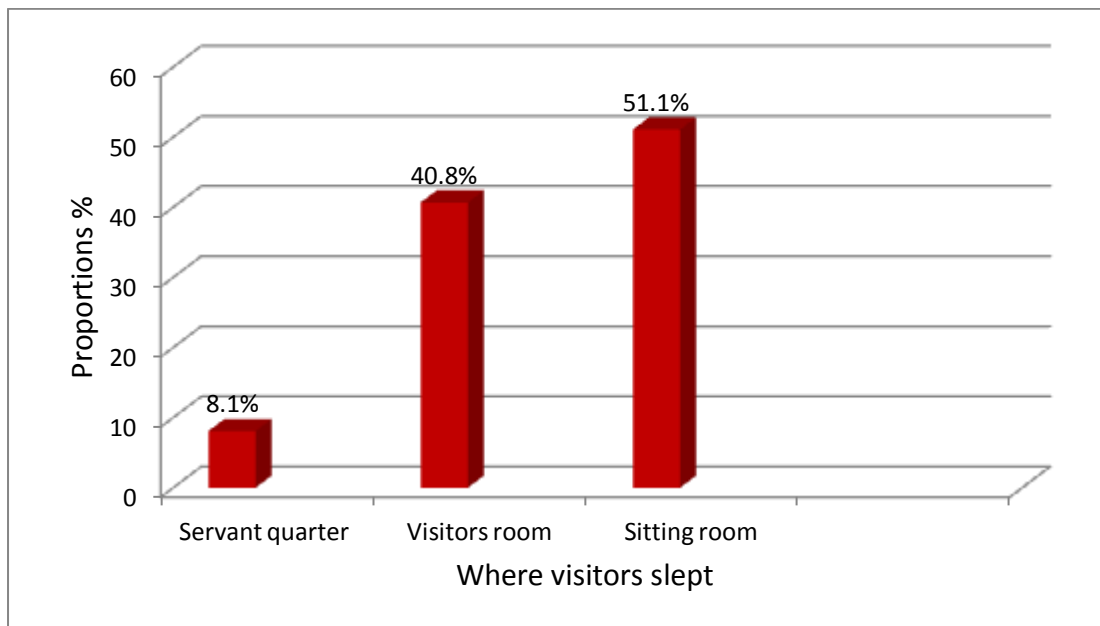
**Figure4.8: How often the Jaggery and tea workers slept under net**

The above figure 4.8 shows how often the respondents slept under an ITN with 95 (45.5%) said that they sometimes slept under the ITNs while 79 (38.2%) said always with only (16.3%) said that they never used it. Among the (38.2%) who always slept under net did not report more hospital visitation for malaria treatment compared with (45.5%) and 34 (16.3%) who sometimes and never used net respectively. It was

revealed that some of those who never slept under an ITN were found not having the net.

#### 4.5.3 Where the visitors slept

The visitors in most households altered the sleeping arrangements. The household owners preferred their visitors to sleep at servant quarters, visitor's room and sitting room as these places did not have any planned net for use.



**Figure4.9: Where the visitors slept**

On where the visitors slept as it can be seen in figure 4.9 above, the majority 107 (51.1%) slept in the sitting room while 83 (40.8%) and 17 (8.1%) slept in visitors and servant quarters respectively. For those who slept in the sitting room (51.1%) there was no arrangement to use ITNs compared with (40.8 %) and (8.1%) in the visitors and servant quarters, respectively were more likely to get an ITN net to use as such could be the arrangements in those rooms.

#### 4.6 Factors that influenced ITNs use among the Jaggery and tea workers

From the analysis of this study it was clear that there are some socio-demographic factors among the Jaggery and tea workers which hindered ITNs use. Barriers towards use of bed nets that would negate their use include; gender, age, marital status, education and occupation as can be seen in table 4.10 below.

##### 4.6.1 Demographic factors versus ITNs use

**Table 4.10: Demographic factors associated with ITN use**

Variables	ITN Use		$\chi^2$ Test P-Value
	Yes n (%)	No n(%)	
<b>Gender</b>			<0.001***
Male	93(51.6%)	17(100%)	
Female	92(48.4%)	0(0.0%)	
<b>Age</b>			0.131
18-28	52(27.1%)	17(100%)	
29-39	85(44.3%)	0(0.0%)	
40-49	55(28.6%)	0(0.0%)	
<b>Marital status</b>			0.362
Single	42(17.7%)	17(100%)	
Married	95(45.0%)	0(0.0%)	
Widowed	23(11.0%)	0(0.0%)	
Divorced	29(15.9%)	0(0.0%)	
Living together	9(4.7%)	0(0.0%)	
No response	11(5.7%)	0(0.0%)	
<b>Education</b>			<0.001***
None	0(0.0%)	14(82.4%)	
Primary	26(13.5%)	3(17.6%)	
Secondary	88(45.5%)	0(0.0%)	
College	62(32.3%)	0(0.0%)	
Vocational training	16(8.7%)	0(0.0%)	
<b>Occupation</b>			<0.003***
Jaggery worker	87(45.3%)	0(0.0%)	
Tea worker	105(54.7%)	11(64.7%)	
Others	0(0.0%)	6(35.3%)	

\*P<0.05; \*\*\*P<0.001; \*\*\*\*P<0.0001; \*\*\*\*\*P<0.00001

From the above table 4.10, 99 (51.6%) of gender were male, while 93 (48.4%) were female. Therefore, gender was found to play a great role and was statistically

significant  $p < 0.001$  among the ITNs users. Among the non- users of ITNs 17 (100%) were also found to be males and were not having any in their households.

Age and marital status were found not to be statistically significant. The majority of ITNs users' age ranged between 29-39 years with non- users age ranging from 18-29 years respectively. On marital status 95 (49.5%) who were married and were found to be among the users of ITNs while 17 (100%) of the singles were found to be non - users of ITNs in this study.

Education and occupation were also found to be statistically significant with the  $p < 0.001$  and  $p < 0.003$  respectively. Most 88 (45.5%) of the Jaggery and tea workers had attained secondary education. On their occupation, it was revealed that 105 (54.5%) were tea workers and users of ITNs.

#### 4.6.2 Economic factors versus ITNs use

**Table 4.11: Economic factors versus ITN use**

Variables	ITN Use		$\chi^2$ Test P-Value
	Yes n (%)	No n (%)	
<b>Cost</b>			$p < 0.010$ ***
Cost high	144(75.0%)	17(100.0%)	
Cost low	48(25.0%)	0(0.0%)	
<b>Accessibility</b>			$p < 0.001$ ***
Yes	192(100%)	0(0.0%)	
No	0(0.0%)	17(100%)	
<b>House structure</b>			$p < 0.001$ ***
Grass thatched	8(4.2%)	16(94.1%)	
Mud	58(30.2%)	1(5.90%)	
Semi-permanent	79(41.1%)	0(0.0%)	
Permanent	47(24.5%)	0(0.0%)	
<b>Number of rooms</b>			0.521
One	31(16.1%)	12(70.6%)	
Two	64(34.9%)	4(23.5%)	
Three	45(23.4%)	1(5.9%)	
Four	29(15.1%)	0(0.0%)	
More than four	20(10.4%)	0(0.0%)	

\*\* $P < 0.05$ ; \*\*\* $P < 0.010$ ; \*\*\*\* $P < 0.001$

For ITNs to be effectively utilized as can be seen in table 4.11 within the household, they must be readily affordable, accessible and available within the household structure. This study found out that there are other factors within the household that could influence or deter the use of ITNs and these included; cost, accessibility, house structure and the number of rooms. Therefore, this study found out that enabling factors within the community, such as economic empowerment; access and availability determined ITNs use the households. However, on how they came to know about ITNs, 40.1% percent cited radio while 20.3% said TV/posters. Also 26.7% cited that they got information from the health workers. From the analysis, it was evident that the major sources of information about ITNs among the Jaggery and tea worker was the radio.

From the economic characteristics of respondents in this study, the majority 144 (75%) of users said that cost of the nets was high with only 48 (25%) of the user said that they were comfortable with the cost as seen in table 4.11 above. Cost was found to be statistically significant  $p < 0.010$  with ITNs use. Those who said that the cost was high were found to have been engaged in small scale tea and sugar cane farming activities which did not generate enough income to meet their household daily requirement including the purchase of ITNs. Affordability was measured in terms of how much they had paid for the nets they were using if not given free by the government. The respondents said that it ranged from Kshs450 to Kshs1200 depending on the type of a net. This means that although the average cost of Kshs800 still was high to some people. It was revealed that none users 17 (100) % had none in their household did not bother to find out where they could get the affordable mosquito net due to their limited finances as can be seen in table 4.10 above.

Lack of financial resources was frequently mentioned by key informants as a key barrier to obtaining nets. Low income among the Jaggery and tea workers was observed as a reason of not able to purchase an extra net as they earned Kshs7600 as seen in figure 4.1 above and prioritized their immediate needs such as food and shelter compared to nets.

From this study as seen in table 4.11 above, it was revealed that house structure will always determine the ITNs use. House structure was found to be statistically significant with ITNs use with  $p < 0.001$  as 79 respondents (41.1%) lived in semi-permanent structures. Although the awareness level has improved over time, studies by (Osero, *et al*, 2005) and (Adeneye, *et al.*, 2007) have shown that a lot of factors militate against actual ownership and correct use of ITNs.

This study found out that the number of rooms were not statistically significant  $p < 0.521$  with the ITNs use. The majority 70.6% of non ITNs users lived in one room and grass thatched as these were related to their level of income. It was found out that both pregnant Jaggery and tea workers in the household were given preferences to sleep under the mosquito net. This showed that there is a relationship of mosquito nets ownership in the household and malaria episodes among those who had less than two as a result of disruption of sleeping arrangements especially when they had visitors.

#### 4.6.3 Weather conditions versus ITNs use

**Table 4.12: Weather conditions versus ITN use**

Variables	ITN Use		P-Value
	Yes n (%)	No n (%)	
<b>Weather conditions</b>			$p < 0.001$ ***
Yes(hot)	173(90.1%)	2(11.8%)	
No	19(9.9%)	15(88.2%)	

From the study, it was found that also weather conditions as seen in table 4.12 above was statistically significant with  $p < 0.001$  and ITNs use. It was also found that the 88.2% of non-users of ITNs cited weather condition as the reasons for not using and gave reasons that they caused suffocation and irritation. Among the users 19 (9.9%) who were found not using said that they do so when mosquitoes are plentiful but keep them away when there are no mosquitoes during the dry seasons.

## **CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter provides the discussion, summary, conclusion and recommendations of the study. The way the variable relates to each other is discussed in this chapter.

### **5.2 Discussion**

In seeking to determine the use of insecticide treated nets in the prevention of malaria among the Jaggery and tea workers in the South Mugirango Sub County, the research had five objectives which are discussed in greater details. This study was therefore set to investigate the demographic and socioeconomic characteristics, knowledge, perceptions and beliefs, level of ITNs use and the factors that influenced ITNs use among the Jaggery and tea workers in the South Mugirango Sub County, Kisii County. Overall the above variables were found to influence the use of ITNS among the group under study.

#### **5.2.1 Demographic and socioeconomic characteristics of the Jaggery and tea workers**

Findings from this study revealed a low likelihood of the Jaggery and tea workers use of ITNs in the prevention of malaria. This study was congruent with the one done by (Somi, MF, et al; 2007) who found a dual causation link between malaria socioeconomic in rural Tanzania. Most of the Jaggery and tea workers did not use ITNs due to lack of knowledge and sometimes due to ignorance and these were traced from their demographic and socioeconomic and cultural contexts within which they lived.

From the demographic and socioeconomic characteristics only gender and education were found to be statistically significant with ( $p < 0.001$ ) played a crucial role in ITNs use among the Jaggery and tea workers respectively. This study was in line with one done by (Adhroey, *et al*; 2010) on effects of malaria who found that gender is key in reducing malaria prevalence. Therefore the study revealed that literacy played a role as a mechanism of social transformation among the Jaggery and tea workers in relation to the use of ITNs in the prevention of malaria in South Mugirango. This was similar with a study previously documented by (Rashed, *et al*; 1999). The result indicated that 62 respondents (32.3%) who had attended college and the 16 respondents (8.3%) with vocational training were found using ITNs than those with no education at all. However, among all the variables, only education with  $p < 0.001$  showed a slight influence on the knowledge of ITNs use as seen in the table 4.10.

On level of income as seen in figure 4.1 revealed that almost all households accessed some income. From the FGDs it was revealed that workers in the Jaggery and tea industry earned very little to sustain them and have extra to purchase ITNs. This study therefore, is in agreement with other studies done by (Mac Cormack, *et al*; 1989) which reported that households with low income would not consider purchasing any health items at the expense of the basic needs and this could have been the reasons why some household as it can be seen in table 4.5 where 17 respondent (8.1%) had none.

This study also indicated that about 49.5% of the users of ITNs were married while from among the non- users 17 (100%) were found to be single as it can be seen in table.4.10 and this concurred with a study by (Osero, *et al*; 2005) on maternal use of

ITNs who found that the head of household determined who was to sleep under incase household received visitors. From their occupation, it was revealed that more than half 116 of the respondents (56%) as seen in table 4.1 were tea workers who engaged with other small scale activities to supplement their income. About (18%) of the tea workers were found using the ITNs in carrying tea to the tea buying centers and the reasons were said that nets and netting materials were portable and easy to carry compared with the baskets. Therefore, this study revealed that the majority 55.5% as seen in table 4.7 were aware of ways of preventing malaria, but demonstrated a high level of ignorance in the use of ITNs as they believed that they cause dreams, suffocation and irritation respectively.

### **5.2.2 Level of knowledge among the Jaggery and tea workers**

Low levels of ITNs use were attributed to lack knowledge and low level of income. This study indicated that those with knowledge about ITNs said that these were the nets, which have been treated or re-treated with repellent chemicals to expel mosquitoes and this study was also in agreement with the one done by (Osero, *et al*; 2005) and (Adeneye, *et al*; 2007) which found out that although the awareness level has improved over time there are other factors that militate against actual ownership and correct use of ITNs.

The majority 109 respondents (52.2%) did not know the difference between ITNs and non-treated nets while 100 respondents (47.8%) as seen in figure 4.2 were able to differentiate between the two hence this affects its utilization. Therefore, it was revealed that those who were unable to differentiate treated nets from non-treated nets were more likely not to have or used the ITNs in the prevention of malaria.

This study indicated that 155 (74.2%) of the respondents as seen in figure 4.3 cited that the net had not been re-treated and this finding concurred with a study by (Armstrong, *et al*; 2002) that showed that re-treatment of nets was not done by majority owners.

This study further established where they could preferred to re-treat the net 122 (58.5%) said treatment center. The reason for preference was because they did not know the chemical and how to use them. Of 12 respondents (14.6%) percent preferred to do it from home and this was because they had knowledge on chemicals used and where they can purchase it from. Only 17 respondents (8.1%) did not have any preference as they were found not owning one. This study suggested that having knowledge about the causes of malaria, signs and symptoms would enable people to seek care and intervention appropriately. This finding concurred with (Nganda, *et al*; 2004) who found out that knowledge of malaria influenced ITNs use.

This study also investigated where they could obtain the nets currently used in their household to establish their level of awareness. Only 71 respondents (34.5%) said that they could be obtained from government, while 54 respondents (25.7%) Supermarket and 44 respondents (22.2%) said pharmacy and about 20 respondents (9.5%) said NGOs as presented in the figure 4.5 above. Although they were aware some 8.1% of the respondents were found not having any. From the information above it was clear that the respondent were aware of where the ITNs could be obtained. Therefore, this study also was in agreement with a study done by (Erhun, *et al*; 2005) and (Adedotun, *et al*; 2010) which had shown that educated communities have multiple sources of information compared with their counterparts with no formal education at all.

### **5.2.3 Perception of ITNs use among the Jaggery and tea workers**

On the perceived feelings about ITNs use this study found out that perception plays a key role in the use of ITNs among the Jaggery and tea workers. This study therefore, was in line with one done by (Deressa, *et al*; 2008) in Ethiopia on health seeking behavior and challenges on ITNs use. About 16 respondents (7.5%) who said that ITNs were not effective as seen in the figure 4.6 above experienced high morbidity and mortality and this was similar to a study by (Rowe, *et al*; 2006) who found that those not using had high burdens of malaria morbidity and mortality and had visited the health center for malaria treatment more than three times in the last six months. This study was also in agreement with the one done by (Onwujekwe, *et al*; 2003) in a Nigerian study who also found that households with a recent attack of malaria were more likely to purchase a net than their counterparts.

Findings for the perceived benefit of ITNs use among the Jaggery and tea workers, the majority 73.1% percent said that ITNs were necessary in preventing malaria among the Jaggery and tea workers. This study was also similar to one done by (Beer, *et al*; 2012) on perceived need of bed nets who found that as a need factor arise among the people who directly use the bed nets, their health status improves as these leads to reduced morbidity. This study was also similar with the one done by (Bauch, *et al*; 2013) who also found that when people perceive malaria to be risk, use becomes more evident. This study found that as much the respondents said it was necessary; utilization was still low. Furthermore, a study by (Michael, *et al*; 2011) on linking cost and cost effectiveness found that when people perceive cost to be high, use also become more limited and this leads to more suffering several malaria episodes.

Respondent's perception on ITNs use and mode of malaria transmission the majority 109 respondents (52%) said that it is caused by mosquito, while 32 respondents (15%) said stagnant water while 27 (13%) said dirty environment. Only a few 16 respondents (8%) and 25 (12%) said eating sugar cane and rain respectively. This study was similar with the one done by (Nuwaha, *et al*; 2006) at Mbarara who also found that people perceived malaria to be caused by different phenomena. This study also found out that the Jaggery and tea workers were not using ITNs and perceived them to cause irritation, dreams and suffocation. This showed that although they were aware that ITNs prevents malaria, they ignorantly never used the nets. The findings from this study revealed that the Jaggery and tea workers perceived malaria to be a dangerous disease. They gave reasons to support their perception that it disturbs their daily activities and it causes death.

A few 17 (8.2%) were neutral while 10 (4.8%) disagreed. Those who strongly disagreed 20 (9.5%) said that rainy conditions were the cause of malaria and these led to the number of days lost. Therefore, when people perceive malaria to be dangerous then need factor comes hand as they will try to find the solution for their problems. Those who were neutral 8.2% were also found not having any net in their households.

#### **5.2.4 Levels of ITNs use among the Jaggery and tea workers**

The different kinds of household structures, number of rooms, and number of people sleeping there, number of ITNs may favor or deter the use of mosquito nets especially hanging nets. This study indicated that the number of rooms and number of Jaggery and tea workers sleeping in the rooms always deterred the use and this was similar to a study by (Alii, *et al*; 2003). As it can be seen from table 4.4 those who had two

rooms were 32 %. Who had three while 14% had one and 15 % had four with 9% having more than four. People with more number of rooms are more likely to have extra nets for the visitors than those with one and concurred with (White, *et al*; 2012) who found that people who use ITNs for malaria interventions have reduced malaria deaths.

The respondents were asked about how often they slept under ITNs, 45.5% said that they sometimes slept under the ITNs while 38.2% said always with only 16.3% said that they never used it. This study also was similar to that done by (Pulford, *et al*; 2011) on reasons of not using the mosquito nets. Among the 38.2 % who always slept under ITNs did not report more hospital visitation for malaria treatment compared with 45.5% and 16.3% who sometimes and never used net respectively. Therefore, the study found that there was no consistency in ITNs use among the Jaggery and tea workers. This led to high morbidity and this study was similar with one done by (Adedotun, *et al*; 2012) in western Nigeria who found high *Plasmodium* infection among the non users of ITNs.

The actual use of nets at night was not verified in this study and the possibility of untrue report of ITN use, which could cause bias in the results, arises. The findings of ITNs use was congruent with one done by (Osero, *et al*; 2005) who found that many people who had nets were not using them.

On where the visitors slept the majority 107 respondents (51.1%) slept in the sitting room while 83 respondents (40.8%) and 17 respondents (8.1%) slept in visitors rooms and servant quarters respectively. On those who slept in the sitting room 51.1%, there

were no arrangement to use ITNs compared with 40.8% and 8.1% in the visitors rooms and servant quarters respectively were more likely to get an ITN net for use. This study was in extent similar with the one done by (Nuwaha, 2002) in Western Uganda, on the perceptions about malaria prevention by use of ITNs. Overallly, it was found that various levels deter the use of ITNs among the Jaggery and tea workers.

#### **5.2.5 Factors that influenced ITNs use among the Jaggery and tea workers**

From the analysis of this study, it was clear that there were factors within the household, which hindered ITNs use and this was similar to a study done by (Chuma, *et al*; 2006) on the economic cost of malaria in rural Kenya. Barriers towards the use of ITNs that negated their use were classified into three categories. These include; demographic, socioeconomic factors and weather conditions. This study found out that among the demographic factors such as age and marital status were not statistically related to ITNs use among the Jaggery and tea workers with  $p < 0.131$  and  $p < 0.362$  as can be seen from table 4.10 respectively.

The result further illustrated that gender was significantly related to ITNs use among the Jaggery and tea workers. Males were found to be among the highest non users of the ITNs compared with 48.4% female users. Education was also found to be statistically significant with  $p < 0.001$  and the ITNs use. Those who had attained a high level of education were found to be utilizing the ITNs compared with those without education as can be seen from table 4.10.

Occupation was also found to significantly associated  $p < 0.003$  with ITNs use. Among the users 54.7% majority were tea workers. However, from among the non-users 64.7% were also found to be from the same group seen in table 4.10. Therefore, the

kind of occupation may deter or affect the ITNs use and these research findings congruent with a study carried out in Western Kenya about factors affecting ITN use by (Alii, *et al*, 2003).

This study further established the socio- economic factors and these included: cost, accessibility, house structure and number of rooms. Among all the factors only the number of rooms were found not statistically significant with ITNs use with the  $p < 0.521$ . This study was similar with one done by (Koenker, *et al*; 2013) in Zanzibar who found that perceptions deter use of ITNs. The cost was also found to be statistically significant with the use of ITNs among the Jaggery and tea workers with the  $p < 0.010$ . This means that when the cost is high the demand goes down and only few 25% with purchasing power were able to buy one. This was also similar to a study by (Chuma, *et al*; 2006) on the economic cost on malaria in rural Kenya as can be seen in table 4.11 above. Furthermore, house structure was also found to be statistically significant  $p < 0.01$  with ITNs use. Among the non- users, all were found living in grass thatched houses and this was due to their income levels. That is why 70.6% of the non-users were also found living in one roomed house. This study therefore was in line with (UNICEF, 2009) which found that net ownership is lowest among the poorest households. Furthermore, this study indicated some similarity with that one done by (Osero, *et al*; 2005) who found that although the awareness level had improved over time, a lot of factors influence the actual ownership and correct use of ITNs. Therefore, the study found that both demographic, socioeconomic factors as well as weather conditions affected use of ITNs among the Jaggery and tea workers.

### 5.3 Conclusion

This study concludes that there was an association between demographic and socioeconomic characteristics among the Jaggery and tea workers and ITNs use in the prevention of malaria. Therefore the null hypothesis was rejected. Moreover, this study also indicated that there was a relationship between knowledge and ITNs use among the Jaggery and tea workers with  $p < 0.001$ . Low level on the use of ITNs was attributed by the level of knowledge, perception, demographic and socioeconomic characteristics.

The study also found out that there was a relationship between knowledge and ITNs use among the Jaggery and tea workers with  $p < 0.001$  hence led to the rejection of the null hypothesis again. Among the ITNs users, 49% were unable to differentiate between treated and non-treated net. Only 28.1 % of users had ITNs. Therefore, knowledge plays a role in the utilization of the net. The study also found that 73.4% of the users had not re-treated their nets. The other factors within the households include: the house structure, number of beds, number of people sleeping in the household, sleeping arrangements, number of nets within the household and the number of visitors as the later led to disruption of sleeping arrangements among the Jaggery and tea workers. However, effectiveness largely depends on the knowledge and perceptions of the people in the household who directly use them.

In regard to perceptions and beliefs, more than half of the respondents perceived that malaria was caused by mosquitoes whereby overall the study indicated that 67.1% were not using ITNs due to irritation, suffocation and dreams. The findings of this study showed that perceptions about ITNs influenced its use among the Jaggery and tea workers within their household. In case they received visitors the head of the household decided who was to use the ITNs. The negative perceptions and beliefs

among the Jaggery and tea workers led to low usage of ITNs as this led to more hospital visitation due to malaria episodes.

Furthermore, level of ITNs use was assessed against the kind and the number of mosquito net in the household. Therefore, this study established that 37.8% were living in semi-permanent houses where 33.5% were living in two rooms and this was attributed to economic status thus not possible to use the ITNs hence there was no significant relationship between the kind of mosquito net and number in the household.

Finally, in regard to the factors that influence the ITNs use; cost, accessibility, house structure and weather conditions were found to be statistically significant with  $p < 0.001$  with the ITNs use among the Jaggery and tea workers. Therefore, demographic factors, economic factors and weather conditions were found to be attributing factors that affected ITNs use among the Jaggery and tea workers in the households within which they lived. Therefore, all the five objectives were achieved as well as the hypothesis tested.

#### **5.4 Programmatic recommendations**

1. There is need to encourage more use of ITNs in the different socioeconomic groups where the male should be considered as they were a majority among the Jaggery and tea workers.
2. Knowledge on the use of ITNs should be enhanced by health workers through trainings and demonstrations at household level.
3. In order to improve perceptions on the use of ITNs among the Jaggery and tea workers, there is need to develop a health promotion package based on the

perceived factors that demystified the negative perceptions that led to low use of ITNs.

4. Massive sensitization and training to Jaggery and tea workers is necessary on ITNs. This therefore calls for an urgent and proper training and empowerment through (IGAs) on how to use the ITNs, the chemicals used for re-treatment and where it can be found.
5. Policy makers should take into account how malaria episodes among the Jaggery and tea workers affect the economy and measures to put into place to prevent malaria incidences and prevalence.

### **5.5 Recommendations for further study**

The study suggests the following area for further research:-

1. A study on the assessment of ITNs should be designed to have a wider coverage to enhance Country wide representation.
2. A study is required on how to improve ITNs use both informal sector and low income workers as they are the most malaria vulnerable groups.

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## APPENDICES

### Appendix 1: Consent Form

The questionnaires for the Jaggery and Tea Workers on the use of Insecticide Treated Nets in the Prevention of Malaria in Kisii-County, Kenya.

#### Section 1: Identification

Village .....

Date of interview.....

.....

Time of Interview

#### Informed Consent Form.

My name is Masta Ondara Omwono. I am a master of public Health student from Kenyatta University “I am conducting a study on **“Use of insecticide treated nets in the prevention of malaria among the Jaggery and tea workers in Kisii, County, Kenya”**”.

The information will be used by the Ministry Medical Services and Public Health and Sanitation to improve access and quality for screening of Malaria in Kisii County as well as in other Counties in Kenya.

#### The procedure to be followed

Participation in this study will require that I ask you some questions and also examine you in order to record the information from you in a questionnaire.

You have the right to refuse participation in this study. You will get the same care and medical treatment, whether you agree to join the study or not and your decision will not change the care you receive from the clinic today or that you will get from other clinic at any time.

Please remember participation in the study is voluntary. You may ask questions related to the study any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from the clinic or any other organization now or in future.

### **Discomforts and risks**

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may take about half an hour.

### **Benefits**

If you participate in this study you will help us to learn how to provide effective screening services that can improve the health of the Jaggery and Tea workers and reduce the risk of malaria. You will also benefit from being screened for malaria and if you are found to have a problem you will be advised on the treatment.

### **Reward**

If you agree to participate in this study, lunch will be provided and transport expenses will be reimbursed.

**Confidentiality**

The interview and examinations will be conducted in a private setting. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

**Contact information**

If you have any questions you may contact

**Supervisors:**

1. Prof Alloys S.S.Orago ( PhD) Dept .of Pathology KU Tel 0722483827
2. Dr Justus O.O.Osero (PhD) Dept. Of Community Health KU Tel 072469330 or  
The Kenyatta University Ethical Review Committee Secretariat on  
[Chairman.kuerc@ku.ac.ke](mailto:Chairman.kuerc@ku.ac.ke), [secretary.kuerc@ku.ac.ke](mailto:secretary.kuerc@ku.ac.ke), [ercku2008@gmail.com](mailto:ercku2008@gmail.com)

**Participant's Statement**

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment, whether I decide to leave the study or not and my decision will not change the care I will receive from the clinic today or that I will get from any other clinic at any other time.

Code of participant

Signature or Thumbprint

Date

**Investigator's Statement**

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer

Interviewer Signature

Date

## Appendix 2: Questionnaires

I would like to ask you some questions about people who usually live in your house.

Your residence	Age	Gender	Previous night	Use of the net
001 Please give number of people who reside in this home.	002 Please give the age in years. (18-49)	003. Sex 1 Male 2 Female	004 Did that number sleep here last night? 1. Yes 2. No 0: DK	005 Did that number sleep under a mosquito net last night? 1 Yes 2 No 0 DK

### Socio- demographic characteristics of jaggery and tea workers

006	What is your marital status?	Single Married Widowed Divorced/separated Living together/cohabiting No response	1 2 3 4 5 6
007	What is your highest level of education?	No education Primary education Secondary education Post secondary education Vocational education	1 2 3 4 5
008	What is your occupation?	Tea worker Jaggery worker	1 2
<b>Types of the houses</b>			
009	What kind of house structure do you stay in?	Grass thatched/made of mud Semi-permanent Permanent	
010	How many rooms does your house have?	.....	
011	How many people sleep in this house?	.....	

012	How many Jaggery and tea workers live here in this house?	1 2 3
013	What sleeping arrangements do you have in this place?	1 2 3 4
014	Do you have beds for all the Jaggery and tea workers?  <b>Knowledge, perception and level of use</b>	Yes No If yes, how many beds do you have? ..... .....
015	Do you sleep alone?	Yes No
016	If no, whom do you sleep with?	Wife, co- workers, Relative.
017	Do you always ensure that you cover yourself well?	Yes No
018	If yes, what do you use?	ITNS Blanket Bed covers, bed sheets
019	Did you receive any visitor who spent a night in your house in the last three months?	Yes No If yes, how many were they? ..... .....
020	Where did that Visitor(s) sleep when they came?	In the sitting room 1 Visitors room 2 In the employers servant quarters 3
021	If visitors slept in the sitting room what did they sleep on?	Bed Mat Sofa set others.....
022	Do you know anything about mosquito nets?	Yes No If yes what do you know .....

		.....
023	What kind of mosquito nets do you know?	Long lasting net 1 Insecticide Treated mosquito nets 2 Ordinary nets 3 Both treated and untreated mosquito nets 4 Others.....
024	Do you have any mosquito nets in your house or in the place you sleep?	Yes No
025	How many mosquito nets do you have where you sleep household?	More than 3 3 nets 1 nets 2net s More than 2 None
026	How many people sleep under a mosquito net in your home?	.....
027	Who in the household sleep under the mosquito net?	Pregnant jaggery and tea workers aged (18-49) Pregnant tea workers aged (18-49) Men workers aged 18-49
028	What kind of mosquito net do you sleep under?	Insecticide treated mosquito net 1 Ordinary nets 2
029	How often do you sleep under the nets?	..... .....
030	What types of nets do you use in this house?	Conical shaped 1 Square shaped 2 Rectangle shaped 3
031	For how long have you been sleeping under the mosquito net?	Always 1 Sometimes 2 Never 3
032	How consistently do you sleep under the net during the night?	Every night 1 During the season for mosquitoes 2 All year round 3 Most part of the night 4 Some part of the night 5

033	What is your feeling about the use of Insecticide treated nets in prevention of malaria?	Very effective 1 Effective 2 Average 3 Less effective 4 Not effective at all 5 Explain.....	
034	Do you know what the ITNs are?	Yes No	If no, skip to qtn 038
035	Do you have ITNs in this house?	Yes No	1 2
036	Do you know the difference between ITN and a non treated net?	Yes No	1 2
037	If yes, explain the difference?	..... ...	
038	What type of net are you using in this house?	Conical Net 1 Net 2 ITN/currently Treated net 3 Others ..... 4	
<b>Factors influencing ITNs use among the Jaggery and tea workers</b>			
039	If not using a treated mosquito net, why?	..... .....	
040	What are the factors that influence ITNs use? Please name them.....	..... .....	
041	How did you come to know about ITNs?	Radios TV/media/posters Health workers Counselors/field Visitation in homes Friends Others..... .....	1 2 3 4 5 6 7
042	Do you treat your mosquito nets in this house?	Yes No If no, what are the reasons	1 2

043	If yes, how often do you normally treat your mosquito net?	Only wash it with soap Never Within six months Thrice Year After year	1 2 3 4
044	Why is it that you treat your net within the period mentioned above?	..... .....	
045	Are you aware how long the net is supposed to take to be re-treated?	Yes No	1 2
046	If no, why?	..... .....	
047	Do you think ITNs are necessary in preventing malaria among the jaggery and tea workers?	Yes No	If no, skip to qtn 049
048	If yes, give reasons	..... .....	
049	If no, Give reasons	..... .....	
050	What is your feeling about ITNs in malaria prevention among the jiggery and tea workers?	Very effective Average Less effective Not effective at all Explain..... .....	1 2 3 4 5
051	What do other people say about mosquito nets?	..... .....	
052	What could be done in order to make sure that everyone uses ITNs?	..... .....	
053	Do know where you can obtain a net?	Yes No <b>If yes, proceed to 54</b>	1 2

054	Where did you obtain the net you are currently using in this house?	Government NGO Supermarket Retail shop Kiosk Pharmacy Drug shop Others (Specify).....	1 2 3 4 5 6 7 8
055	How much was the cost of a net that you are using?	..... .....	
056	How did you acquire the net(s) you are currently using?	..... .....	
057	Have these mosquito nets ever been treated?	Yes No If yes, skip to 059	
058	If no, why have you never re-treated the mosquito net(s)	.....	
059	When were the net last treated?	One year ago Last r 6 months Last r 3 months Last month Never treat	1 2 3 4 5
060	Who re-treated the net?	Myself Health Centre Treatment centre	1 2 3
061	Do you know anywhere you can retreat your net from?	Yes No	1 2
059	Do you know the chemicals used for treatment?	Yes No If yes, name them..... and where they can be found.....	1 2

## **Appendix 3: Key Informant Interview Guide**

### **Introduction**

Interviewer introduces himself and explains the purpose of the meeting, the expected duration of the interview, and seeks verbal consent to participate before the beginning of the interview.

### **Background Information**

Please record the following:

Names and designation.....

Gender (sex) female/male.....

Jaggery or tea worker .....

Date of interview.....

1. How common is the use of mosquito nets in this community among the jiggery and tea workers?

2. Who provides mosquito nets in this community?

3. Do you know any linkage between malaria and use of mosquito nets among the jiggery and tea workers?

- Knowledge about purpose of mosquito nets.
- Different kinds of mosquito nets
- Perception of the effectiveness of the different kinds of mosquito nets.
- The types of mosquito nets and explanations for it.
- Constraints in accessing Insecticide treated nets.

4. What do you think should be done to increase the use of mosquito nets in prevention of malaria? (Probe for)

- Avenues for increasing access to mosquito nets
- Avenues for improving proper use of mosquito nets

5. What are the sleeping arrangements in this community? Probe for:

- Jaggery and tea workers.
- Whether they sleep on the floor or bed
- The kind of mosquito nets used and explanations for it.
- Regularity of using mosquito nets and explanations for it
- Perception of the effectiveness of mosquito nets in preventing malaria
- Perceived constraints in accessing mosquito nets (cost and distance).
- Knowledge of the proper use of mosquito nets in terms of treatment procedure and frequency
- Sources of insecticide chemicals for treating mosquito nets.

6. How can one know who uses a net when they are asleep?

Probe for gender roles in:

- Gender needs for health care seeking
- Which roles do men play?
- Which roles do women play?
- . Power relations in decision making and resource allocation to health care seeking.
- . Decision making for health care seeking

7. What are the constraints to effective and consistent use of mosquito nets? Probe for

- Distance and costs. Cultural and traditional beliefs/practices.

**THANK YOU FOR TAKING YOUR TIME**

## Appendix 4: Kenyatta University Graduate School Approval



**KENYATTA UNIVERSITY  
GRADUATE SCHOOL**

E-mail: [kubps@yahoo.com](mailto:kubps@yahoo.com)  
[dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)  
 Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
 NAIROBI, KENYA  
 Ext. 4150

**Internal Memo**

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**FROM:** Dean, Graduate School **DATE:** 18<sup>th</sup> May, 2015  
**TO:** Mr. Masta Ondara Omwono **REF:** Q57/23705/13  
 C/o Community Health Dept.  
KENYATTA UNIVERSITY  
**SUBJECT: APPROVAL OF RESEARCH PROPOSAL**

---

We acknowledge the receipt of your revised Research Proposal as per recommendations raised by the Graduate School Board of 15<sup>th</sup> April, 2015 entitled "Use of Insecticide Treated Nets in the Prevention of Malaria among the Jaggery and Tea Workers in Kisii County, Kenya".

You may now proceed with your Data collection, subject to clearance with the Principal Secretary, Higher Education, Science and Technology.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking Forms per semester. The form has been developed to replace the progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

  
**SILVERIA THIONG'O**  
**FOR: DEAN, GRADUATE SCHOOL**

c.c. Chairman, Community Health Dept.

Supervisors:

1. Prof. Alloys S. S. Orago  
 C/o Pathology Dept.  
 Kenyatta University
2. Dr. Justus O. S. Osero  
 C/o Community Health Dept.  
 Kenyatta University

ST/cao

**Appendix 5: Kenyatta University Graduate Authorization**

KENYATTA UNIVERSITY  
GRADUATE SCHOOL

E-mail: [kubps@yahoo.com](mailto:kubps@yahoo.com)  
[dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)  
Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 8710901 Ext. 57530

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Our Ref: Q57/23705/13

Date: 18<sup>th</sup> May, 2015

The Principal Secretary,  
Higher Education, Science & Technology,  
P.O. Box 30040,  
**NAIROBI**

Dear Sir/Madam,

**RE: RESEARCH AUTHORIZATION FOR MR. MASTA O. OMWONO - REG. NO. Q57/23705/13**

I write to introduce Mr. Omwono who is a Postgraduate Student of this University. He is registered for a M.P.H. degree programme in the **Department Community Health in the School of Public Health.**

Mr. Omwono intends to conduct research for a thesis Proposal entitled, "Use of Insecticide Treated Nets in the Prevention of Malaria among the Jaggery and Tea Workers in Kisii County, Kenya".

Any assistance given will be highly appreciated.

Yours faithfully,

**MRS. LUCY N. MBAABU**  
**FOR: DEAN, GRADUATE SCHOOL**

ST/cao

## Appendix 6: Kenyatta University Ethical Review Committees



**KENYATTA UNIVERSITY  
ETHICS REVIEW COMMITTEE**

Email: [chairman.kuerc@ku.ac.ke](mailto:chairman.kuerc@ku.ac.ke)  
[secretary.kuerc@ku.ac.ke](mailto:secretary.kuerc@ku.ac.ke)  
[rccku2008@gmail.com](mailto:rccku2008@gmail.com)  
 Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P. O. Box 43844 - 00100 Nairobi  
 Tel: 8710001/12  
 Fax: 8711242/8711975

Our Ref: KU/R/COMM/51/495 Date: 9<sup>th</sup> July, 2015

**Maria O. Omwono**  
 Kenyatta University,  
 P.O Box 43844, Nairobi

Dear Omwono

**RE APPLICATION NUMBER PKU/565/I 539- "USE OF INSECTICIDE TREATED NETS IN THE PREVENTION OF MALARIA AMONG THE JAGGERY AND TEA WORKERS IN KISII COUNTY, KENYA.**

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**1. IDENTIFICATION OF PROTOCOL**

The application before the committee is with a research topic "use of insecticide treated nets in the prevention of malaria among the jaggery and tea workers in Kisii County, Kenya" received on 19<sup>th</sup> May, 2015 and discussed on 1<sup>st</sup> July, 2015.

**2. APPLICANT**  
 Maria O. Omwono, Department of Community Health

**3. STUDY SITE**  
 Kisii County, Kenya

**4. DECISION**  
 The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 9<sup>th</sup> July, 2015.

**5. ADVICE/CONDITIONS**

- Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
- Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
- Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
- Submit an electronic copy of the protocol to KUERC.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.



**PROF. NICHOLAS K. GIKONYO**  
 CHAIRMAN ETHICS REVIEW COMMITTEE



I MARIA O. OMWONO.....accept the advice given and will fulfill the conditions therein.  
 Signature.......... Dated this day of 09/Jul/15..... 2015.

cc. Vice-Chancellor

**Appendix 7: Research Authorization by National Commission for Science, Technology and Innovation, Kenya**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 310571, 2219420  
Fax: +254-20-318245, 318249  
Email: secretary@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/15/99980/8029**

Date:  
**3<sup>rd</sup> November, 2015**

Masta Ondara Omwono  
Kenyatta University  
P.O. Box 43844-00100  
**NAIROBI.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on "*Use of insecticide treated net in the prevention of malaria among Jaggery and Tea workers in Kisii County, Kenya,*" I am pleased to inform you that you have been authorized to undertake research in **Kisii County** for a period ending **3<sup>rd</sup> November, 2016.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Coordinator of Health, Kisii County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

*Said Hussein*  
**SAID HUSSEIN**  
FOR: DIRECTOR GENERAL/CEO

Copy to:

The County Commissioner  
Kisii County.

The County Director of Education  
Kisii County.

**COUNTY COMMISSIONER  
KISII COUNTY**  
*5/11/15*

**COUNTY DIRECTOR OF EDUCATION  
KISII**  
P O Box 4499-40200 KISII  
Date: *5/11/2015*

**Appendix 8: Research Permit National Commission for Science, Technology and Innovation, Kenya**

THIS IS TO CERTIFY THAT:  
**MR. MASTA ONDARA OMWONO**  
of KENYATTA UNIVERSITY, 0-100  
Nairobi, has been permitted to conduct  
research in Kisii County

Permit No : NACOSTI/P/15/99980/8029  
Date Of Issue : 3rd November, 2015  
Fee Received : Ksh 1,000

on the topic: **USE OF INSECTICIDE  
TREATED NET IN THE PREVENTION OF  
MALARIA AMONG JAGGERY AND TEA  
WORKERS IN KISII COUNTY, KENYA.**

for the period ending:  
3rd November, 2016



*[Handwritten Signature]*  
Applicant's  
Signature

*[Handwritten Signature]*  
Director General  
National Commission for Science,  
Technology & Innovation

**COUNTY COMMISSIONER  
KISII COUNTY**  
*[Handwritten Signature]*  
5.11.2015

## Appendix 9: Abstract of Papers published and submitted for publication

### Level of Knowledge among the Jaggery and Tea Workers on ITNs Use in Malaria

#### Prevention in South Mugirango Sub - County, Kisii County, Kenya.

Masta Ondara Omwono<sup>1</sup>, Justus Oseno Osero<sup>2</sup>, Alloys Sigar Steven Orago<sup>3</sup>, Taratisio Ndwiga

<sup>1</sup> Public Health, Moi University, Eldoret, Kenya. omwono76@gmail.com (Masta Ondara Omwono)

<sup>2</sup> Department of Community Health, Kenyatta University, Nairobi, Kenya. oseroj@yahoo.com/www.ku.ac.ke (J. O. Osero)

<sup>3</sup> Department of Pathology, School of Medicine, Kenyatta University, Nairobi, Kenya orago.alloysss@ku.ac.ke /www.ku.ac.ke (A. S. S. Orago).

<sup>4</sup> Department of Environmental Health, School of Public Health, Moi University, Eldoret, Kenya taratisationdwiga@yahoo.com (T. Ndwiga)

Submission: 19 October 2017 Accepted: 29 October 2017 Published: 30 November 2017 Human Journals

Research Article

November 2017 Vol.:8, Issue:1

#### ABSTRACT

**Background;** Insecticide-treated nets (ITN) are the most powerful malaria control intervention tool, which has been recommended by most governments in the world if used correctly. Yet up to date, use is still very low in some places with only three percent of African sleeping under an ITN and about 20 percent sleeping under any kind of net. Worse still, malaria continues to be the leading cause of

Mortality and morbidity among the Jaggery and tea workers in the agricultural sector. Therefore, the main aim of this study was to establish the level of knowledge on ITNs use among the Jaggery and tea workers in the prevention of malaria in the South Mugirango Sub County, Kisii County. **Methods;** The study adopted descriptive cross-sectional design whereby 209 Jaggery and tea workers were interviewed. Data were collected using questionnaires, key informant interview and focused group discussions. Qualitative data were transcribed; coded and categorized to come up with the emerging themes. Data were analyzed using SPSS version 20.0. Chi-Square was used to determine the relationship between variables. **Results;** The results show low levels of ITNs use due to lack of knowledge and low level of income, as (52.2%) did not know the difference between ITNs and non-treated nets. It was found that 56% of the workers were males with 44% females. Most of the Jaggery and tea workers were aged between 29-39 years and 40-50 years with 41% and 26% respectively. Education was significantly related ( $P < 0.001$ ) with ITNs use whereby 82.4% of non-users were found to have no education at all. Gender and occupation were significantly related ( $P < 0.001$ ) and ( $P < 0.003$ ) with ITNs use respectively. Economic factors were also associated with ITNs use. The cost, accessibility and house structure were related ( $P < 0.010$ ) and ( $P < 0.001$ ) with ITNs use respectively. The study found that weather was significantly related ( $P < 0.001$ ) with the ITNs use among the Jaggery and tea workers. **Conclusion and recommendations;** The study concludes that demographic and socioeconomic characteristics were statistically associated ( $P < 0.001$ ) with ITNs use. Low level of knowledge was found to influence ITNs to use among the Jaggery and tea workers. About 52.2% were unable to differentiate between treated nets from non-treated ones. This study, therefore, recommends implementation of programs and policy formulation to empower the Jaggery and tea workers in education and economically through income generating activities to strengthen their resource base. Study results are useful in addressing ITNs utilization among the Jaggery and tea workers in the prevention of malaria in Kisii County, Kenya. It will also help the Kisii County Government to redirect more resources to malaria prevention.

**Keywords;** Jaggery and tea workers, malaria transmission, ITNs.

**Appendix 10: Abstract of Jaggery and Tea Workers Perceptions on the Use of ITNs in Prevention of Malaria in South Mugirango Sub- County, Kisii County, Kenya.**

Masta Ondara Omwono<sup>1</sup>, Justus Oseno Osero<sup>2</sup>, Alloys Sigar Steven Orago,<sup>3</sup> Taratisio Ndwiga

- 1 Public Health, Moi University, Eldoret, Kenya. omwono76@gmail.com (Masta Ondara Omwono)
- 2 Department of Community Health, Kenyatta University, Nairobi, Kenya. oseroj@yahoo.com/www.ku.ac.ke (J. O. Osero)
- 3 Department of Pathology, School of Medicine, Kenyatta University, Nairobi, Kenya orago.alloysss@ku.ac.ke /www.ku.ac.ke (A. S. S. Orago).
- 4 Department of Environmental Health, School of Public Health, Moi University, Eldoret, Kenya taratisationdwiga@yahoo.com (T. Ndwiga).

**To cite this article:**

1Masta Ondara Omwono<sup>1</sup>, 2Justus Oseno Osero, 3Alloys Sigar Steven Orago, 4Taratisio Ndwiga. **Jaggery and Tea Workers Perceptions on the Use of ITNs in Prevention of Malaria in South Mugirango Sub- County, Kisii County, Kenya.** World Journal of Public Health. Vol. 3, No. 1, 2018, pp. 1-8. doi: 10.11648/j.phi.20180301.11

**Received:** November 18, 2017; **Accepted:** December 15, 2017; **Published:** January 16, 2018

**ABSTRACT:**

**Background;** An estimated 51.6% of adults by age distribution among the Jaggery and Tea workers aged 18-49 years are at risk of contracting malaria due to improper use of ITNs in South Mugirango Sub County. Kisii County, Kenya. This is due to their perception and the reasons for not sleeping under ITNs. Published data on ITNs use among the Jaggery and Tea workers in the South Mugirango Sub County are limited. The purpose of this study is to establish the Jaggery and Tea workers' perception of ITNs use. **Methods;** A descriptive cross sectional study was used, where South Mugirango was purposively selected. The study systematically and randomly selected and interviewed 209 Jaggery and Tea workers on ITNs use. Qualitative methods were used to investigate their perceptions on ITNs use. Data was also collected via structured questionnaire, focused group discussion and Key informant interviews to obtain views. **Results;** Overall 209 Jaggery and Tea workers were selected and interviewed; 116 (56%) males and 93 (44%) females, about 52% perceived mosquitoes to cause malaria and 77.3% cited the main reasons of not using the ITNs as to cause suffocation, irritation and dreams. There was a positive relationship between gender and education on ITNs use ( $P < 0.001$ ,) respectively. There was also a significant relationship between cost, accessibility and house structure and ITNs use ( $P < 0.0010$ ) while age and marital status were not statistically significant. **Conclusion and recommendations;** The 77.3% who perceived that ITNs causes suffocation, irritation and dreams is a high number as malaria is on the rise among the study group. Therefore the study recommends; (a) Policy review on ITNs use among the Jaggery and Tea workers (b) Intensive health training in perception and beliefs on ITNs to improve its use with adoption of door to door awareness creation on the importance of ITNs use.

**Keywords;** Insecticide Treated Nets, Infection, Malaria, Risk

**Appendix 11: Abstract of Factors Influencing the Use of ITNs among the Jaggery and Tea Workers in the Prevention of Malaria in South Mugirango Sub - County, Kisii County, Kenya.**

**Authors;** 1Masta Ondara Omwono , 2 Justus Osano Osero , 3 Alloys Sigar Steven Orago, 4 Taratisio Ndwiga.

1. Department of Public Health, Moi University, Eldoret, Kenya. omwono76@gmail.com/omwono76@yahoo.com (Masta Ondara Omwono).
2. Department of Community Health, Kenyatta University, Nairobi Kenya. oseroj@yahoo.com/osero.justus@ku.ac.ke (Justus Osano Osero).
3. Department of Pathology, School of Medicine, Kenyatta University, Nairobi, Kenya Orago.alloysss@ku.ac.ke (Alloys Sigar Steven Orago).
4. Department of Environmental Health, Moi University, Eldoret, Kenya. taratisiondwiga@yahoo.com (Taratisio Ndwiga).

**Key words;** Morbidity, mortality, ITNs, Malaria intervention, Jaggery and Tea workers, Transmission

**ABSTRACT.**

**Background;** Insecticide treated nets remains the most preferred malaria control intervention measures advocated worldwide if used well. In some place to date its use has been very low with about three percent of people in Africa sleeping under ITNs with twenty percent sleeping under any kind of net. Worse still 51.6% of adults Jaggery and tea workers by age distribution between 18-49 years are at risk of getting malaria infections due to improper ITNs use in South Mugirango Sub-County, Kisii County, Kenya. Malaria is among the top ten diseases that lead to high level of morbidity and mortality. This study, therefore focuses on the factors influencing the use of ITNs in the prevention of malaria among the Jaggery and tea workers aged 18-49 years in the South Mugirango Sub County, Kisii County, Kenya. **Methods;** This was descriptive cross sectional study design where Kisii County was purposively selected. Overall 209 Jaggery and tea workers were systematically and randomly selected and interviewed. Data was collected through the use of questionnaires; focused group discussions and key informant interview to obtain views. Both qualitative and quantitative data were transcribed; coded and categorized and analyzed using SPSS version 20.0. Chi- Square was used to determine the statistical significance between variables; **Results;** The results shows that about 209 Jaggery and Tea workers were selected and interviewed; 56% males and 44% females. The majority were between 29-39 years (44.3%) while 95 (49.5%) were married. About 88 (45.5%) had secondary education and 54.5% were tea workers by occupation. Chi-square was used to establish relationships between variables. From the socio-demographic factors only gender and education were found to be statistically related with ( $P<0.001$ ) and ITNs use among the Jaggery and tea workers. Among the economic variables only cost, accessibility and house structures were found to be related ( $P<0.001$ ) with ITNs use. **Conclusion and recommendations;** This study concludes that there was a low level of ITNs use among the Jaggery and tea workers and they were attributed by socio-demographic factors, economic factors and weather conditions which were found to be statistically associated ( $P<0.001$ ) with ITNs use. This study, therefore, recommends implementation of programs and policy formulation to empower the Jaggery and tea workers in education and economically through income generating activities to strengthen their resource base. This result is useful in addressing ITNs use among the Jaggery and tea workers in the prevention of malaria in Kisii County, Kenya. It will also help the Kisii County government to mobilize the necessary resources and direct it to malaria prevention and control.

