# FACTORS ASSOCIATED WITH LEISHMANIASES AMONG HOUSEHOLDS IN MARIGAT SUB -COUNTY OF BARINGO COUNTY, KENYA

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# Factors Associated with Leishmaniases Among Households in Marigat Sub –County of Baringo County, Kenya

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## DECLARATION

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

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## DEDICATION

This work is dedicated to my dear wife Rael Mong'ina and our beloved children Michael Okindo junior and Joy Moraa for their moral support and sacrifices during the period. To my parents Nelson Okindo Miyienda and Mary Kwamboka Okindo who have always been there for me and imparted in me the value of education early in life. I also dedicate it to my parent in laws the late Robinson Nyakundi Ongondi and Bathseba Moraa Nyakundi. I am grateful to them all for their immense support and their prayers to help me accomplish this task.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **CHEW** | Community Health Extension Workers |
| **CL** | Cutaneous leishmaniasis |
| **DALYS** | Disability Adjusted Life Years |
| **DCL** | Diffuse Cutaneous Leishmaniasis |
| **DDT** | Dichlorodiphenyltrichloroethane |
| **ERC** | Ethical Review Committee |
| **GOK** | Government of Kenya |
| **KAP** | Knowledge, Attitude and Practices |
| **KEMRI** | Kenya Medical Research Institute |
| **KII** | Key Informant Interviews |
| **KNH** | Kenyatta National Hospital |
| **MCL** | Mucocutaneous leishmaniasis |
| **MOH** | Ministry of Health |
| **MOPHS** | Ministry of Public Health and Sanitation |
| **MSF** | Medicines' Sans Frontiers'. |
| **PI** | Principal investigator |
| **PKDL** | Post Kalaazar Dermal Leishmaniasis |
| **UoN** | University of Nairobi |
| **VL** | Visceral Leishmaniasis |
| **WHO** | World health organization |

## OPERATIONAL DEFINATION OF NAMES

**Kala-azar** Refers to the leishmaniases infections

**Household head** Father or mother or alternative adult household member 18 years and above.

## ABSTRACT

The global burden of leishmaniases has remained stable for some years, causing a morbidity and mortality mainly to the poor proportion of the population. The global estimate for new cases of visceral leishmaniasis is 500 000 cases per year. In Kenya an estimated 4,000 cases occur annually and five million people are at risk of infection. The overall objective of the study was to assess factors associated with leishmaniases by interviewing household heads in Marigat Sub -County, Baringo County. The specific objectives were to determine the level of knowledge, attitude, perceptions and practices of households towards leishmaniases; the costs and the socio-economic factors associated with leishmaniases in Marigat Sub County. This was a descriptive cross sectional study which used both quantitative and qualitative methods of data collection from households and KII respectively. The study was carried out between November and December 2015 and employed both the probability and non-probability sampling methods. The Marigat Sub County is divided into 17 locations, this study considered three locations (Marigat, Eldume and Loboi) which comprised of 634 households as per the chiefs' records these formed the sampling frame from which a sample of 423 households was randomly selected. Of the 423 questionnaires administered to the households, 405 were completed giving a response rate of (96%). From each selected household one participant (household head) who voluntary agreed to give informed consent was selected for questionnaire administration. Purposive sampling was used to select key informant interviews participants. Data was analyzed using SPSS version 20 and Stata SE version 13. The Univariate analysis was used to determine proportions and Chi-square was used to determine association between various variables and those which showed $P \leq 0.05$, were subjected to multivariate regression analysis at 95% confidence level to test the strength of association. There was a strong evidence of relationship between occupation (P=0.0001), education level (P=0.002), type of the main house (P=0.0001) and the occurrence of leishmaniases. Majority hold the belief that kala azar is more serious than malaria. The mean total expenditure due to kala azar was Kenya shillings 25,983.77($ 259.83) per household. The type of house condition was associated with increase in leishmaniases infection because most respondents were having the houses which favour the breeding and entry of the vectors and this included mud plastered and grass thatched; and stick walled and grass thatched. The stake holders should plan to help the community replace the houses which favour vector breeding and entry with iron corrugated walls and roof which tend to protect the human host. The leishmaniases costs include the direct and indirect costs thus need for interventions to improve access to affordable leishmaniases prevention, diagnosis and treatment. The study shows there are knowledge gaps existing at community level which relate to mode of transmission, seasons kala-azar is prevalent, signs and symptoms of kala-azar and prevention and control strategies. The fear of death seems to be a driving force for seeking medication. The costs of kala-azar management are beyond affordability of poorest households in Marigat therefore the government to consider policy change to either provide free leishmaniases treatment or to subsidize the drug costs.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background Information

The leishmaniases are zoonotic infections caused by protozoa of the genus *Leishmania* (Conjivaram and Ruchir, 2007). The infections are transmitted to humans by infected female sand flies of the genera *Phlebotomus* and *Lutzomyia* (Piscopo and Mallia, 2006). The leishmaniases are endemic in 88 countries in the world with 350 million people being at risk. An estimated 14 million people are infected, and each year about two million new cases occur (WHO, 2007). The global burden of leishmaniases has remained stable for some years, causing a morbidity and mortality loss of 2.4 million disability adjusted life-years (DALYs) and approximately 70,000 deaths, a significantly high rank among communicable diseases (Ngure *et al.*, 2009).

Cutaneous leishmaniasis (CL) normally produces skin ulcers on the exposed parts of the body such as the face, arms and legs. In mucocutaneous forms of leishmaniases, lesions can lead to partial or total destruction of mucous membranes of the nose, mouth, throat cavities and surrounding tissues. This is considered with some people in the community as a bad omen by evil spirits and results in the discrimination and stigmatization of the members (WHO, 2007). Visceral leishmaniasis (VL) ranges from asymptomatic infection to severe life-threatening infection. It is the most severe form of leishmaniases and is usually fatal within two years if left untreated (Conjivaram and Ruchir, 2007). Because of sand fly vector exposure, most leishmaniasis lesions occur on the face; anecdotal reports of severe stigma are associated with the disease (Reithinger *et al*., 2005). Although the morbidity associated with CL is not significant, and the disease is not lethal, the disfigurement and resulting social stigmatization may cause or precipitate psychological disorders, along with restricting social participation of the individuals affected by the disease (Kassi *et al*., 2008).

Leishmaniases economic impacts studies conducted in Bangladesh showed that visceral leishmaniasis causes a major economic burden with 58% of patients reporting 34% of direct expenditure to be on drugs for full treatment course. In spite of leishmanial health care being free of charge at government facilities, 79% of patients reported making informal payments for provider access, diagnostics and drug administration (Sharma *et al.*, 2006). Most often families sell their assets or take loans with heavy interest to pay for leishmaniasis treatment (Okwor and Uzonna, 2016) and the estimated burden of visceral leishmaniasis varies from 1,969,000 to 2,357,000 DALYs (Marinho *et al*., 2015).

Leishmaniases are not only associated with poverty but also propagate poverty, because treatment is expensive and either unaffordable or it imposes a substantial economic burden, including loss of wages (WHO, 2007). Whereas literature on knowledge, attitude, practices and the financial costs is available from other regions of the world where leishmaniases are endemic, it is scanty from Kenya and the East Africa at large. The current study therefore investigated knowledge, attitudes, practices and the costs associated with leishmaniases on resident persons in Baringo County of Kenya. The study will document information on the knowledge, attitude, perceptions and practices among the population in Marigat in regard to causes, transmission, signs and symptoms, prevention and treatment.

### 1.2 Statement of the Problem

Leishmaniases pose psychological stress, stigma and discrimination in the society. As with many neglected tropical diseases that cause high morbidity and mortality, the true burden of leishmaniases remains largely invisible. This is partly because most affected live in remote areas where health facilities are barely available or inadequate and the stigma and discrimination associated with kala-azar makes patients from such remote communities to stay at villages and indoors without seeking treatment. But in doing so they act as a reservoir of infection passing on the parasite to other family members and neighbours through the bite of sandflies hence high prevalence and incidence (Boelaert

*et al.*, 2009; WHO, 2014; Ahluwalia *et al.,* 2003). Leishmaniases are clinically recognized diseases with a disfiguring and stigmatizing nature (WHO, 2007). In Kenya leishmaniases as one of the neglected tropical diseases that affect almost exclusively the poorest populations have been given lesser attention and overshadowed by the major focus of HIV and AIDS, Tuberculosis and Malaria. Leishmaniases are one of the diseases which share neither the public eye nor better financial allocations amongst HIV and AIDS, Tuberculosis and Malaria (John *et al.*, 2011). The majority of the Marigat families are poor and the Marigat Sub-county is one of the most populated places in Baringo County (GOK, 2009). The families cannot bear a great economic burden of treatment of their patients and for an extremely poor family is a great tragedy when more than one person is sick (Boelaert *et al.,* 2009). Leishmaniases related disabilities impose a great social and economic burden. The costs associated with the treatment of leishmaniases include direct costs of diagnosis, treatment, hospitalization and drugs administration, and indirect costs of transport, loss of days of productive life years' disability-adjusted life year, and loss of profitable time of family members who take care of the patients. These costs incurred are not yet documented so that they can serve as an indicator for the policy makers and donors to realize the great burden of the disease to the poor who are already burdened with poverty (Boelaert *et al.,* 2010). In spite the health impacts of the disease in Marigat Sub County, there is no documented information on how individuals and communities perceive leishmaniases, its transmission, causes, treatment and prevention (Singh *et al.*,2006). For the success of prevention and control programs of any disease, the most important prerequisite is community participation. Program implementers need to understand knowledge, attitude, and practices (KAP) of the community towards leishmaniases because these are the important determinants of community participation (Alemu *et al.,* 2013). Kala -azar affects not only the weakest in the community such as children and those weakened by other diseases such as HIV and tuberculosis, but also healthy adults and economically productive social groups (Khalil *et al,* 2002). Thus need to assess the factors associated with leishmaniases transmission for timely interventions by the stakeholders. Untreated

Kala-azar is usually fatal in that even after recovery; patients may develop the chronic form that requires prolonged and expensive therapy (WHO, 2010; MSF 2012).

### 1.3 Justification of the study

Leishmaniasis is one of the third world's most neglected and forgotten tropical diseases, (including Buruli ulcer and Chagas diseases), yet it is devastating for its vaccine is non-existent. It is recognized by WHO as endemic and a public health threat for it is lacking effective control measures (WHO, 2016). Leishmaniases forms are fatal and can cause disfiguring in the patients which imparts further economic stress to already poor families of Marigat. When the disease becomes chronic, it incapacities patients and making them unable to work, vulnerable to poverty, malnutrition and secondary infections (Lukes *et al*., 2007; WHO, 2016*).* The research findings are of great importance to County government of Baringo having exposed the knowledge gaps existing on the ground they can organize community sensitization programs as regards to the cause, transmission and prevention of leishmaniases. The Ministry of Health can also implement prevention programs through the understanding of the knowledge, attitudes and practices of the Marigat residents. There is need to document the costs associated with leishmaniases, information that is important to MOH/GOK/County government and other stakeholders for policy making in areas such resource allocation for treatment and management of leishmaniases in Marigat Sub County and other affected regions. Although studies might have documented these costs in other regions the literature available points that the leishmaniases negatively impacts financial position of affected households. Since leishmaniases diseases are associated with poverty, their lack of adequate consideration in terms of treatment and related issues delays attainment of the first sustainable development goal of ending poverty in all its forms everywhere. The third sustainable development goal is to ensure health lives and promote well-being for all ages hence the premise of the current study on leishmaniases as one of the infectious diseases exposes the problem so that it can be addressed at the policy level to promote the health of Marigat community residents. This study also aimed at investigating the exposure

factors that contribute to the transmission of kala-azar in the study area of Marigat Sub-County. This would help in making recommendations to the community and stakeholders on the probable intervention measures for the prevention, control and management of this forgotten and yet dreadful disease.

### 1.4 Research Questions?

The research questions of the study were:

1. What is the level of knowledge, attitudes and the preventive practices by households with leishmaniases in Marigat Sub- County, Kenya?

2. What are the costs associated with leishmaniases and how are the affected households' economic activities?

3. What are the socio-demographic factors in the households associated with leishmaniases in Marigat Sub County?

### 1.5 Objectives

#### 1.5.1 General objective

The general objective was to determine factors associated with Leishmaniases amongst households in Marigat Sub -County, Baringo County.

#### 1.5.2 Specific Objectives

The specific objectives of the study were:

1. To determine the level of knowledge, attitude, perceptions and practices of household heads towards leishmaniases in Marigat Sub County.
2. To determine the costs associated with leishmaniases at the household level among the residents of Marigat Sub County.
3. To determine the socio-economic factors associated with leishmaniases in Marigat Sub County.

### 1.6 The Limitations of the study

There is a challenge of generalizing the specific results of this study to other settings in Kenya and elsewhere because of variation in health-care seeking behavior, attitude and perceptions, the socio- economic structure of the region, proximity of health facilities and charges. This may mainly affect transport costs as different areas within the country have varying transport infrastructure. The pastoralist nature of the people of Baringo may also bring variations not common in other endemic regions.

### 1.7 The Conceptual Framework

The illustration figure 1.1 below shows the relationship between the dependent and independent variables. It shows the social and economic factors as dependent factors that affect leishmaniases infections in the households. The factors include occupation, type of house, distance of household from animal shed, poor or ineffective use of preventive methods, high costs of leishmaniases management, poor knowledge, attitudes and perceptions towards leishmaniases. Studies done by Kassi *et al.,* (2008), shows leishmaniases not only cause health and economic effects but also result in horrific social stigma. Thus failure to contain leishmaniases infections it becomes a burden to the society. The proximate factors highlight clearly how leishmaniases control is not effective. With high costs associated with leishmaniases, negative attitudes, poor knowledge and ineffective preventive practices it is clear that all the parties involved have not done enough to cap leishmaniases infections.

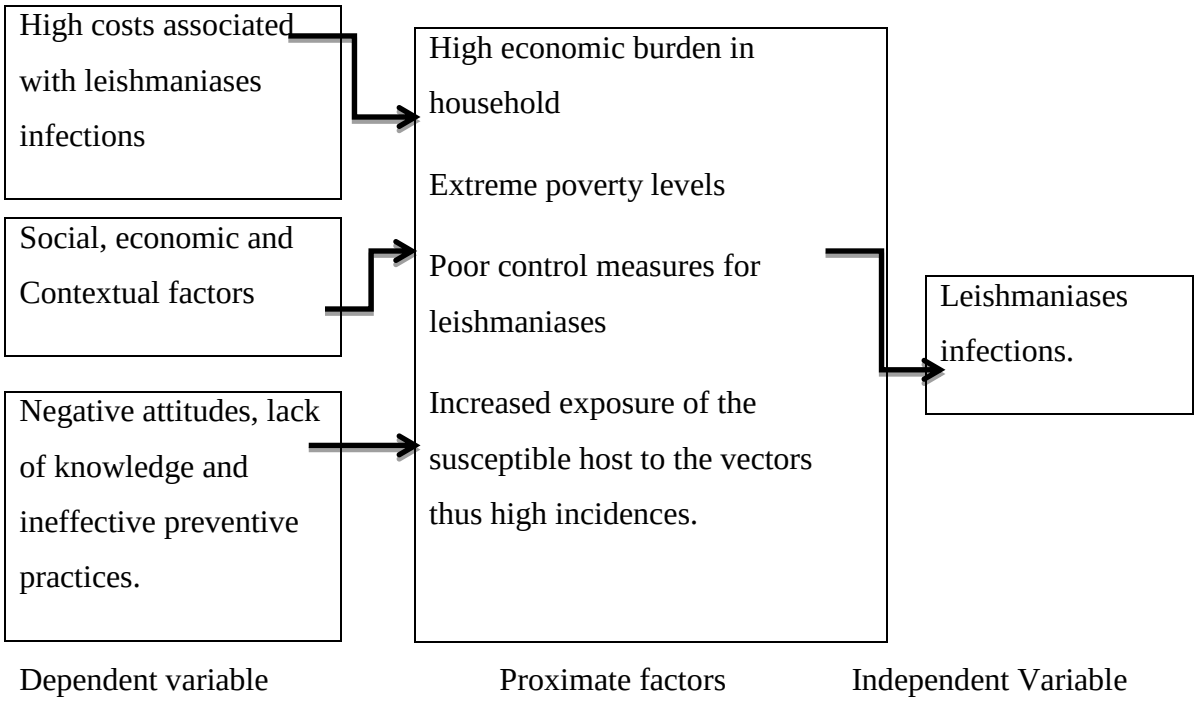


**Figure 1.1: Conceptual framework indicating factors relating to leishmaniases infections**

# CHAPTER TWO

# THE LITERATURE REVIEW

## 2.1 Global and regional distribution of Leishmaniases

The leishmaniases cause substantial clinical, public health and socioeconomic problems in endemic regions in more than 88 countries in the Indian sub-continent, South Western Asia, Southern Europe, Africa, and Central and South America (Desjeux, 2004). There is a remarkable increase in risk factors for leishmaniases worldwide and the disease burden is increasing (Reithinger *et al.*, 2007). The global estimate for new cases of visceral leishmaniasis is 500 000 cases per year out of which 90% of the cases arise in just five countries which include: Bangladesh, Brazil, India, Nepal and Sudan (Desjeux, 2004). Each year, there are 1.5 million new cases of cutaneous leishmaniasis in more than 70 countries worldwide with 90% of the cases reported in Afghanistan, Algeria, Brazil, Islamic Republic of Iran, Peru, Saudi Arabia and Syria (Ghalib and Modabber, 2007). About 90% of all cases of mucocutaneous leishmaniasis cases occur in Bolivia, Brazil and Peru (Desjeux, 2004).

Geographical distribution of leishmaniases is restricted to tropical and temperate regions (Conjivaram and Ruchir, 2007). In Africa, visceral leishmaniasis is a particular problem in Kenya, Sudan, Ethiopia and Eritrea (Wasunna *et al.*, 2005). Sudan is the most affected country, being one of the five countries that constitute 90% of all global cases of visceral leishmaniasis (Guerin *et al.*, 2002). Visceral leishmaniasis has been known to be endemic in Sudan since 1904 along the Blue Nile where it enters Ethiopia and its tributaries (Berman, 2006). Algeria is among the eight countries that contribute 90% of worldwide cases of cutaneous leishmaniasis (Reithinger *et al.*, 2007). In West Africa, leishmaniasis is endemic although it is one of the less recognized or under-reported parasitic infections in this region (Boakye *et al.*, 2005). Cases of leishmaniases have been reported in Niger, Mali, Nigeria, Senegal, Cameroon, Burkina Faso, Mauritania, Gambia, and Guinea (Niamba *et al.*, 2007).

## 2.2 Epidemiology of Leishmaniases in Kenya

Leishmaniases have been endemic in Kenya for a long time. The most prevalent forms of leishmaniases are the cutaneous and visceral forms (Tonui, 2006). Leishmaniases affects communities in 22 out of the 47 counties in the country. Visceral leishmaniasis is endemic in the Baringo, Koibatek, Turkana, West Pokot, Kitui, Meru, Keiyo, Marakwet, Mwingi and Machakos Counties. It is estimated that about 4,000 cases occur annually while 5 million people are at risk of infection (Wasunna *et al.*, 2005). The disease mainly affects children above two years and young adults but older people are also occasionally infected. Baringo County is the only focus where both visceral leishmaniasis and cutaneous leishmaniasis are known to occur in Kenya (Robert *et al.*, 1994).

Visceral leishmaniasis is caused by *Leishmania donovani* and transmitted by *Phlebotomus martini* (Perkins *et al.*, 1988). Failure to satisfactorily eliminate wild and synanthropic animals have led to the conclusion that the disease is anthroponotic in Kenya with a man-sand fly–man cycle (Anjili *et al.*, 2011). Cutaneous leishmaniasis is transmitted by *Leishmania major*, *Leishmania aethiopica* and *Leishmania tropica*. Cutaneous leishmaniasis due to *Leishmania major* is transmitted by *Phlebotomus duboscqi* sand fly which breeds and rests in animal burrows where it feeds on rodents which are frequently infected (Ngure *et al.*, 2009). *Leishmania aethiopica* infection was first reported in Kenya in 1969 in Bungoma County in the Mount Elgon area (Kungu *et al.*, 1972). *Leishmania aethiopica* has been identified as the etiological agent of diffuse cutaneous leishmaniasis (DCL), with hyraxes, *Procavia johnstoni*, *Dendrohyrax arboreous* and the giant rat *Cricetomys gambianus as* animal reservoirs and *Phlebotomus pedifer* and *Phlebotomus elgonensis* as the vectors (Ashford 2000). *Leishmania tropica* is endemic within Laikipia County where the vector has been identified as *Phlebotomus guggisbergi* (Lawyer *et al.*, 1991). No animal reservoir has been found (Johnson *et al.*, 1993).

## 2.3 Pathology of Leishmaniases

Cutaneous leishmaniasis is the most common form of leishmaniases (Desjeux, 2004). Multiple species of *leishmania* produce cutaneous leishmaniasis in children and adults, primarily *Leishmania major*, *Leishmania tropica*, *Leishmania aethiopica*, *Leishmania infantum and Leishmania chagasi* (Rashid *et al*., 1986). *Leishmania donovani* are known to cause Post Kala azar Dermal Leishmaniasis (PKDL) in Kenya (Murray *et al.*, 2005). The disease produces skin lesions mainly on the face, arms and legs (Akilov *et al.*, 2007). Cutaneous leishmaniasis starts as a papule at the site of a sand fly bite, which then increases in size, crusts and eventually ulcerates (Piscopo and Mallia, 2006).

Visceral leishmaniasis is the most severe form of leishmaniasis and is potentially fatal if left untreated (Garg and Dube, 2006). Parasites of the *Leishmania donovani* complex are the typical etiological agents of VL (Mukhopadhyay and Chakraarty, 1987). *Leishmania donovani* is the principal cause of VL in the Indian sub-continent and East Africa, *Leishmania infantum* in the Mediterranean region and *Leishmania chagasi* in the new world (Murray, 2001). *Leishmania tropica* has been reported to produce visceral disease in immunocompromised persons while visceralization by *Leishmania amazonensis* has also been reported (Berman, 2006). The clinical symptoms of visceral leishmaniasis include splenomegaly, recurring and irregular fever, anemia, pancytopenia, weight loss and weakness (Hailu *et al.*, 2005).

Post leishmaniases dermal leishmaniasis is a disease that appears after treatment of visceral leishmaniasis (Ghalib and Modabber, 2007) , and it requires lengthy and costly treatment (WHO, 2007). This is usually due to infection by the *Leishmania donovani* cluster (Piscopo and Mallia, 2006). The skin lesions are macular, maculopapular or nodular, and usually spread from the peri-oral area to other areas of the body. The symptoms first appear around the mouth; those which do not heal spontaneously become denser and spread over the entire body (Berman, 2006).

## 2.4 Diagnosis of Leishmaniasis

Diagnosis of visceral leishmaniasis is routinely usually based on microscopic detection of amastigotes in smears of tissue of the bone marrow (Piscopo and Mallia, 2006). The parasite can also be detected through direct evidence from peripheral blood, or splenic aspirates. The smears are stained with Leishman, Giemsa, or Wright stains and examined under a microscope in order to view amastigotes (Conjivaram and Ruchir, 2007). Microscopic examination of amastigotes is essential in proper diagnosis of leishmaniasis. The clinical signs and epidemiological manifestations of visceral and cutaneous leishmaniases cannot be used in diagnosis. They can mimic several other conditions such as malaria, tropical splenomegaly, schistosomiasis, cirrhosis, lymphoma or leukaemia, hence a laboratory diagnosis is necessary to confirm the infection (Singh, 2006).

## 2.5 Knowledge, Attitude, Perception and Behavior

In most countries, Kala-azar affects the poorest among the poor. The very poor have little knowledge about the disease and hence they are unlikely to seek early treatment and most of those who start treatment cannot afford to complete it. The occurrence of the diseases drags them further into the downward spirit of poverty from which they are unable to recover (WHO, 2007). In a study in Pacific Ocean on knowledge, attitude and practice by gender on Kala-azar, 94% of the population believed that the disease appears as a skin disease; more men affected and more women did not know the mode of its transmission and 35% of the respondents connected the disease to the bite of an insect but did not know what the etiologic agent was; and thought that the bite was infected by a worm that lives in the mountains. Great variety of treatment used to cure the disease was also based on plants, chemical substances, burning the lesion and to a lesser degree drugs. About 45% did not know how to prevent the disease. This in essence calls for an extensive study on knowledge and practices in the community that can help in identification and quantification of the local factors contributing to the disease, so as to institute preventive and control measures (MSF, 2007). The biting time of the sand flies

lie between 6.30pm and 7.00pm at dusk. At this time people sit outside their homesteads at night. Children play on termite hills during the day and possibly early morning, between 6.00am to 10.00am that is the biting period of the sand flies at dawn (WHO, 2006). A study carried out in Kitui revealed a significant correlation between Kala-azar incidence and the presence of termite hills within 100 yards from homesteads. Of those with Kala-azar, 30 had a termite hill present while 116 did not. Latter studies by Southgate found that 70% of homesteads close to termite hills were infected compared to only 20% of those without (WHO, 2007). A pilot entomologic study conducted in 2004 in Uganda demonstrated that termite mounds are important for vector breeding and resting sites and that sitting on termite mounds increases the risk of infection (MSF, 2004).

### 2.6 Control and Treatment of Leishmaniases

There is no well-defined model for cost-effective control of the disease (WHO, 2007). Control strategies rely on chemotherapy to alleviate disease and on vector control to reduce transmission (Tonui and Titus, 2006). The drugs currently recommended for the treatment of leishmaniasis include Sodium stibogluconate, meglumine antimoniate and Amphotericin B which are given only to hospitalized patients during the period of treatment. However these drugs have drawbacks such as serious side effects, long courses of treatment and rampant drug resistance especially of the antimonials (WHO, 2007). The leishmaniasis experts advocate for vector control especially for areas of anthroponotic transmission (Hailu *et al.*, 2005). Vector control using indoor spraying of insecticides is always determined by the behavior and type of the species of sand flies present in each area such as whether endophilic or exophilic and endophagic or endophagous (WHO, 2007). Measures employed include spraying houses with insecticides where sand flies are endophilic and using treated and untreated bed nets where sand flies are endophagic. Personal protection using repellents and treated bed nets is an important aspect (Piscopo and Mallia, 2006). In endemic areas, spraying with

dichlorodiphenyltrichloroethane (DDT) and other residual insecticides is effective in sand fly control (Conjivaram and Ruchir, 2007).

### 2.7 Leishmaniases social and economic burden

Leishmaniases are diseases of poverty that cause high morbidity but low mortality and their true burden remains largely invisible because the most affected live in remote areas and partly because the social stigma from deformities and disfiguring scars keeps patients hidden (WHO, 2007). The disabilities related to leishmaniases impose a great social burden and reduce economic productivity (Boelaert *et al.*, 2010). Some of the neglected tropical diseases like leishmaniases not only cause health and economic effects but also result in horrific social stigma. Although the morbidity associated with cutaneous leishmaniasis is not significant, and the disease is not lethal, the disfigurement and resulting social stigmatization may cause or precipitate psychological disorders, along with restricting social participation of the individuals affected by the disease (Kassi *et al.*, 2008).

Median household expenditures on visceral leishmaniasis treatment represent, on average, 11% of annual household expenditures and an estimated 7 months of an individual's income at the daily wage. With majority of households being forced to take out loans to finance disease costs, VL can contribute to a spiral of increasing poverty. The pattern of visceral leishmaniasis treatment, with multiple visits and treatments for a single episode of illness, significantly increases the economic burden on the household (Sarnoff *et al.*, 2010). Cutaneous leishmaniasis can lead to permanent disfiguring scars and creates a lifelong stigma and social prejudice (Boelaert *et al.*, 2010). The unaffected people in cutaneous leishmaniasis affected area tend to isolate affected people during the course of active lesions. Such lesions are a source of apprehension and even disgust. This indeed leaves a very strong impact on the individual as the scar lasts for years (Kassi *et al*, 2008). When school children are infected, their performance can be affected because they spend time seeking treatment. The school children and students are given

responsibilities of taking care of the family members who are infected with visceral leishmaniasis (Boelaert *et al.,* 2010). The economic cost burden arises from the direct medical costs incurred including consultation fees, treatment drugs and laboratory tests (Meheus *et al.,* 2006). Sodium stibogluconate (Pentostam®) which is the standard drug used costs is USD 66.43 per 100ml bottle whereas the second line drug, Amphotericin B costs USD 7.5 per 50mg vial**.** The total cost depends on the length of treatment which in most cases cannot be afforded by the poor (Guerin *et al.*, 2002). The direct non-medical costs are transportation, good nutrition for patients and the person accompanying the patient during hospitalization and hospitalization expenditure**.** The indirect costs include the wage losses to patient or caretakers, losses in agriculture output or other earnings and value of time lost across all patients (Meheus *et al.*, 2013). The treatment for leishmaniases is expensive and in Kenya there is no policy to assist the victims to acquire the drugs for free and the treatment is restricted in most cases to district hospitals which are usually a distance from the affected households. This problem is compounded when more than one person in a family is infected (Bern *et al.,* 2008).

### 2.8 Cultural, Social beliefs and practices

Many communities like America, Nepal, Bangladesh, Sudan and Kenya., especially the areas of Kitui, Machakos, North Eastern, East Baringo, West Pokot and Turkana, have multifactorial explanation of ill health due to kala-azar (Boelart, 2000). They belief variables such as social class, economic position, religion, gender, life events can be correlated with the incidence and distribution of the disease. Many associate Kala-azar ill health with misfortune that is believed to result from supernatural forces like sorcery, witchcraft, breaking of taboos, curses and spirit disturbances. Sudden changes of weather from wet to dry, exposure to dry air during hot seasons are also believed to cause the disease (Boelart, 2000). Arrangement of living space and type of house, social isolation of certain sub-groups such as within a rigid caste system, population movements such nomadic life style are also believed to cause the disease (WHO, 2015). The mentioned communities devised strategies to cope with the disease include

bloodletting to reduce headaches and fever, sitting by the fire place, use of bitter herbs, visiting of witchdoctors and traditional healers. It is estimated that between 50-80% of the people in many communities predisposed to leishmaniasis first visit drug outlets and other unprofessional practitioners before going to the hospital (Hahn, 1995**).**

A descriptive study of knowledge, attitudes, perceptions and practices regarding leishmaniases provides the baseline for future control programs. The sociodemographic factors help in understanding the risk factors associated with leishmaniases infections. The region being endemic for kala-azar the study sought to document the level of education, housing quality, occupation, knowledge on transmission, preventive methods, signs and symptoms, and poverty levels among the households. The explored the estimates and costs of leishmaniases management by the Marigat residents.

# CHAPTER THREE

# MATERIALS AND METHODS

## 3.1 Study site

The study was carried out at Marigat Sub County, in the Baringo County. Baringo District, now Baringo County measures 11,075.3km$^2$ with a population of 555,561 (2009 census). Baringo County is a county in Kenya and its capital and largest town is Kabarnet. Marigat Sub County is one of the densely populated places in Baringo County where both cutaneous and visceral leishmaniases are prevalent. Marigat Sub County in the county of Baringo is a semi-arid area situated at the altitude of 1067 m above sea level and is approximately 250 km west of Nairobi City. The area has a mean temperature of about $32.8^0$ C.$\pm 1.6^0$ C with total amount of annual rainfall of 512 mm that falls in two seasons, in March to August and November to December. Farming is the major activity which includes dairy farming, growing of maize, groundnuts, cotton and coffee. The rest of the county mainly comprises of rangelands where the rearing of goats, sheep, cattle, camels and bee keeping farming are the main activities. Baringo County has 89 health facilities distributed all over the county. Most of them are under-utilized due to lack of staff and equipment. The average distance to the nearest health Centre is 15 km. The map of the study site is shown in figure 3.1.

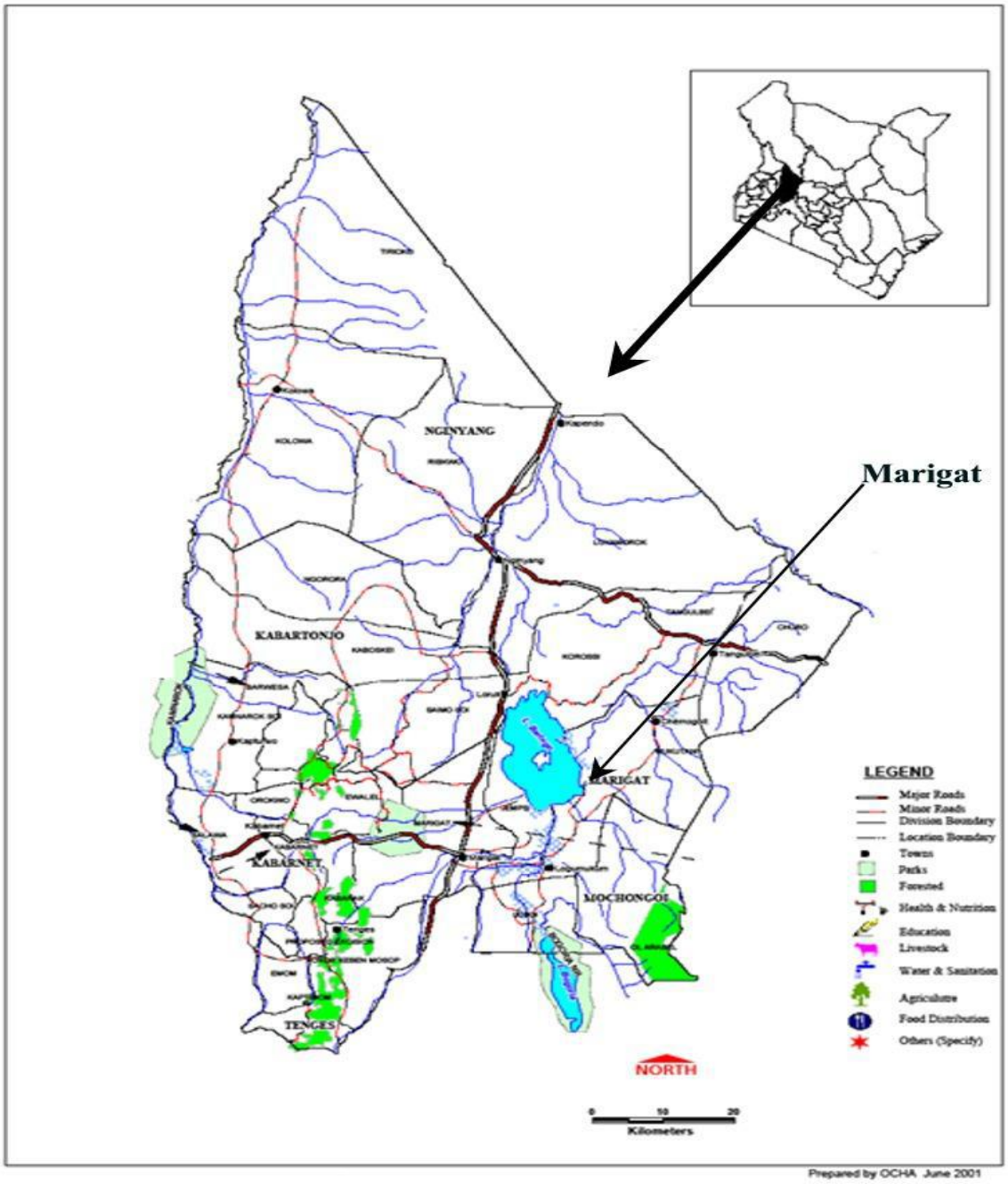


**Figure 3.1 Map of Baringo county**

(United Nations, 2001.)

### 3.2 Study design

This was a descriptive cross sectional study which used both quantitative and qualitative methods of data collection from households.

### 3.3 Study Population

These were household heads in Marigat Sub County. This was the ideal group since they are the ones who make decisions for the households. Among the key informants identified to be part of the study included the health workers and opinion leaders in the region who understand leishmaniases. The study was conducted in November and December of 2015 among 405 respondents.

### 3.4 Inclusion and Exclusion criteria

#### 3.4.1 Inclusion Criteria

The inclusion criteria for the respondents included:

- Consenting household heads, fathers or mothers or alternative adult household members 18 years and above in their absence
- Marigat sub-county residents who have stayed in the region for a minimum of a year.

#### 3.4.2 Exclusion criteria

The exclusion criteria for those who were not eligible for the study included:

- Not being the household head or being an alternative adult member but under 18 years old.
- Failure to consent to participate in the interview even after the objective of the study had been explained carefully, clarifying that participation is voluntary.

### 3.5 Sample size determination

Fishers formula was used to calculate the sample size (Fishers *et al.*, 1998) with 95% confidence based on assumption of prevalence of 50% (MOPHS, 2011) and a precision of 0.05. There is no local and national prevalence of leishmaniases. There exists a 3.9% in the neighboring originally Pokot district (Mutero *et al*., 1992), which could not be applied in the formula because clinical and epidemiological characteristics of viscera leishmaniasis vary according to geographical setting (MSF, 2012) and also the current study was addressing both VL and CL and not VL alone to which the prevalence applies. Prevalence of leishmaniases was therefore considered to be unknown in Baringo County, hence the use of 50% in the formula for calculation sample size as it is recommended for the prevailing circumstances.

A sample size of was calculated as follows:

$$N = \frac{Z^2pq}{d^2}$$

Where:

N = Sample size required

Z = Confidence level at 95% (standard value of 1.96)

p = Estimated Prevalence of leishmaniasis infections (50%)

q = 1-p, proportion of those people without leishmaniasis infections (1-0.5 = 0.5)

d = Precision error (0.05)

$$= \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

$$= 384$$

Ten percent (10%) of 384 were added on the minimum sample size to account for non-response, refusals or bias bringing the sample population to a total of 423.

### 3.6 Sampling procedure

The study employed both the probability and non-probability sampling methods. The Marigat Sub County comprised of 634 households as per the chiefs' records from the three locations (Marigat, Eldume and Loboi) in the area and these formed the sampling frame from which a sample of 423 households was randomly selected using computer generated random numbers. From each selected household one participant (household head) either father or mother and in case they were absent any adult in charge of household who voluntary agreed to give informed consent was selected for questionnaire administration. The selected participants provided responses to questionnaire on socio-demographic issues, knowledge, attitude, practices and cost effects which constituted quantitative data. To avoid bias when selecting the households, the PI used statistical random tables as follows:

The following were the steps the PI followed since the method of sampling was simple random sampling, there were **six steps**: **(a)** defining the population; **(b)** choosing the sample size; **(c)** listing the population; **(d)** assigning numbers to the units; **(e)** finding random numbers; and **(f)** selecting the sample.

- There were 643 households as per the chiefs' records from the three locations (Marigat, Eldume and Loboi) Marigat Sub County.
- The sample size was 423 as calculated above.
- Each house hold was assigned a number starting with 001 to 643.
- Using the random tables, the PI randomly selected a row and column.
- From the columns the PI picked 423 households, any value that was found to be above 643 or repeated was to be dropped and since the PI had located a number (from 001 to 643) to each of the household, selected and identified the household location using the chiefs' records.

Purposive sampling was used to select key informant interviews participants who provided information as contained in the interview guides after signing consent form.

Key informant interviews were conducted in individual's offices for confidentiality to explore knowledge, attitudes, practices, costs and factors associated with leishmaniases by the opinion leaders. It was conducted among the management and health personnel of Kimalel hospital and Marigat district hospital and Community health workers in Marigat Sub County.

### 3.7 Data collection

#### 3.7.1 Preliminary Procedures

The PI visited the study area and sort approval to conduct the study in Baringo county through the office of the director (public service) & human resource & administration who referred me to the Marigat Sub-County hospital for further assistance (Appendix 5). The Marigat district hospital through the office of Public health officer acknowledged the letter from the county by stamping on it and directed me also to Kimalel health Centre where most patients are treated for leishmaniases (Appendix 5). The permission to enter into the locations of Marigat Sub County was sort from the chiefs where the PI presented the approval and stamped letters from Baringo County and Marigat Sub-County authorities (Appendix 5)

#### 3.7.2 Data collection tools and enumerators

A pretest of the questionnaire was carried out in June 2015 at Marigat town in Baringo County. Marigat town was selected since it is near and facing the same problem of leishmaniases infections. The questionnaires were examined for clarity, ambiguity, time taken to fill it out and analyzability. Following the pilot study, the questionnaires were adjusted accordingly before embarking on the definitive study. Three research assistant one per location were recruited to assist the principle investigator in the data collection process. The research assistants were trained on interviewing techniques (including ethical considerations) prior to data collection; the training was also comprehensive so as to maintain the quality of the study, confidentiality, competence, understanding house

hold heads and the importance of consenting before the interview. They were consistently monitored by the principle investigator during data collection period.

### 3.7.3 Data Collection

The data collection included the administration of structured questionnaires (Appendix 2) to the house hold respondents and key informant interviews (KIIs) using interview guide (Appendix 3)

#### 3.7.3.1 Household respondents

The households were sampled, did the introduction to the respondents and acknowledged their participation in a research study to assess factors associated with leishmaniases among the households. The PI informed the participants about the study, objectives, risks and benefits. The participants were taken through consent form by trained research assistant and required to sign the consent form before they were allowed to fill in the study questionnaire (Appendix 2). When the participant (household head) agreed to participate he/she was instructed that completing the questionnaire (Appendix 2) was voluntary and that he/she would not be identified by participating in the study. The research was conducted at the convenience of the respondent.

The household heads were interviewed either a mother or the father. Incases both father and mother were absent, an adult household member was interviewed instead or an appointment to revisit was obtained. Trained research assistant helped in questionnaire administration because of their fluency in local language.

#### 3.7.3.2 Key Informant Interviews

The principal investigator was personally involved in conducting the key informant interviews. The KIIs were used to explain the experience at a personal level. The interviewees were sought out purposively in the offices and at their convenience. The introduction was done by explaining to them who was involved in the process therefore establishing credibility for the interview. Those who agreed to participate in the study were taken through consent form and allowed to sign it and permission to record the

interviews was obtained. An interview guide (Appendix 3) was used in the interviews where ten interviews were conducted using an interview guide. Respondents were purposively chosen. The guide addressed issues such as knowledge, attitudes, practices, and factors associated with leishmaniases. The interviews were held in places found to be conducive for interviews such as their offices for ease of recording and confidentiality. The Principal investigator moderated the interviews while the research assistant took notes and tape-recorded as the same time, as backup.

### 3.8 Data Management and Analysis

The completed questionnaires were checked daily to ensure each question had been filled out correctly and that there were no gaps. The questionnaires were then numbered and coded for ease of handling.

Its data was captured, checked, and cleaned in MS excel and exported to StataCorp.2013. *Stata statistical software: Release 13.* College Station, TX: StataCorp LP (Stata SE version 13) and IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. (SPSS version 20) for analysis. The univariate analysis was used to determine proportions and the Chi square test were run on the perceived perceptions for kala-azar infection. Those variables which showed some association were subjected to multivariate regression to assess the kind of association that existed. Univariate analysis was performed in order to obtain descriptive statistics where proportions, means and standard deviations were determined during the analysis. The results were presented in form of figures, tables and charts. The variables showing significance $P \leq 0.05$ at bivariate analysis were subjected to multivariate regression analysis in order to examine strength of association between the socio-demographic factors and occurrence of leishmaniases. Measures of association were considered statistically significant when P value was found to be equal to or less than 0.05.

Data from qualitative methods were manually analyzed using contents and thematic analysis. Key informat interview data was transcribed and translated for coding and analysis. Some of the themes included, knowledge, attitudes, practices and factors associated with leishmaniases. Findings are presented in verbatim form and in summary descriptive text. The data was used to compliment and elaborate quantitative findings and clarify relevant aspects of how leishmaniases has affected the community.

### 3.9 Ethical Considerations

The following procedures were carried out to ensure that no harm comes to the participants of this study as a result of their participation.

**Approval:** The proposal for this study was reviewed and approved by Kenyatta National Hospital/University of Nairobi ethical review committee (KNH/UON-ERC) before collection of data.

**Informed Consent:** All participants were informed of the purpose of the study and what it involved of them through the Informed Consent Form (Appendix 1) that was affixed to the questionnaire. In this form, participants were given the option to opt out of completing the questionnaire.

**Confidentiality:** The investigator undertook to treat the information provided during the study with utmost confidentiality. The responses provided were kept confidential and anonymous. Social demographic identifiers of the participants were captured, and only a code that was assigned by the principal investigator was used as an identifier thus no names of the individual, or household or the location (street) of the participant were used.

Further permission was sought from Baringo county government through the Office of Director (Public service) & Human Resource & Administration, Marigat District public

health office and Marigat Sub-County Medical office, chiefs and the community leaders (Appendix 5).

# CHAPTER FOUR

# RESULTS

The study was conducted between November and December 2015 in the three locations (Marigat, Eldume and Loboi) of Marigat Sub- County.

## 4.1 Socio-demographic characteristics of respondents

Of the 423 questionnaires administered to the households, 405 were completed giving a response rate of (96%). The study recruited 405 respondents of which 52.1% were females and 47.9% males. Table 4.1 shows the demographic characteristics of respondents from Marigat Sub-county. The occupation of household heads shows the farmers are higher than any other occupation 79.5%. The proportion (28.2%) of them having not received basic education. Monthly expenditure by the households were estimated between Kshs 1000 and Kshs 5000 for nearly half of the respondents 44.7%. Nearly half of the respondents were between 28 and 47 years of age.

**Table 4. 1: Socio-demographic characteristics of participants**

| *Characteristics* | *Variable* | *(n)* | *Percentage(n%)* |
|---|---|---|---|
| *Gender of the respondent* | Male | 194 | 47.9 |
| | Female | 211 | 52.1 |
| *Age group* | 18-27 years | 19 | 4.7 |
| | 28-37 years | 95 | 23.5 |
| | 38-47 years | 103 | 25.4 |
| | 48-57 years | 84 | 20.7 |
| | 58-93years | 104 | 25.7 |
| *Level of education* | None | 114 | 28.2 |
| | Primary education | 209 | 51.6 |
| | Secondary education | 71 | 17.5 |
| | Post-secondary education | 11 | 2.7 |
| *Marital status* | Single | 47 | 11.6 |
| | Married | 260 | 64.2 |
| | Divorced | 34 | 8.4 |
| | Widowed | 64 | 15.8 |
| *Occupation* | Farmer | 322 | 79.5 |
| | Teacher | 14 | 3.5 |
| | Health worker | 5 | 1.2 |
| | Administrator | 5 | 1.2 |
| | Other | 59 | 14.6 |
| *Monthly health related expenditure* | Ksh1-Kshs 1000 | 35 | 8.6 |
| | Kshs 1001-5000 | 181 | 44.7 |
| | Kshs 5001-10000 | 110 | 27.2 |
| | Kshs 10001-15000 | 38 | 9.4 |
| | Kshs 15000 -30,000 | 41 | 10.1 |
| *Type of house* | Mud plastered and grass thatched | 116 | 28.6 |
| | Mud plastered and corrugated iron roof | 73 | 18.0 |
| | Timber house and corrugated iron roof | 43 | 10.6 |
| | Corrugated iron sheet wall and roof | 148 | 36.5 |
| | Stick-walled house and grass thatched | 16 | 4.0 |
| | Stone walled house | 9 | 2.2 |

The table 4.2 represents a summary of the number of individuals in same household. The oldest respondent was aged 93 years old. On average animal shed was located 9.7 metres away from the house.

**Table 4. 2: Household size and age of respondents**

| *Variable* | *N* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|---|
| *Household size* | 405 | 4.992593 | 2.365688 | 1 | 12 |
| *Age in years* | 405 | 44.56296 | 15.15511 | 18 | 93 |
| *Distance to animal shed* | 350 | 9.758571 | 6.987063 | 1 | 50 |

### 4.2 Association between socio-demographic characteristics and leishmaniasis cases

The table 4.3 shows a comparison of individuals who reported having had leishmaniases and those who did not as regards to their demographic characteristics. Chi square test did not show any relationship between cases and gender (P=0.250), marital status (P=0.085), monthly expenditure (P=0.680), and age group (P=0.314). There was however a relationship between having suffered from leishmaniases and occupation, level of education and type of house (P<0.0001, P=0.002 and P<0.0001 respectively).

**Table 4. 3: Association between Socio-demographic characteristics and leishmaniases cases**

| *Characteristics* | *Variable* | *Suffered (N=405)* | | $X^2$ *Value* | *P value* |
|---|---|---|---|---|---|
| | | Yes, n(n%) | No,n(n%) | | |
| *Sex* | Male | 91 (46.9) | 103 (53.1) | 1.3214 | 0.250 |
| | Female | 87 (41.2) | 124 (58.8) | | |
| *Age group* | 18-27 years | 8 (42.1) | 11 (57.9) | 4.7462 | 0.314 |
| | 28-37 years | 35 (36.8) | 60 (63.2) | | |
| | 38-47 years | 42 (40.8) | 61 (59.2) | | |
| | 48-57 years | 41 (48.8) | 43 (51.2) | | |
| | 58 years and older | 52 (50) | 52 (50) | | |
| *Level of education* | None | 46 (40.35) | 68 (59.65) | 14.5620 | 0.002 |
| | Primary not completed | 36 (33.96) | 70 (66.04) | | |
| | Primary completed | 46 (44.66) | 57 (55.34) | | |
| | Secondary/post-secondary | 50 (60.98) | 32 (39.02) | | |
| *Marital status* | Single | 26 (55.3) | 21 (44.7) | 6.6190 | 0.085 |
| | Married | 110 (42.3) | 150 (57.7) | | |
| | Divorced | 10 (29.4) | 24 (70.6) | | |
| | Widowed | 32 (50) | 32 (50) | | |
| *Occupation* | Farmer | 118 (36.6) | 204 (63.4) | 34.6465 | 0.0001 |
| | Teacher | 9 (64.3) | 5 (35.7) | | |
| | Health worker | 4 ( 80) | 1 (20) | | |
| | Administrator | 4 (80) | 1 (20) | | |
| | Other | 43 (72.9) | 16 (27.1) | | |
| *Expenditure* | Below Kshs 1000 | 12 (34.3) | 23 (65.7) | 2.3068 | 0.680 |
| | Kshs 1000-5000 | 85 (47) | 96 (53) | | |
| | Kshs 5001-10000 | 48 (43.6) | 62 (56.4) | | |
| | Kshs 10001-15000 | 15 (39.5) | 23 (60.5) | | |
| | above Kshs 15000 | 18 (43.9) | 23 (56.1) | | |
| *Type of house* | Mud plastered and grass thatched | 32 (27.6) | 84 (72.4) | 32.9017 | 0.0001 |
| | Mud plastered and corrugated iron roof | 34 (46.6) | 39 (53.4) | | |
| | Timber walled and corrugated iron roof | 31 (72.1) | 12 (27.9) | | |
| | Corrugated iron sheet wall and roof | 65 (43.9) | 83 (56.1) | | |
| | Stick-walled and grass thatched | 12 (75) | 4 (25) | | |
| | Stone walled house | 4 (44.4) | 5 (55.6) | | |

### 4.3 Knowledge of household heads on leishmaniases

#### 4.3.1 Source of information on Leishmaniases

Figure 4.1 shows respondents' sources of information on leishmaniases. The respondent could give more than one response. From the results, majority of the respondents (63%) got information from health centers with slightly more than half of them (51%) having it through community health workers. Those who got information through internet were the least at 3%.

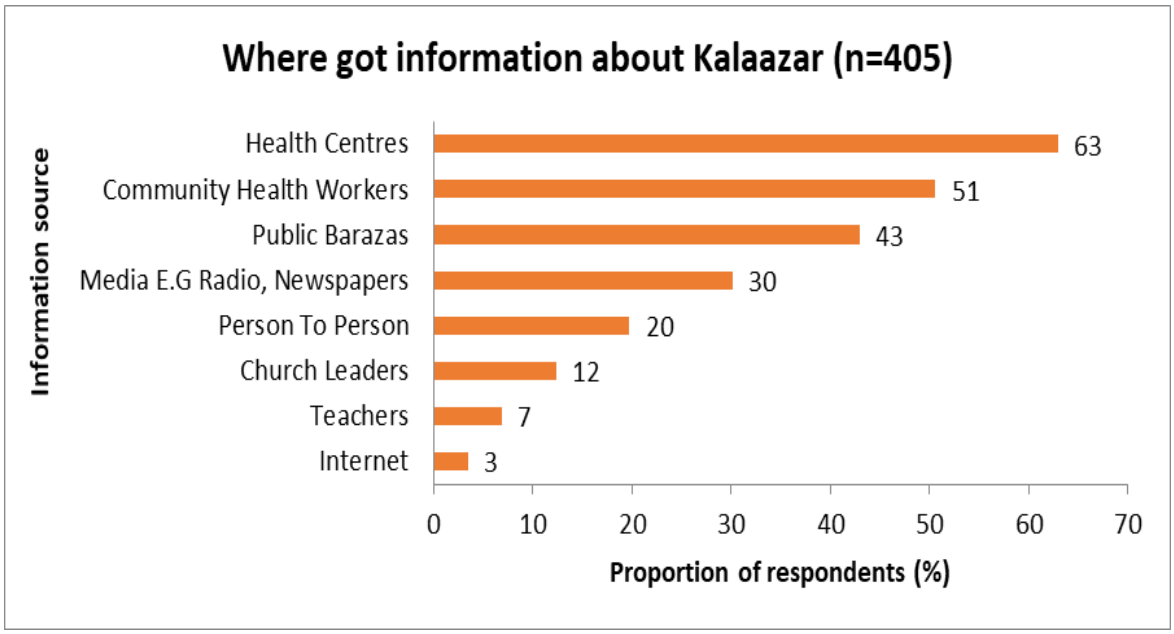


**Figure 4. 1: Respondents sources of information about leishmaniases**

#### 4.3.2 Information on leishmaniases identification, prevention and control

Table 4.4 shows that more than half of the respondents (53.1%) who reported having information on identification, prevention and control of leishmaniasis had suffered from leishmaniasis compared to those who had no information. Chi square test revealed a relationship exist between having information on leishmaniasis and not suffering from the disease (Pearson chi2(1) = 10.7013; Pr = 0.001)

**Table 4. 4: Respondent information on identification, prevention and control of leishmaniases**

| *Informed on identification, prevention and control of leishmaniasis* | *Have leishmaniasis?* | | *Total* |
|---|---|---|---|
| | Yes | No | |
| *Yes* | 94(53.1) | 83(46.9) | 177 |
| *No* | 84(36.8) | 144(63.2) | 228 |
| *Total* | 178(43) | 227(56) | 405 |

### 4.3.3 Distinguishing leishmaniases from malaria

Table 4.5 shows more than half of the respondents (53.3%) who could distinguish malaria from kala-azar hadn't suffered from the disease. No difference was observed between those who distinguished malaria from kala-azar between cases and non-cases (Pearson chi2(1) = 3.7693, Pr = 0.052).

**Table 4. 5: Respondents who can distinguish leishmaniases from malaria**

| *Ability to distinguish Leishmaniases from Malaria* | *Suffered from leishmaniasis?* | | *Total* |
|---|---|---|---|
| | Yes, n(%) | No, n(%) | |
| *Yes* | 142 (46.7) | 162 (53.3) | 304 |
| *No* | 36 (35.6) | 65 (64.4) | 101 |
| *Total* | 178 (44) | 227 (56) | 405 |

### 4.3.4 Knowledge of signs and symptoms of leishmaniases

Respondents were asked to name signs and symptoms of leishmaniases. The respondents could give more than one sign and symptom (multiple responses allowed). Figure 4.2 shows majority of the respondents (72.1%) indicated swollen abdomen followed by loss of appetite (68.9%), fever (66.9%) with only (0.2%) reporting paralysis.

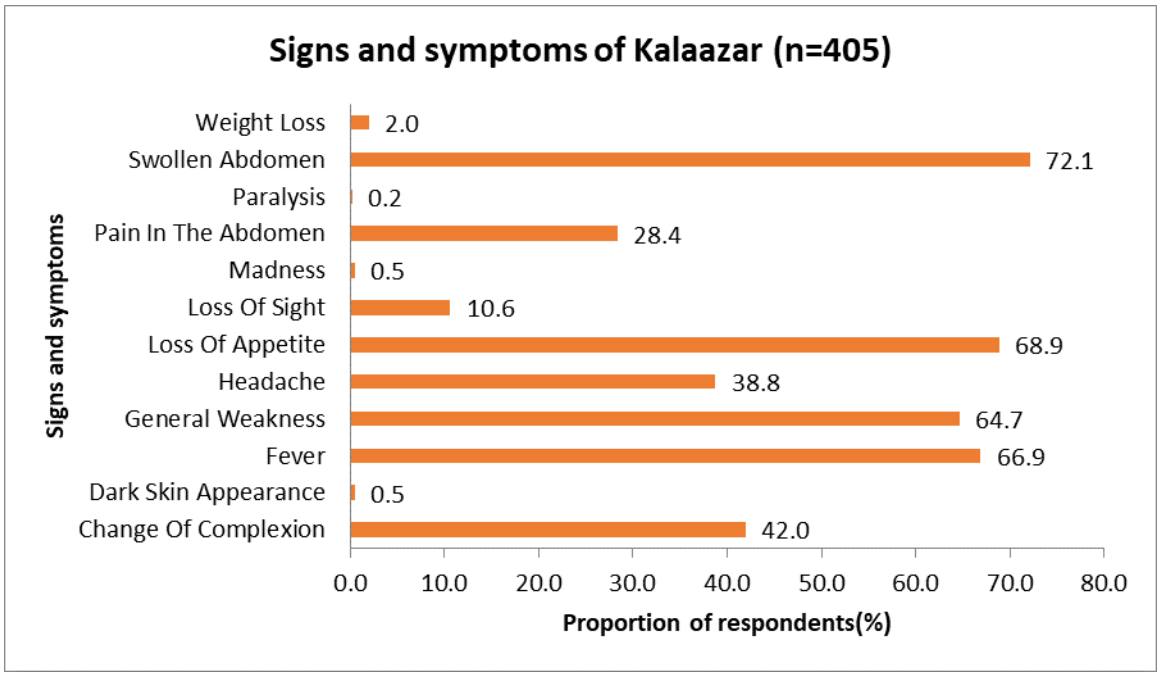


**Figure 4.2 Signs and symptoms of leishmaniases according to the respondents**

### 4.3.5 Assessing knowledge on the cause, season and breeding area

Table 4.6 shows majority of the respondents (85.2%) mentioned bite by a sand fly insect as the cause of leishmaniases with more than half of them being from the non-cases ones (54.5%). Those who mentioned witchcraft as the cause were the least with 1.5%. Participants were asked about season when leishmaniases is most prevalent. Most of the respondents (45.7%) said leishmaniases were prevalent during dry season followed by those who said leishmaniases were prevalent at the peak of the rainy season at 34.3%. The 4.4% did not know when leishmaniases were most prevalent. Majority of the respondents (76.5%) reported termite moulds as the breeding place for sandflies. Decaying trees were least mentioned (19.3%) as the breeding place. Chi square test or fishers exact test were performed on these factors to check if difference exist between cases and non-cases as regards knowledge about cause, season when prevalent and breeding places of vectors. No relationship exists between causes of leishmaniases and having leishmaniasis (P=0.175). Study results reveal that a relationship exists between

season of leishmaniases (P=0.012), sandflies breeding sites (P=0.002) and suffering from kala-azar.

**Table 4. 6: Knowledge about VL causes, season and breeding of vector**

| *Knowledge indicator* | *Variable* | *leishmaniasis case(N=405)* | | *Total (Cases &Non-cases)* | $X^2$ | *P value* |
|---|---|---|---|---|---|---|
| | | **Cases n(n%)** | **Non-cases n(n%)** | | | |
| *Causes of kala-azar* | Consumed dirty water | 2 (13.3) | 13 (86.7) | 15 (3.7) | 7.6257 | 0.142 |
| | Witchcraft | 3 (50) | 3 (50) | 6 (1.5) | | |
| | Curse | 7 (50) | 7 (50) | 14 (3.5) | | |
| | Poverty | 8 (36.4) | 14 (63.6) | 22 (5.4) | | |
| | Bite by an insect | 157 (45.5) | 188 (54.5) | 345 (85.2) | | |
| | Other | 1 (33.3) | 2 (66.7) | 3 (0.7) | | |
| *Season kala-azar is most prevalent* | At the beginning of the rainy season | 17 (56.7) | 13 (43.3) | 30 (7.4) | 12.3077 | 0.012 |
| | At the peak of the rainy season | 39 (28.1) | 100 (71.9) | 139 (34.3) | | |
| | At the end of the rainy season | 16 (48.5) | 17 (51.5) | 33 (8.1) | | |
| | During the dry season | 100 (54.1) | 85 (45.9) | 185 (45.7) | | |
| | I don't know | 6 (33.3) | 12 (66.7) | 18 (4.4) | | |
| *Sandflies breed* | Animal Burrows | 56 (47.9) | 61 (52.1) | 117 (28.9) | 19.4022 | 0.002 |
| | Cracks And Crevices | 83 (52.9) | 74 (47.1) | 157 (38.8) | | |
| | Decaying Trees | 48 (61.5) | 30 (38.5) | 78 (19.3) | | |
| | In Stagnant Water | 59 (57.8) | 43 (42.2) | 102 (25.2) | | |
| | Livestock Sheds | 64 (57.7) | 47 (42.3) | 111 (27.4) | | |
| | Termite Moulds | 128 (41.3) | 182 (58.7) | 310 (76.5) | | |

### 4.4 Attitude of respondents

Table 4.7 shows that more than half of the respondents (63.0%) reported there were no stigma and discrimination of people suffering from kala-azar, 25.7% agreed there is and a few 11.3% did not know whether stigma and discrimination existed. As regards isolation of people with kala-azar, majority (88.9%) didn't see need for isolation. Most of the respondents (92.6%) reported that kala-azar can be completely cured. The respondents (82.2%) have an attitude that kala azar is more serious than malaria. The Chi square test revealed seriousness of kala-azar as compared to malaria, and an attitude that leishmaniases can be completely be cured are statically significant with P<0.05.

**Table 4. 7: Respondents' attitude as regards to leishmaniases**

| ***Indicator*** | ***Variable*** | ***Cases n(n%)*** | ***Non-cases n(n%)*** | ***Total n(n%)*** | ***$X^2$*** | ***P value*** |
|---|---|---|---|---|---|---|
| *There is stigma and discrimination of people suffering from Leishmaniases* | Yes | 38(36.5) | 66(63.5) | 104(100) | 0.7952 | P = 0.672 |
| | No | 106(41.6) | 149(58.4) | 255(100) | | |
| | Don't know | 18(39.1) | 28(60.9) | 46(100) | | |
| *Person with Leishmaniases need isolation* | Yes | 15(33.3) | 30(66.7) | 45(100) | 0.9375 | P= 0.333 |
| | No | 147(40.8) | 213(59.2) | 360(100) | | |
| *Leishmaniases can be completely cured* | Yes | 140(37.3) | 235(62.7) | 375(100) | 15.000 | P = 0.001 |
| | No | 22(73.3) | 8(26.7) | 30(100) | | |
| *Attitude* | Kala azar is more serious than malaria | 135(40.5) | 198(59.6) | 333(100) | 9.6030 | P = 0.008 |
| | Malaria is more serious than Kala azar | 15(62.5) | 9(37.5) | 24(100) | | |
| | Malaria and Kala azar are equally serious | 12(25) | 36(75) | 48(100) | | |

### 4.5 Practices of respondents

Figure 4.3 shows the majority of the respondents 74.6% were in agreement that young boys were more at risk of infection, followed by young girls 45.9%. The least at risk were adult female 5.4%.

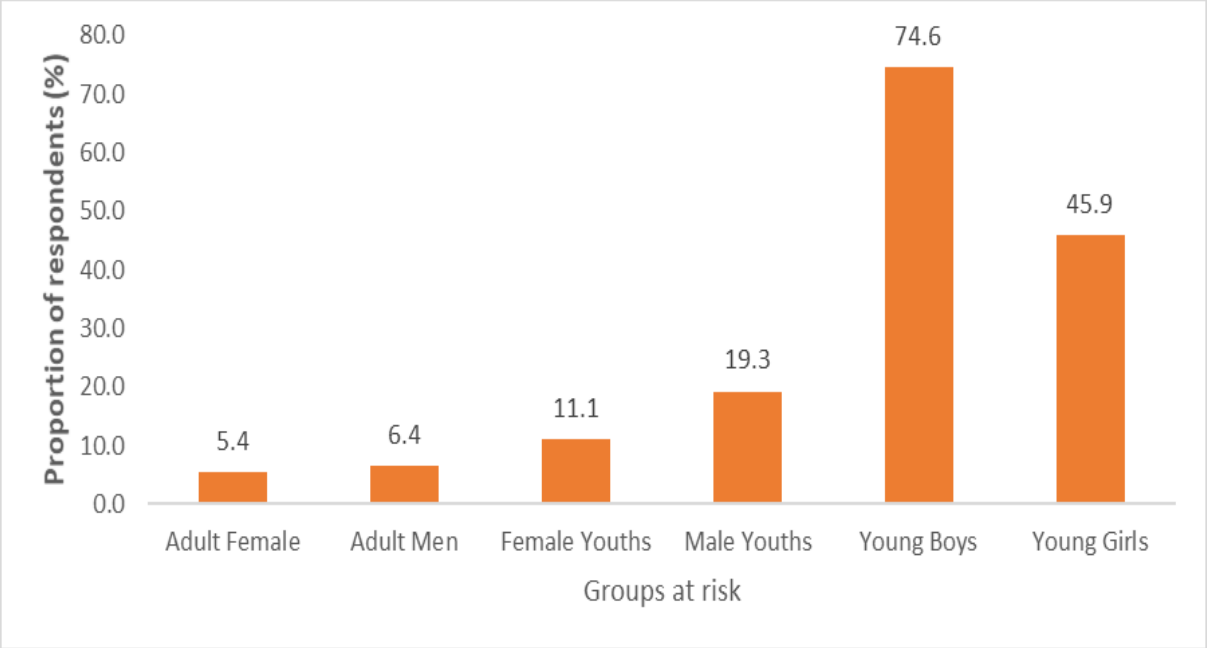


**Figure 4. 3: Responses regarding respondents perception on who is more at risk of leishmaniases infection**

Study results revealed that majority of the respondents (92.1%) said they would seek immediate doctors' advice when infected with VL as shown in figure 4.4.

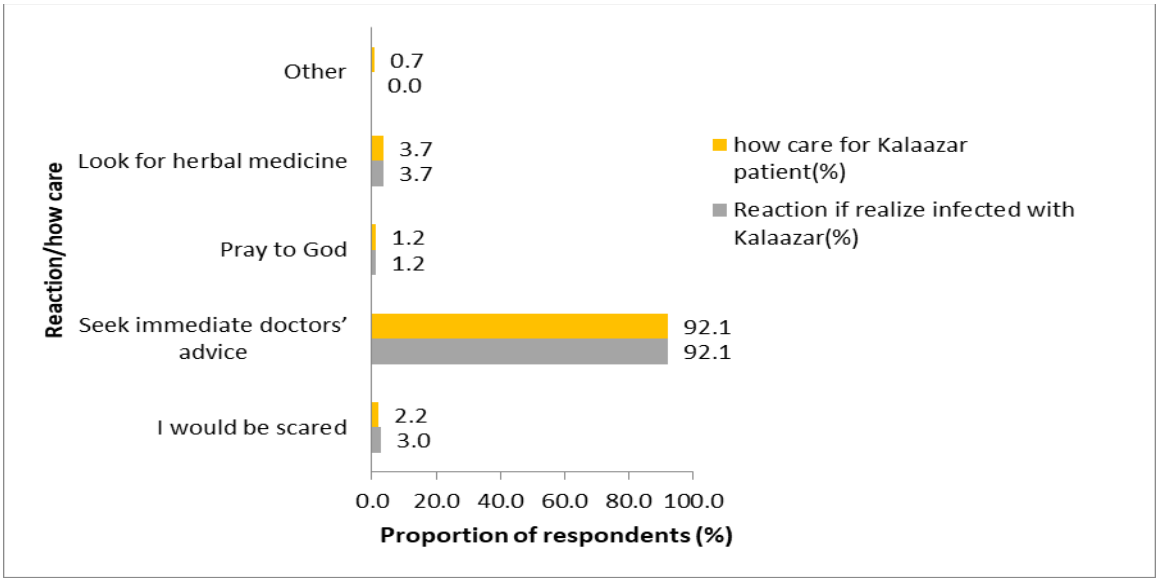


**Figure 4.4: What one can do if they get infected with kala-azar and care that will be sought**

Figure 4.5 shows the reason why respondents seek treatment for leishmaniases. Most of the respondents 69.4% reported seeking treatment for fear of death. Minority of them 0.49% sought care to contain embarrassment reasons.

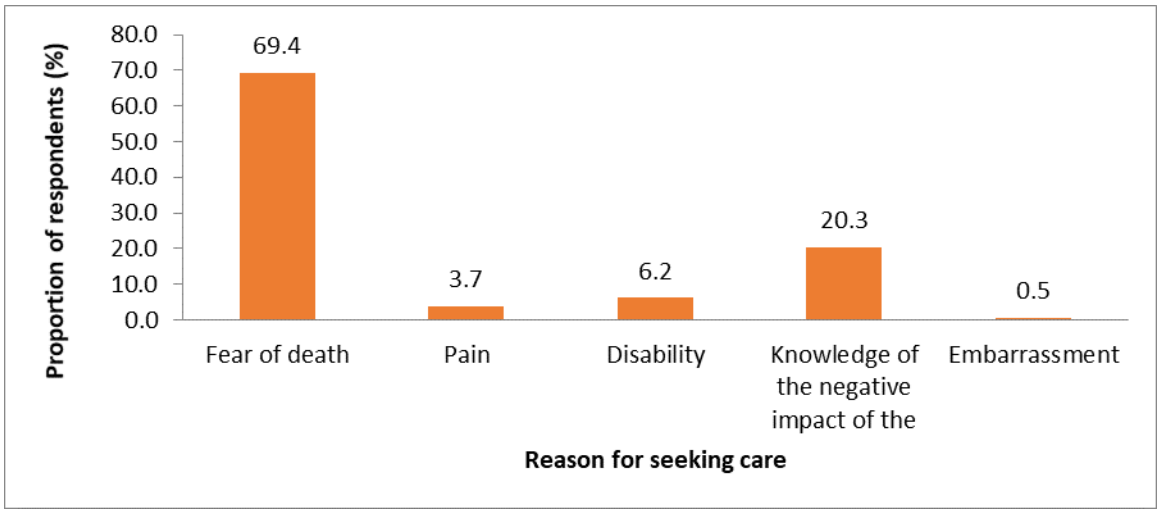


**Figure 4.5: Reasons for seeking leishmaniases treatment by household heads**

Figure 4.6 shows the preventive practice methods used by the household heads. Most of the respondents (85.2%) reported using bed nets as one way of protecting self from leishmaniases followed by observing personal hygiene (44.4%) with few (5.7%) having installed a window mesh as a preventive practice.

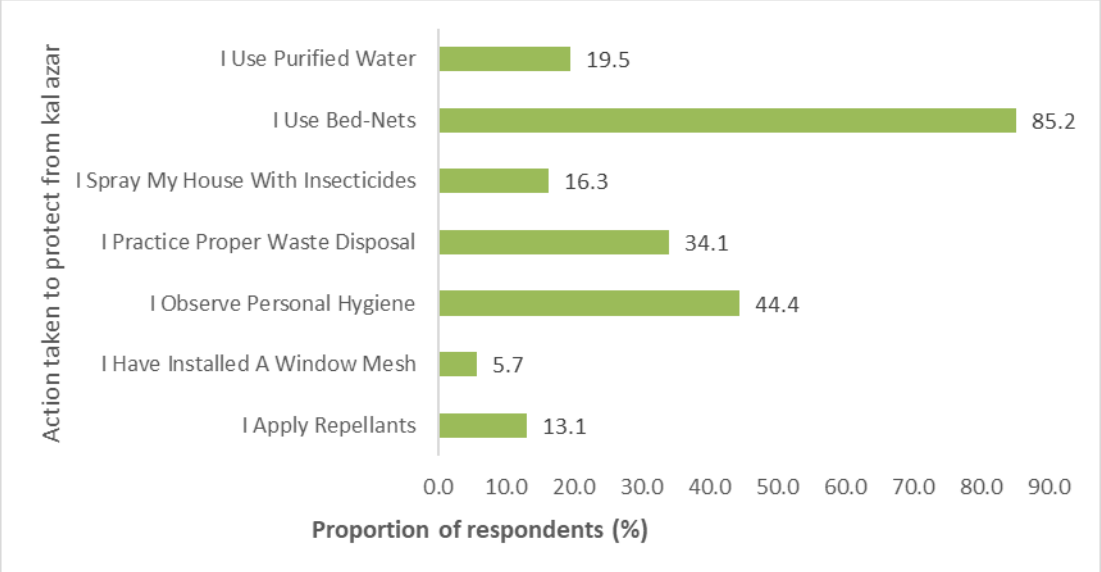


**Figure 4.6: Preventive practice methods employed by respondents against leishmaniases**

Figure 4.7 shows the number of household heads who have suffered from leishmaniases themselves or one of their household members. More than half of the respondents (60%) reported having at least a leishmaniases case in household and 40% did not have a case in their household.

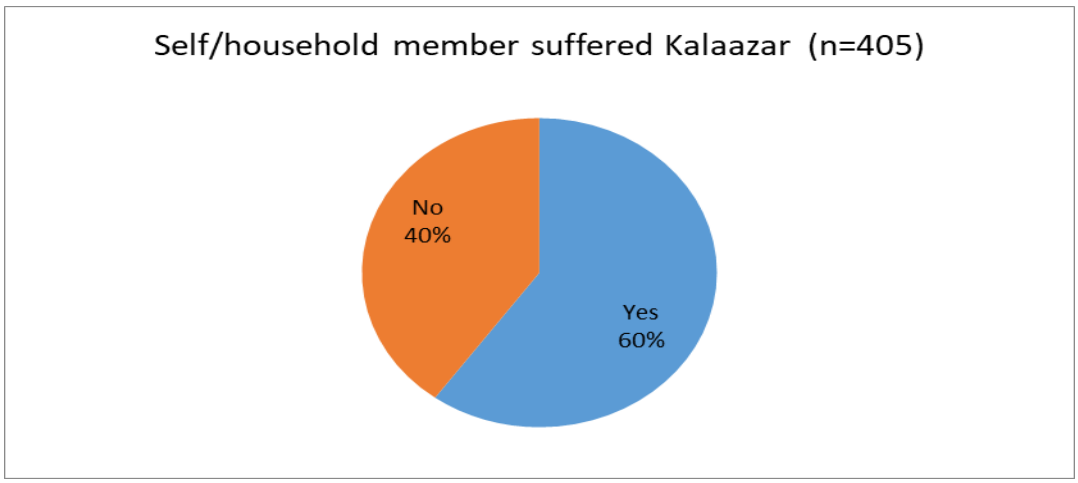


**Figure 4.7: Self or household member suffered leishmaniases**

### 4.6 Costs associated with leishmaniases and other health related costs

Figure 4.8 shows the sources of money for treatment of leishmaniases by respondents in case the house hold member was infected. The respondents reported they borrowed from relatives (35.1%) with substantial number reporting they raised the funds through fundraising (25.4%).

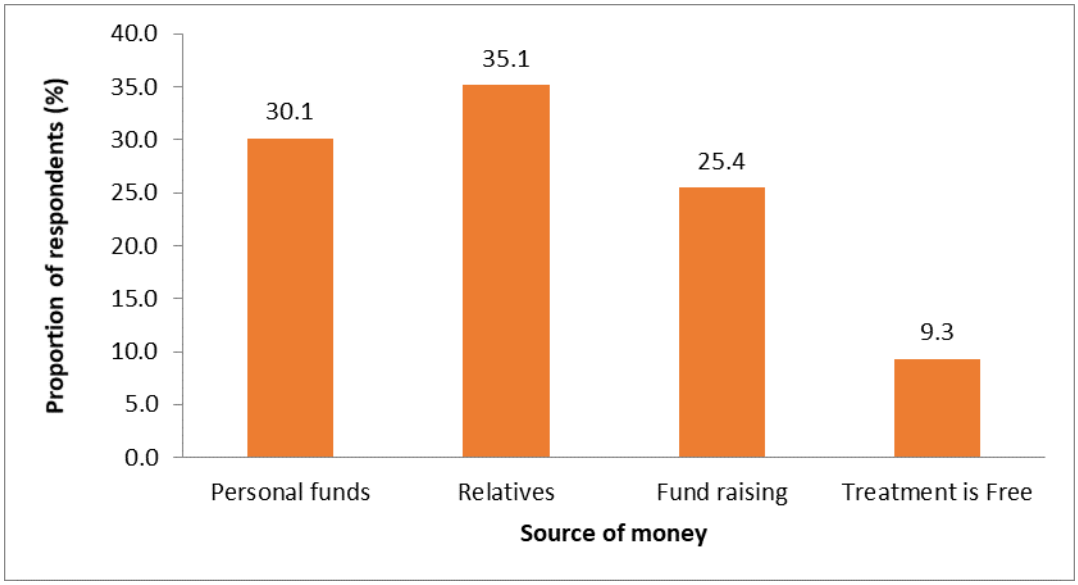


**Figure 4.8: Source of money for treatment if household member suffered from leishmaniases**

Table 4.8 shows the comparison of having a leishmaniases case in compound and health related expenditure. Study results showed no relationship between health related expenditure and having a leishmaniases case (Pearson chi2(4) =8.8495; Pr=0.065).

**Table 4.8: Comparison of having a leishmaniases case in compound and other health related expenditure**

| *Health related expenditure vs case type* | *Category* | | |
|---|---|---|---|
| ***Health related expenditure*** | **Not suffered from leish.[n(n%)]** | **Suffered from leish.[n(n%)]** | **Total** |
| *Below Kshs 1000* | 18(51.4) | 17(48.6) | 35(8.6) |
| *Kshs 1000-5000* | 80(44.2) | 101(55.8) | 181(44.7) |
| *Kshs 5001-10000* | 38(34.5) | 72(65.5) | 110(27.2) |
| *Kshs 10001-15000* | 9(23.7) | 29(76.3) | 38(9.4) |
| *above Kshs 15000* | 17(41.5) | 24(58.5) | 41(10.1) |
| *Total* | 162(40) | 243(60) | 405(100) |

Table 4.9 shows that according to the respondents on average; it takes 8.9 weeks for somebody infected with leishmaniases to resume normal duties. One is unable to carry on with normal duties for 9 weeks on average and could take on average 25 days seeking treatment. Number of days spent taking care of patient till recovery was estimated to be 37 days.

**Table 4. 9: Time lost due to leishmaniases according to the respondents**

| *Variable* | *Observation* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|---|
| *Time taken for treated person to resume duties in weeks* | 227 | 8.98 | 5.23 | 1 | 30 |
| *Time unable to carry out normal duties in weeks* | 241 | 9.28 | 7.43 | 1 | 65 |
| *Time spend seeking treatment and follow up in days* | 239 | 25.72 | 22.05 | 1 | 180 |
| *Days spent taking care of patient till recovery* | 224 | 37.94 | 25.21 | 2 | 180 |

Table 4.10 shows the various expenses associated with hospital treatment of leishmaniasis infected family members. Highest mean cost incurred by respondents was the cost of drugs from the hospital at Kenyan shillings 11,116.30 (US$111.16) followed by mean costs of nutritive supplements/drugs from outside chemists at Kenyan Shillings 5,299.55(US$ 54) and lowest mean cost being consultation fee at Kenyan shillings 583.90(US$ 5.84). The grand mean total expenditure by respondents due to leishmaniases in Marigat Sub County was Kenyan Shillings 35,983.77 ($ 359.83) per household.

**Table 4. 10: Monetary costs of treating leishmaniases**

| ***Variable*** | ***Mean*** | ***Minimum*** | ***Maximum*** |
|---|---|---|---|
| *Drug costs from hospital* | 11116.30(US$111.16) | 50(US$0.5) | 60000(US$600) |
| *Costs of Nutritive supplements /drugs from chemists outside the Hospital* | 5299.54(US$ 54) | 80(US$0.8) | 60000 (US$600) |
| *Costs of laboratory Tests* | 1730.33(US$ 17.30) | 50(US$0.5) | 23000(US$230) |
| *Costs of hospital consultation* | 583.90(US$ 5.84) | 0 | 12000(US$120) |
| *Costs of Transport by Patients* | 4,993.72(US$ 49.93) | 0 | 50000(US$500) |
| *Total cost of travelling to the hospital by caretaker* | 3761.49(US$ 37.61) | 80(US$0.8) | 20000(US$200) |
| *Money used by the caretaker to buy food in the hospital* | 3568.50(US$ 35.69) | 7(US$0.07) | 25000(US$250) |
| *Costs of buying food for the sick before recovery at home* | 4,929.99(US$ 49.30) | 15(US$0.07) | 30,000(US$300) |
| *Total* | 35,983.77(359.83) | | |

### 4.7: Assessing perceived factors associated with leishmaniases on households

Table 4.11 shows cross tabulations of risk factors and having kala-azar in household. Crude associations were done using Pearson's Chi-square test at 95% level of significance (Fisher's exact used when expected cell frequency of some cells was less than 5). There was no association between use of bed nets and window mesh installation and lack of contraction of kala-azar. Type of house was significantly associated with having kala-azar (P=0.019). The preventive practice of using insecticides (P=0.0001), embracing personal hygiene(P=0.0001), proper waste disposal(P=0.0001), use of purified water(P=0.0001) and application of repellants (P=0.030) showed significant association with not suffering from kala-azar.

**Table 4. 11: Bi variate analysis of the factors associated with kala-azar**

| *Category* | *Variable* | *Leishmaniases* | | *Total* | $X^2$ | P value |
|---|---|---|---|---|---|---|
| | | Not-suffered | Suffered | | | |
| *Type of house* | Mud plastered and grass thatched | 60 | 56 | 116 | 13.3957 | 0.019 |
| | Mud plastered and corrugated iron roof | 25 | 48 | 73 | | |
| | Timber house and corrugated iron roof | 12 | 31 | 43 | | |
| | Corrugated iron sheet wall and roof | 58 | 90 | 148 | | |
| | Stick-walled house and grass thatched | 3 | 13 | 16 | | |
| | Stone walled house | 4 | 5 | 9 | | |
| *Use Bed nets* | No | 23 | 37 | 60 | 0.0815 | 0.775 |
| | Yes | 139 | 206 | 345 | | |
| *Insecticide* | No | 120 | 219 | 339 | 18.3548 | 0.0001 |
| | Yes | 42 | 24 | 66 | | |
| *Personal Hygiene* | No | 66 | 159 | 225 | 24.000 | 0.0001 |
| | Yes | 96 | 84 | 180 | | |
| *Proper waste disposal* | No | 80 | 187 | 267 | 32.8945 | 0.0001 |
| | Yes | 82 | 56 | 138 | | |
| *Installed window mesh* | No | 153 | 229 | 382 | 0.0077 | 0.93 |
| | Yes | 9 | 14 | 23 | | |
| *Use sterilized water* | No | 116 | 210 | 326 | 13.5870 | 0.0001 |
| | Yes | 46 | 33 | 79 | | |
| *Apply repellants* | No | 148 | 204 | 352 | 4.6891 | 0.03 |
| | Yes | 14 | 39 | 53 | | |

The table 4.12 shows results of multivariable (adjusted) analysis of factors to kala-azar infection. Adjusting for age, health related expenditures, type of house, practices, occupation and education, for every one-meter increase in distance of animal shed from household, one is 1.5% less likely to suffer from kala-azar.

Adjusting for age, distance to animal shed, health related expenditures, practices, occupation and education, those households who live stick-walled house and grass thatched were 22.7 times more likely to suffer from kala-azar compared to those households who live in corrugated iron sheet wall and roof.

Adjusting for age, distance to animal shed, health related expenditures, type of house, occupation and education, those households who use insecticides were found out to be 70% less likely to suffer from kala-azar compared to those households who do not use insecticides. Similarly, adjusting for age, distance to animal shed, health related expenditures, type of house, occupation and education, those households who practice proper waste disposal were found out to be 73% less likely to suffer from kala-azar compared to those households reported not practicing proper waste disposal.

Level of education and occupation did not show any significant association with having kala-azar.

**Table 4. 12: Multivariable Regression analysis on the Sociodemographic factors associated with leishmaniases**

| *Case* | *Odds Ratio* | *Std. Err.* | *Z* | *P>z* | *[95% Conf.* | *Interval]* |
|---|---|---|---|---|---|---|
| *Age years* | 1.035877 | 0.0111337 | 3.28 | 0.001 | 1.014283 | 1.05793 |
| *Distance to animal shed* | 0.9530391 | 0.0186957 | -2.45 | 0.014 | 0.9170916 | 0.9903955 |
| ***Expenditure(REF: 1001-5000)*** | | | | | | |
| *Below Kshs 1000* | 0.542319 | 0.2640354 | -1.26 | 0.209 | 0.2088506 | 1.408231 |
| *Kshs 5001-10000* | 1.624393 | 0.5515998 | 1.43 | 0.153 | 0.8349226 | 3.160356 |
| *Kshs 10001-15000* | 1.867513 | 1.080758 | 1.08 | 0.28 | 0.6007043 | 5.805861 |
| *above Kshs 15000* | 0.8741341 | 0.4653934 | -0.25 | 0.801 | 0.3078889 | 2.481773 |
| ***Type House (REF: Corrugated iron sheet wall and roof)*** | | | | | | |
| *Mud plastered and grass thatched* | 0.7887173 | 0.2696516 | -0.69 | 0.488 | 0.4035592 | 1.541471 |
| *Mud plastered and corrugated iron roof* | 1.786103 | 0.698655 | 1.48 | 0.138 | 0.8297531 | 3.844713 |
| *Timber house and corrugated iron roof* | 1.535805 | 0.7556143 | 0.87 | 0.383 | 0.5855258 | 4.028341 |
| *Stick-walled house and grass thatched* | 22.71782 | 28.42651 | 2.5 | 0.013 | 1.955552 | 263.9149 |
| *Stone walled house* | 0.2680512 | 0.2804494 | -1.26 | 0.208 | 0.0344862 | 2.083483 |
| ***Protection methods(REF: None)*** | | | | | | |
| *Insecticides* | 0.3001735 | 0.1080098 | -3.34 | 0.001 | 0.1482822 | 0.607653 |
| *Personal Hygiene* | 1.205734 | 0.4297453 | 0.52 | 0.6 | 0.5996087 | 2.424572 |
| *Proper waste disposal* | 0.2720377 | 0.1085157 | -3.26 | 0.001 | 0.124476 | 0.5945288 |
| *Purified water* | 0.9757802 | 0.3848742 | -0.06 | 0.95 | 0.4504173 | 2.113922 |
| *Repellants* | 2.401209 | 1.128816 | 1.86 | 0.062 | 0.9556027 | 6.033683 |
| ***Occupation (REF: Farmer)*** | | | | | | |
| *Teacher* | 2.467779 | 2.064604 | 1.08 | 0.28 | 0.4788178 | 12.71869 |
| *Health worker* | 1 | (empty) | | | | |
| *Administrator* | 1 | (empty) | | | | |
| *Other* | 0.5996854 | 0.2317218 | -1.32 | 0.186 | 0.2811994 | 1.278888 |
| ***Education (REF: None)*** | | | | | | |
| *Primary not completed* | 1.472843 | 0.5711938 | 1 | 0.318 | 0.6887249 | 3.149684 |
| *Primary completed* | 1.691746 | 0.7018789 | 1.27 | 0.205 | 0.7502137 | 3.814919 |
| *Secondary/post-secondary education* | 0.776794 | 0.3721823 | -0.53 | 0.598 | 0.3037197 | 1.98673 |
| *_Constant* | 0.6194883 | 0.4583036 | -0.65 | 0.517 | 0.1453134 | 2.640952 |

### 4.8 Summary of Key Informant Interviews findings

The qualitative results from the key informant interviews confirmed that the fear of death is the main reason why majority of residents seek treatment. Also they have the

same perception that leishmaniases are more serious than malaria. Most interviewees agree that Kimalel hospital managed by KEMRI was the most preferred to treat leishmaniases in the Marigat Sub County. Leishmaniases are regarded as deadly diseases but treatable. Isolation was not considered as a major concern by the KIIs. Bed nets was the most embraced method of prevention by the community.

**Table 4. 13: Summary of responses from Key Informant Interviews**

| ***Theme*** | ***Main responses*** |
|---|---|
| *Attitude towards leishmaniases* | "Kala-azar ni rahana kwa family" (kala-azar is curse in the family). "Kala-azar ni ugonjwa wa maskini" (kala-azar is a disease for the poor).<br><br>"Kala-azar ni ugonjwa mbaya sana" (kala-azar is an extremely bad disease)<br><br>***"Kala-azar ni ugonjwa mbaya sana" (kala-azar is an extremely bad disease), KII, male, 45 years from catholic religion.***<br><br>***"Kala-azar ni ugonjwa unaosumbua watu maskini" (kala-azar is a disease for the poor). KII, female, 48years*** |
| *Knowledge on leishmaniases* | Termite mounds adversely mentioned to be the breeding sites of sandflies. The interviewees unanimously agreed sand fly bite is the cause of leishmaniases.<br><br>**"*Those who's houses are near to termite hills are mostly affected by leishmaniases" KII, male from Loboi location, 47 years.***<br><br>***"Sand fly huishi ndani ya shimo ya mchwa" Sand fly live in termite moulds. KII, female, 31 years***<br><br>Swollen stomach and fever were the adversely mentioned signs and symptoms of kala-azar.<br><br>**"*Wagonjwa wako na shida nyingi kama tumbo kubwa, hawana hamu ya chakula na joto mwilini*" (*Patients complain of many problems like swollen abdomen, fever and lack of appetite) KII, male, 42 years.***<br><br>**"*Majority of the patients normally present themselves when they experience symptom of swollen abdomen" KII, female nurse, 35*** |

| | |
|---|---|
| | ***years.*** |
| *Practices towards leishmaniases* | • Most people use mosquito nets to prevent sand fly bites. Although are not impregnated.<br>• "Dawa ya kienyeji ndio ilikua inatumika kitambo kutibu kalaazar" (Herbal medicine was commonly used to treat kala azar in the past).<br>• ***"Most people use mosquito nets to prevent sand fly bites. Although are not impregnated." KII, male, 52 years from Marigat location*** |
| *Costs associated to leishmaniases cases* | Treatment, diagnosis, transport are the major costs of leishmaniases.<br>"Tunauza mbuzi na kufanya michango kujitibu hata wengine huendea loans" (We sell goats and do fundraising to get money for treatment, even others take loans). Female interviewee from Loboi location.<br>A lot of time is spent during hospital admission to get kalaazar treatment injection which are twenty-one.<br>***"Tunauza mbuzi na kufanya michango kujitibu hata wengine huendea loans" (We sell goats and do fundraising to get money for treatment, even others take loans). Female, 35 years, interviewee from Loboi location.***<br>***"Treatment, diagnosis, transport are the major costs of leishmaniases." KII, Male, 29 years.***<br>***"Kalaazar is regarded kama ni rahana kwa family" (kala-azar is curse in the family). KII, Male 37 years.*** |

# CHAPTER FIVE

# DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 DISCUSSION

### 5.1.1 Socio-Demographic characteristics of the participants

In this study, household heads were selected as the study subjects because they have the decision-making capacity for the household. In the traditional African social context, in most situations the eldest male member of the household holds takes this responsibility of the head of the family. To obtain household and community participation to make a disease control program successful, understanding of such local customs and traditions is crucial (Alemu *et al.*, 2013).

In this study the average age of the respondents was 44.5 years, with a wide variation of 18 years (youngest) and 93 (oldest) and age group 28-47 years having almost half of the respondents 48.89%. The results are almost similar to what was reported in the studies in Ethiopia with the age group of 26-42 years forming 55.8% of the respondents and mean age being 41.5years (Alemu *et al.*, 2013). More than a half of the respondents 60% reported having at least a leishmaniases case in the household, the result was lower with that reported in Nepal India at 82%. This is an indication of variation in endemicity and prevalence of this leishmaniases in the area as supported by other studies (Bantie *et al.*, 2014) however, leishmaniases are a big public health problem in Marigat, and there is need for control.

Regarding educational levels, the majority (28.15%) are illiterate (those who have had no education at all) with 26.17% having not completed primary education. The percentage of the level of illiteracy in Marigat is high compared to study done in Iran which showed 16% (Sakari *et al.*, 2014). The variability between studies might be due to

socioeconomic status of the different areas and the fact that they are pastoralists community. However, the level of illiteracy is almost similar with the reports from Ethiopia which has 34.1% of respondents who do not know how to read and write with only 12.1% who have attained secondary education (Alemu *et al.*, 2013). Distribution across gender indicated that females are less educated than males and this is typical of pastoralist communities (Alemu *et al.,* 2013). Since the highest proportion of household heads interviewed had no basic education, the low level of education and illiteracy seemed to be part of the contributors to leishmaniases infection. Persons with higher education (secondary and post sec education) seem to have better knowledge on leishmaniases and occupation hence high level of income and better housing in the community which helps them to avoid infections. Within endemic areas such as Marigat Sub County, increased infection risk is mediated through poor housing conditions and environmental sanitation, lack of personal protective measures and economically driven migration and employment that bring non-immune hosts into contact with infected sand flies.

This study found the majority of the respondents lived in mud plastered grass thatched and stick walled grass thatched because better housing is out of reach. The nature of housing for most residents encourages the breeding of vectors in the mud cracks and also access and hide in the houses to bite when the human host rests at night. These findings suggest the poor living condition of study villages which may contribute to the high burden of leishmaniases in Marigat. The similar observations were made in Brazil (Jorge *et al*., 2006). Due to the low income the families are forced to live either in stick walled house and grass thatched and mud plastered grass thatched houses which provide the good breeding areas for the house flies and the opening for them to bite. Consistent with this finding, the study by Singh *et al.*, (2010) reported that low socio-economic status was found to be associated with Visceral leishmaniasis. Low income can be associated with poor housing conditions, poor environmental hygienic conditions, poor nutritional status and increased risk of infections (WHO 2014; Bantie *et al.,* 2014*).*

In this study, although knowledge of kala-azar is high, more emphasis should be laid on putting the knowledge into practices through enhanced health education regarding the predisposing factors of leishmaniases. It is documented by various studies that health education could offer promise of influencing individuals to adopt preventive measures (Siddiqui *et al.*, 2010). Majority of the key informant interview respondents were having secondary education and above.

### 5.1.2 Knowledge on Leishmaniases

Understanding the level of knowledge of the community towards kala-azar can be the key to the success in the planning of an elimination programme in Kenya. In the 21st century the public health fraternity has laid down a lot of emphasis towards the active participation of individuals and communities in successful disease prevention and control programmes. This is evident in studies done on malaria and onchocerciasis that have been conducted to assess the knowledge, attitude and practices of residents towards diseases (Sharma *et al.*, 2003 ; Dimomfu *et al.*, 2007).

In the present study more than half of the respondents (64.7%) in the study knew at least more than one sign and symptoms of the disease. The findings were reinforced by the KII respondents who reported swollen abdomen, loss of appetite and fever as the major signs and symptoms exhibited by the leishmaniases cases.

This confirms the endemicity of this disease in Marigat and favorable knowledge on the progression of the disease as reported in other studies (Siddiqui *et al*, 2010; Mondal *et al*., 2009). The majority of the participants 85.2% knew that the vector of kala-azar is the biting fly. This was in agreement with other previous studies in India (Singh *et al.*, 2006). A similar report was made by Alemu *et al*., (2013), with the result reported from rural communities of Addis Zemen, North-west Ethiopia who reported that about 82.5% of the respondents were aware of at least one VL clinical sign and 68% of them were aware of VL transmission through a sand fly (Alemu *et al.*, 2013). However, the present

finding is higher than (Siddiqui *et al,* 2010) whom reports from rural areas of India where 32% of the respondents were aware of any clinical sign and only 4% of them were aware that, VL is transmitted by sand flies. Such variability of knowledge among the various studies could be associated with the difference in the timing of the study, levels of illiteracy, setting of the study and public awareness activities conducted in the areas.

It is important for the community to know the breeding sites and habitat as a preventive measure to reduce the chance of vector-human contact. The current study reported 76.5% termite moulds are the breeding sites for the sand fly which is a good number with the knowledge followed by those saying animal burrows. The qualitative data from the KII support the same whereby almost everyone reported termite mounds as the breeding sites.

This agrees with the observation and previous reports from the community (Ngure *et al.,* 2015). Households living in close proximity to the termite hills in Marigat were consequently more prone to leishmaniases infections. The findings also are similar with study reports in India where 60% reported termite hills and 40% animal sheds (Mondal *et al.,* 2009).

Most of respondents do not clearly know the seasons kala-azar is most prevalent with 45.7% reporting during the dry season while 4.4% don't know. Those who indicated as being the rain season were 34.3%. Medical records indicate that sand fly bite at all seasons or times and any time of day but mostly at dawn. (Desjeux, 2001). The biting times of sand flies lie between late evening 6.30 p.m. to 6.30 a.m. at dawn according to the study at Uganda and Sudan (MSF, 2006; Rijal *et al.,* 2006). The varying responses on the season when kala-azar is prevalent are consistence with other similar studies (Hailu *et al.,* 2005; Siddiqui *et al.,* 2010).

With regard to source of information about leishmaniases 63% of the respondents said they got information from health Centre when they were sick themselves or when caring for their household members. This is possible because there is Kimalel health Centre in the vicinity of Marigat. The Centre was opened by KEMRI to manage cases of leishmaniases. Twenty percent got information from person to person who suffers or is suspected to have kala-azar and this way it will strengthen the social links among the residents. Fifty-one percent got from community health workers which is a good indication the government is employing health personnel to cater for the one of the neglected disease in Marigat. About 43% said they got information from either public barazas when researchers who carry the research in the area arrange for barazas to educate them, and less than 12% got from church leaders, teachers and internet. The KII respondents reported the major source of information is the hospital sensitization during visits and treatment and person to person who have ever been infected. This finding was different from other studies done in the rural area of India where the report indicated important sources of information about kala-azar were friends, relatives, and neighbors 60.6%, followed by health personnel 20.5%. The role of mass media was found to be limited, with newspapers 8.3%, radio 6.2%, magazines 1.8% and television 0.8%. Similarly, the role of school to provide information was also limited to 1.8% (Siddiqui *et al*, 2010). The current study shows that internet, teachers, church leaders, mass media such as television, radio, magazine and newspapers are not a very important source of information for leishmaniases in Marigat. One of the possible explanation for that could be the poor information, education and communication (IEC) activities for kala-azar through some sources including mass media. These shows that for the successful control of leishmaniases in Marigat the above members and stakeholders should be encouraged to take it upon themselves to share the important information on leishmaniases with the community of Marigat.

The majority of respondents 56.3% have not been informed on identification, prevention and control of leishmaniases. There is need for more to be informed for effective

implementation of the control and prevention mechanism. Knowledge, attitudes and practices (KAP) studies on malaria suggest that education has a significant role to play in enhancing knowledge (Panda *et al.*, 2000; Sharma *et al.*, 2001; Sharma *et al.*, 2003) thus more education should be done regarding to leishmaniases . It is however documented for infectious diseases like Tuberculosis and malaria that low levels of knowledge and awareness apparently influence initial health care seeking behavior after the onset of symptoms since many people like trying other treatment avenues before visiting the hospitals. (Enwuru *et al.*, 2002; Matta *et al.*, 2004). Low levels of knowledge on leishmaniases may influence people to seek other treatment like herbal and traditional medicine and they will revert to hospital treatment when the disease has advanced greatly.

### 5.1.3 Preventive practices towards the spread of leishmaniases

Due to the perceived seriousness of leishmaniases, the residents of Marigat Sub County employ various leishmaniases preventive practices to prevent them from being infected with kala-azar. Most respondents 85.2% in the study employed the use of bed nets as their preferred method of prevention. This concur with KII who reported many use mosquito nets to prevent themselves from the sand fly bite although they are not impregnated. The nets employed have big holes which the sandflies can pass through but are effective against the mosquitoes. It's only the impregnated which can keep away the sandflies thus effective control of the vector from biting the host.

This result is almost the same with what was reported in Addis-zemen town in northwest Ethiopia where a large majority (93.7%) of the respondents used bed nets. However, the result is higher than those from rural areas of Nepal; where 58% of villagers in Titaria and 36.8% in Haraincha used bed nets (Koirala *et al.*, 1998), and rural areas in Bihar state India 23.9% (Singh *et al.*, 2006). Observed differences in bed net use might be due to the fact that the Kenya government supplies bed nets for the control and prevention of malaria or the socioeconomic status of the people. Bed net use is one of the prevention

methods of leishmaniases (WHO, 2007). Semi field experiments on the ability of various bed net brands to prevent against sand fly bites in Marigat are in agreement with the practice (Kasili *et al,* 2010) though limitations to access of bed nets need to be addressed (Kasili and Mwangangi., 2016).

The other practices employed included indoor spraying with insecticides which was embraced by a small percentage (16.3%) since the spray need reapplication and too expensive to maintain. This finding is similar with the result from India which indicated 17% of respondents had performed an insecticide spray activity (Siddiqui, *et al.*, 2010). The findings show that the knowledge on preventive practices against leishmaniases is considerably good, although some respondents reporting to be observing personal hygiene and use purified water to prevent kala-azar infections show otherwise. Residents have considerable understanding on the control practices for the leishmaniases hence need for incorporation of community participation in control strategies. Public investment in treatment and control would decrease leishmaniases disease burden and help to alleviate poverty ( Jorge *et al*., 2006). Although the household heads reported the use of different methods in preventing the spread of leishmaniases, not all members were able to afford these tools due to the poverty. This leaves some members of the household exposed to danger of leishmaniases infection. Therefore, low income people, though may have knowledge, are not economically able to protect themselves from the disease that is reported to hit the poorest among the poor in the communities (Desjeux, 2001; WHO, 2014).

The respondents reported that their preferred method of treatment of kala-azar patients was by seeking doctors' advice at 92.1%. The use of herbal medicine was second most preferred method of treatment by the community with (3.7%). The findings concur with the study on awareness about kala-azar disease and related preventive attitudes and practices in India which showed that government hospitals and health Centre's were the first choice of treatment by 73.6% of respondents if a suspected case of kala-azar

occurred in the household (Siddiqui *et al*., 2010). This shows that the community has a good perception regarding to the treatment of leishmaniases. If the government invests on the diagnosis and treatment of leishmaniases in the government facilities the infected patients will receive treatment on time and avert complication resulting from delayed treatment and prevent the spread to uninfected community members.

### 5.1.4. Attitudes of the respondents towards leishmaniases

The main reason for seeking treatment is the fear of death followed by the knowledge of the negative impact of kala-azar. The findings were similar with the studies in India (Siddiqui *et al.*, 2010). The current study shows that some respondents believe there is stigma and discrimination associated with leishmaniases. The findings are in agreement with Boelaert *et al*. (2009) on socioeconomic aspects of neglected diseases that leishmaniases pose stigma, psychological stress and discrimination in the patients in the society. Although the disease has been endemic in Marigat for a long time, some people still believe in the discrimination of leishmaniases patients which is a negative setback. Isolation of patients may lead to psychological stress in the patients. There is need for the stakeholders to intervene and educate the community against this negative social practice of discriminating and stigmatizing patients. The negative attitudes towards leishmaniases have been observed in many studies. In Paras, respondents with the highest incidence of disease felt powerless in the face of dire emotional and economic consequences, and many equated the leishmaniases diagnosis with a death sentence (Ahluwalia *et al.*, 2003).

The current study showed that majority (82.7%) of the respondents have perception that kala-azar was more serious than malaria. The same sentiments were recorded by the KII that kalaazar is a serious and dangerous infection. The respondent said, “kala-azar ni ugonjwa mbaya sana” (kala-azar is an extremely bad disease).

This perception needs to be taken seriously in leishmaniases prevention and treatment interventions since malaria is reported to cause high morbidity and mortality in Kenya

(K'Oyugi, 2015). The views that leishmaniases as more serious than malaria mean leishmaniases have perhaps a more negative effect in the community in terms of morbidity and mortality and should be given a lot of attention and more resources need to be channeled in the disease diagnosis, treatment and prevention of leishmaniases in the community. The attitude on seriousness of kala-azar concurs with other studies in India where almost all respondents considered kala-azar to be a serious condition that "drained" family resources, but could be controlled by community efforts (Siddiqui *et al.*, 2010; Mondal *et al.*, 2009). The young boys were reported to be the most affected with leishmaniases at 74.6% which is contrary with the studies in India where most feel all age groups are at risk (Mondal *et al.*, 2009). The respondents said the reason perhaps is because the young boys and sometimes young girls they play outside the houses up to late evening without protections like repellants when the vectors tend to bite most. Some respondents reported that kala-azar is a curse in the family which was echoed by KII respondent. Similarly, it was reported to be a disease for the poor. These attitudes show the extreme dangers the leishmaniases have caused in the households.

### 5.1.5 Leishmaniases associated costs

Majority of households' expenditure per month was between Kenya Shillings 1001-5000 (U.S. $10-50). This income expenditure is less than two dollars per day. The current study showed that mean total direct medical expenditure due to Kala azar in Marigat Sub County was Kshs 35983.77(U.S. $359) per patient. This is way beyond the affordability of most of the residents. The estimates of the costs incurred by the household per case of leishmaniases was higher than the estimates given by other researchers from Nepal India which varies from U.S. $113.60 (Rijal *et al*., 2006) to U.S. $232.10 (Adhikari *et al.*, 2009). The high costs in Kenya are as a result of high transport costs used due to the long distance covered to the hospital by patients and their caretakers for medication. The high costs of drugs seemed to be the contributors to the high households' costs incurred. Also being semi-arid area, the costs of foods for special diet required by the patient during recuperation is high. Leishmaniases make the situation even worse by sinking most of the households to extreme poverty since

management of leishmaniases can be catastrophic to the households (Adhikari *et al.,* 2009).

The greatest cost is the one of buying the drugs for treatment. The cost of drugs from the hospital was estimated at Kshs 11,116.30 (U.S. $111.2). This estimate is slightly higher than the U.S. $100 reported by Boelaert *et al.,* (2010). The cost of buying both therapeutic drugs and nutritive supplements from pharmaceutical stores outside the hospital was estimated at Kshs 5299.54 (U.S. $53). The cost of buying the drugs when they are out of stock in the hospital is almost three times higher than the official price. This was consistent with study carried out on economic impact of leishmaniasis in Bangladesh (Sharma *et al.,* 2006). There is scant investment in the development of new drugs for leishmaniases, and the most effective treatments are often unavailable or unaffordable for patients in the endemic areas (Ahluwalia *et al.*, 2003; Kumar *et al.*, 2004), hence the high price especially when they are not subsidized by the government. This implies there are high costs of treatment and management of leishmaniases by the households of Marigat.

Studies from Nepal in India show that people with leishmaniases may be ill for months while they are trying to rule out common diseases that are less expensive to treat. Household heads may also prioritize care within the household, generally seeking hospital care for children and men before adult women, who had significantly longer duration of illness than men (Jorge *et al*., 2006). Delays in appropriate leishmaniases diagnosis and treatment increase the risk of complications and death, and augment the reservoir for further transmission. Adult women are particularly vulnerable to mortality and prolonged morbidity from possibly due to poorer underlying nutritional status from menstruation, childbearing and lactation, as well as treatment delays ( Jorge *et al*., 2006).

The mean economic time lost due to sickness by the patient was 9 weeks and that by caretaker was 37 days. The patient used on average 25 days visiting the health Centre for medication. The findings were almost similar with studies by Boelaert *et al*., (2010) that

patients take on average 40 days seeking treatment. The households of infected patient in Marigat division were incurring substantial costs to seek and receive medical treatment. Patients visit several health care providers where they pay for inefficient treatments thus subsequently depleting the little savings they have. When they are eventually diagnosed with leishmaniases for appropriate treatment, more time is spent on travelling to Kimalel health Centre which is the widely known Centre in Marigat for leishmaniases treatment. These days could otherwise be spent on income generating activities. Sometimes school going children are forced to care for their family members and this affects the education of the children. These deprives them their future and continues the cycle of poverty in the households and the community at large.

Studies have shown that leishmaniases are neglected tropical diseases that have strong but complex links with poverty (Jorge *et al*., 2006). Leishmaniases affect the poorest segments of rural populations in southern Asia, eastern Africa, and Brazil (Ahluwalia *et al.*, 2003). Therefore, due to this high cost of treatment, some people in Marigat tend to consult the cheaper traditional healers. Since farmers in Marigat sub county form the largest group in terms of occupation, the activity could be used to change this poverty pattern. However meaningful farming is practiced only in small part of the sub county that is supplied with water for irrigation.

The total cost of treating a leishmaniasis patient was five times more than what most households were spending monthly. The diseases therefore cause a huge financial burden to the affected households whenever they strike. In fact, most households are forced to take a loan with high interest rates, others do borrow which leaves them with debts or sell assets such as livestock to cover the costs of treatment. These was supported by one KII respondent who said *"We sell goats and do fundraising to get money for treatment, even others take loans"*. This pattern has also been observed in Bangladesh (Sharma *et al.*, 2006) and Nepal (Rijal *et al*., 2006).

### 5.1.6 Perceived risk factors in relation to leishmaniases

This study has revealed statistically significant associations between education level, occupation, type of housing and the level of income have a significant contribution to exposure or lack of exposure to leishmaniases infection. The type of house condition was associated with increase in leishmaniases infection according to the current study. This finding is consistent with other studies which indicated that housing condition is one of the most important factors for visceral leishmaniasis. This pattern has been observed in a study in India which showed that house made of mud wall was statistically significantly associated with visceral leishmaniasis infection (Kesari *et al.,* 2010). The possible reason for this could be due to the fact that grass thatched, stick walls and mud walls are most likely to be cracked and favorable for entrance and breeding of the sand fly, the kala-azar vector. Most houses have been exposing the households to the vector biting and efforts should put by all stakeholders to avert the situation.

From the bivariate analysis, the use of bed nets and installation of wire mesh were perceived not to be the good control measures. These results are in contradiction to the studies conducted in India (Kesari *et al.,* 2010). The reason is linked to non-compliance to proper net use, use of non-impregnated nets and improper installation of lack of maintenance of window mesh.

The Pearson's Chi square test shows use of insecticides, embracing personal hygiene, proper waste disposal, use of purified water, and application of repellants were shown to be good control measures against leishmaniases. These is good in case one wants to use preventive measures for leishmaniases has a wide variety to choose depending an individual affordability. The spray of insecticides is the most effective method although many people don't embrace it since it requires reapplication (Kesari *et al.*, 2010). The level of education and type of occupation are not perceived risk factors to leishmaniases since they did not show any significant association with having the leishmaniases infection. The studies were in agreement with other studies (Siddiqui *et al.*, 2010).

The study identified the nearness of the homestead to the animal shed as the risk factor to kala-azar infection. For every one-meter increase of distance of the animal shed from the household one is 1.5% less likely to suffer from kala-azar. The study is confirming the study done in India (Kesari *et al.,* 2010; Sharma *et al.,* 2009). The reason for these might be the animal sheds provide the good breeding sites and the vectors are attracted by the animals from far.

The household who live in stick-walled house and grass thatched were 22.7% times more likely to suffer from kala-azar followed by those who live in mud plastered as compared to those households who live in corrugated iron sheet wall and roof. The type of the house one lives is a predisposing risk to kala-azar. The study reveals what the previous studies have shown that mud plastered houses contribute to the kala-azar cases since they form breeding site and entrances for the vector (Kesari *et al*., 2010). There is need for residents to change their houses to the corrugated iron sheet wall and roof to avoid exposure to the vectors.

## 5.2 CONCLUSIONS

- The study shows there are knowledge gaps existing at community level which relate to mode of transmission, seasons kala-azar is prevalent, signs and symptoms of kala-azar and prevention and control strategies. This is an indication of the gaps in public education and communication efforts by the public health systems.

- The community has an attitude that kala-azar is more serious than malaria because of its endemicity and financial burden associated with it. Considerably a good number of the community have positive attitude to the leishmaniases victims with majority saying the patients do not need isolation.

- The fear of death was the main reason many people were seeking medication. The fear is as a result of the destruction the disease has caused among the residents. It was encouraging that the community knows the disease is curable.

- The housing structures, mud plastered and grass thatched and stick walled and grass thatched favored the breeding of the sand fly vectors and the entry of the vectors to bite while the host is a sleep at night. The use of insecticide and proper waste disposal proved to be effective preventive methods for leishmaniases.

- The leishmaniases costs include the direct and indirect costs. The costs are hospital and non-hospital. The costs of kala-azar management are much beyond the affordability of poorest households in Marigat which force them to go for loans and organize for fundraisings.

- Nearness of homestead to animal shed whereby the animals attracted the sand fly and type of the house one lives which encourage entry of sand fly were perceived predisposing risk factors of leishmaniases.

## 5.3 RECOMMENDATIONS

In view of the study findings, the following recommendations are made:

1. To organize public sensitization using the barazas, media and other available channels in the Sub County and the county at large. Similarly, promotion of public education on transmission modes, signs and symptoms of kala-azar should be done so that the diseases are detected and identified on time and the patients put on proper medication.

2. There is need to improve access to affordable leishmaniases diagnosis and treatment in Marigat Sub county and neighboring communities through better coordination of available resources provided by the government and other

organizations. Also there is need for policy change to provide free treatment or subsidies for all leishmaniases cases in the country should be done like the case for malaria.

3. Poverty alleviation programmes should be intensified and preferential especially in favour of the poorest in the community since the poor people are affected disproportionately when infected. The government should train the community on how to do farming through irrigation and supply livestock to the poor families to boost their income.

4. The government together with other stakeholders should plan to help the community to replace the houses which favour the bite and the breeding of the vectors in the Marigat community. Especially the simple and affordable houses which do not predispose to bites. As well sensitize the community on the factors associated with leishmaniases.

## 5.4 RECOMMENDATIONS FOR FURTHER RESEARCH

It is recommended that a longitudinal study be conducted to include more households over a longer time period so as to provide a clearer picture of the situation in the country. The further research can include and assess the extent of the impact of the disease in those affected by malnutrition and immunodeficiency diseases.

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# APPENDICES

## Appendix I: Consent Form

Informed consent Explanation & Consent form for study participants.

Hello. My name is ERIC GISEGE OKINDO. I am a student of Master of Science in Public Health at Jomo Kenyatta University of Agriculture and Technology (ITROMID-KEMRI). I am currently conducting a research on "Assessment of Knowledge, Attitudes, Practices, Perceptions and Financial Costs Associated with Leishmaniases in Marigat Sub -County, Baringo County."

**Purpose**

This study seeks to determine the community levels of knowledge, attitude, Practices employed towards the disease, perceptions of the household heads and financial costs towards leishmaniases

**Participation**

The study involves individuals with cutaneous or visceral leishmaniases and those without the disease and you are required to complete a questionnaire.

**Voluntarism**

Participation in this study is completely voluntary. If you decide not to participate in this study, there is no penalty for such decision. If you decide to participate, you are free to answer questions that you are comfortable with.

**Risks**

There are no major risks for participating in this study since you are needed to fill the questionnaire and the information will be confidential.

**Benefits**

The participants will have indirect benefits of increased understanding of the disease. The information will be indirectly important to the county government to help in planning the interventions and how to lessen the burden of treatment on the patients.

**Confidentiality**

The responses you provide will be kept confidential and anonymous. Names will not appear in the questioners. Study participants will just be assigned codes. The data collected for this study is only for education and research purposes. In case of publications, no participant's name will appear on the paper. Confidentiality of the responses will therefore be strictly adhered to.

**Contact**

If you have any questions and/or concerns or complaints about the study, you are free to contact me on the mobile No. (+254) 0725 684 346), the Secretary, KEMRI Scientific Steering Committee at Kenya Medical Research Institute (KEMRI) – (Tel. +254 (0)20 2713349, the Secretary, National Ethical Review Committee - Tel. +254 (0)20 2722541, 0722 205 901, 0733 400 003 or P. O. Box 54840 00200 Nairobi) ),Kenyatta National Hospital/ University Of Nairobi –Ethical Review Committee Tel: 726300-9, Fax 725272, Telegrams: MEDSUP or BOX 20723-00202 NAIROBI. Or The Supervisor, PROF.HELEN LYDIAH KUTIMA 0722-251195

**ANY QUESTIONS**

If you have any questions regarding what I have explained to you, you are free to ask.

Consent form for study participants.

I, …….. (Names). Have read and/or have been explained to what the study entails and I have also had a chance to ask questions, and I hereby agree/ not agree to participate in the study.

Study Participant: _____Date: _____

Signature/ Thumb prints

Principal Investigator _____ Date: _____

Signature

## Appendix II: Questionnaire

### Section A: Social Demographic Details of Respondents

1) Year of Birth _____

2) Sex: Male [ ] Female[ ]

3) Place of residence:

| Division | Location | Sub-location | Village |
|---|---|---|---|
| | | | |

4) Marital status: Single [ ] Married[ ] Divorced[ ] Widowed[ ]

5) Occupation: Farmer [ ] Teacher[ ] Health worker[ ] Administrator[ ] Other[ ] other (specify) _____

6) Monthly health related expenditure in Kshs:

1-1000 [ ] 1001-5000[ ] 5001-10000[ ] 10001-15000[ ] 15001-35000[ ]

7) Type of house:

Mud plastered and grass thatched [ ] Mud plastered and corrugated iron roof [ ] Timber house and corrugated iron roof [ ] Corrugated iron sheet wall and roof[ ] Stick-walled house and grass thatched [ ] Stone walled house[ ] Other [ ] (specify) _____

8) Household size

| Total | Number of children (between Zero years to 18years) | Number of adults (above 18 years) |
|---|---|---|
| | | |

9) Complete the table below on household head level of education:

| Tick as appropriate | | | | |
|---|---|---|---|---|
| None | Primary not completed | Primary completed | Secondary education | Post-secondary education |
| | | | | |

**Section B: Knowledge of Leishmaniases (Commonly referred as kala-azar by locals) diseases**

10) Have you heard about kala azar? Yes [ ] No [ ]

11) Have you suffered from kala azar? Yes [ ] No [ ]

12) Is there anybody in your household who have suffered from kalazar in the last 5years? Yes [ ] No [ ]

13) If yes, how many people in your household have suffered from kala azar in the last 10 years? __

14) If yes, did they go to hospital? Yes[ ] No[ ] I don't know[ ]

15) If they were treated, did they recover? Yes [ ] No[ ] I don't know[ ]

16) If somebody suffered from kala azar in your household, is there anybody who died of it? Yes[ ] No[ ]

17) If they did not get treated, what were the reasons?

Drugs not available [ ]Drugs too expensive [ ]No space in the wards[ ] Doctor not available [ ]other (specify) _____

18) Do you think kala azar can be completely cured? Yes[ ] No[ ]

19) What are the signs and symptoms of kala azar? (tick all that apply)

| Fever | Loss of appetite | Swollen abdomen | Pain in the abdomen | Headache | Change of complexion | General weakness | Loss of sight | Madness | Other |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

Other (specify)_____

20) Where do you get information about kala azar? (tick as many as may apply)

| Health centres | Community Health Workers | Public barazas | Person to person | Media e.g. radio, newspapers | Church leaders | Teachers | Internet | Othe |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

Other (specify) _____

21) How do you prevent kala azar? (tick all that apply)

| Bed nets | Insecticides | Personal hygiene | Proper waste disposal | Installing window mesh | Using sterilized water | Using repellants | Praying against kala- azar | Other |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

Other (specify) _____

22) What causes kala azar?

Consuming dirty water [ ] Witchcraft [ ] Curse [ ] Poverty [ ] Bite by an insect [ ] Other (specify) _____

23) If insect, which one? (tick all that apply)

Mosquito [ ] Sand fly [ ] Bed bugs [ ] Lice [ ] Termites[ ] Other (specify)_____

24) Where do sand flies breed? (tick as many as may apply)

| In stagnant water | Termite mounds | Animal burrows | Livestock sheds | Cracks and crevices | Decaying trees | Other |
|---|---|---|---|---|---|---|
| | | | | | | |

Other (specify) _____

25) When do sand flies bite the most

Morning [ ] Afternoon [ ] Evening [ ] Night [ ]

26) What is the distance from your house to the animal sheds? _____ meters

27) In which of the following seasons is Kala azar most prevalent?

At the beginning of the rainy season [ ] At the peak of the rainy season [ ]
At the end of the rainy season[ ] During the dry season [ ] I don't know[ ]

28) Can you distinguish kala azar from malaria? Yes[ ] No[ ]

29) Do you know the closest health Centre that specializes in the treatment of kala-azar? Yes[ ] No[ ]

30) Have you ever been informed on the identification, prevention and control of Kala azar? Yes[ ] No[ ]

31) If you have been trained on Kala azar, who trained you?

Community health worker [ ] Media[ ] Teachers[ ] Doctors and nurses [ ]
Researchers[ ] NGOs [ ] Other [ ] (specify)_____

**Section C: Attitude**

32) Is there any stigma and discrimination of people suffering from kala azar?

Yes[ ] No[ ] I don't know[ ]

33) Does a patient suffering from Kala azar need isolation? Yes[ ] No[ ]

34) Choose one of the following statements;

a) Kala azar is more serious than malaria [ ]

b) Malaria is more serious than Kala azar [ ]

c) Malaria and Kala azar are equally serious [ ]

d) I don't know [ ]

35) What would be your reaction if you realized that you are infected with kala azar? I would be scared [ ] Seek immediate doctors' advice [ ] Pray to God[ ] Look for herbal medicine [ ] Other [ ] (specify) _____

36) If you have a patient suffering from kala azar how will you care for them?

I would be scared[ ]Seek immediate doctors' advice[ ]Pray to God[ ] Look for herbal medicine[ ]Isolate them [ ]Other (specify)_____

37) Who is more at risk of contracting Kala azar?

| Young boys | Young girls | Female youths | Male youths | Adult men | Adult female |
|---|---|---|---|---|---|
| | | | | | |

**Section D: Practice**

38) What is the most frequent reason for seeking Kala azar treatment?

Fear of death [ ] Pain [ ] Disability[ ] Knowledge of the negative impact of the disease[ ]Embarrassment [ ]Other [ ] (specify) _____

39) Which foods are recommended for a patient suffering from kala azar? _____

40) Do you use the bed nets? Yes [ ] No [ ]

41) Do any of your household members sleep outdoors? Yes [ ] No [ ]

42) Do any of your household members spend time outside the house in the evenings before they go to bed? Yes [ ] No [ ]

43) Before the health centres came up, how did people treat kala azar? _____

44) What have you done to protect yourself from kala azar? (tick any that apply)

| I use bed-nets | I spray my house with insecticides | I observe personal hygiene | I practice proper waste disposal | I have installed a window mesh | I use sterilized water | I apply repellants | Other |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Other (specify) _____

**Section E: Assessing the economic impact of the disease**

45) How much does the complete treatment for the disease cost? Ksh _____
Treatment is free [ ] I don't know [ ]

46) If a household member suffered from kala azar, what would be the source of money for the treatment? Personal funds[ ] Relatives[ ] Fund raising [ ] Loan [ ] Treatment is Free [ ]Other (specify) _____

47) For somebody who has the disease how long are they hospitalized? _____days I don't know [ ]

48) How long does it take for a treated person to resume their normal duties? _____weeks I don't know [ ]

49) How much money did you use to buy drugs and nutritional supplements if any (drugs from pharm and hospital combined) Ksh.....?

50) How much money did you use for doing laboratory tests?.....

51) How much money did you use for consultation in the hospital?.....

52) If you hired a vehicle to take the patient (self) to hospital, how much did it cost you or family? Ksh _____

53) If you used public transport to take the patient (self) to hospital, how much did it cost you or family? Ksh.....

54) How much did it cost the caretaker of the patient to travel to the hospital? Kshs.....

55) If you were caretaker how much money did you use to buy your food in the hospital kshs.....

56) While you (your patient) were recuperating, how much money did you use in buying special food for their quick recovery? Ksh _____

57) How many days did you visit your patient while still in the hospital?.....days.

58) How many days did you take care for your patient until she was now able to care for himself or herself?

59) How much time did you spend travelling to seek for treatment as well as follow up .....days

60) While you (your patient) suffered from the disease, how long were you (your patient) unable to carry out your (their) normal duties? _____weeks

61) If it is a relative who suffered from the disease, how many days were you unable to carry out your duties while you took care of your patient? _____days

62) As a result of your (your relative's) sickness, would you provide some estimate of the economic loss that you suffered

Under Ksh 1,000 [ ] Ksh 1,100 to 5,000[ ] Ksh 5,100 to 10,000 [ ]

Ksh 10,100 to 20,000[ ] Over 20,000[ ]

## Appendix III: Interview guides

### Section A: Knowledge

1. Do the community members know the signs and symptoms in symptoms in regards kala-zar?
2. Which season is kala-azar most prevalent?

### Section B: Attitude

3. How is a patient suffering from kala-azar treated by the community?
4. What are the most frequent reasons why patients seek for kala-azar treatment?
5. What is your attitude to leishmaniases?

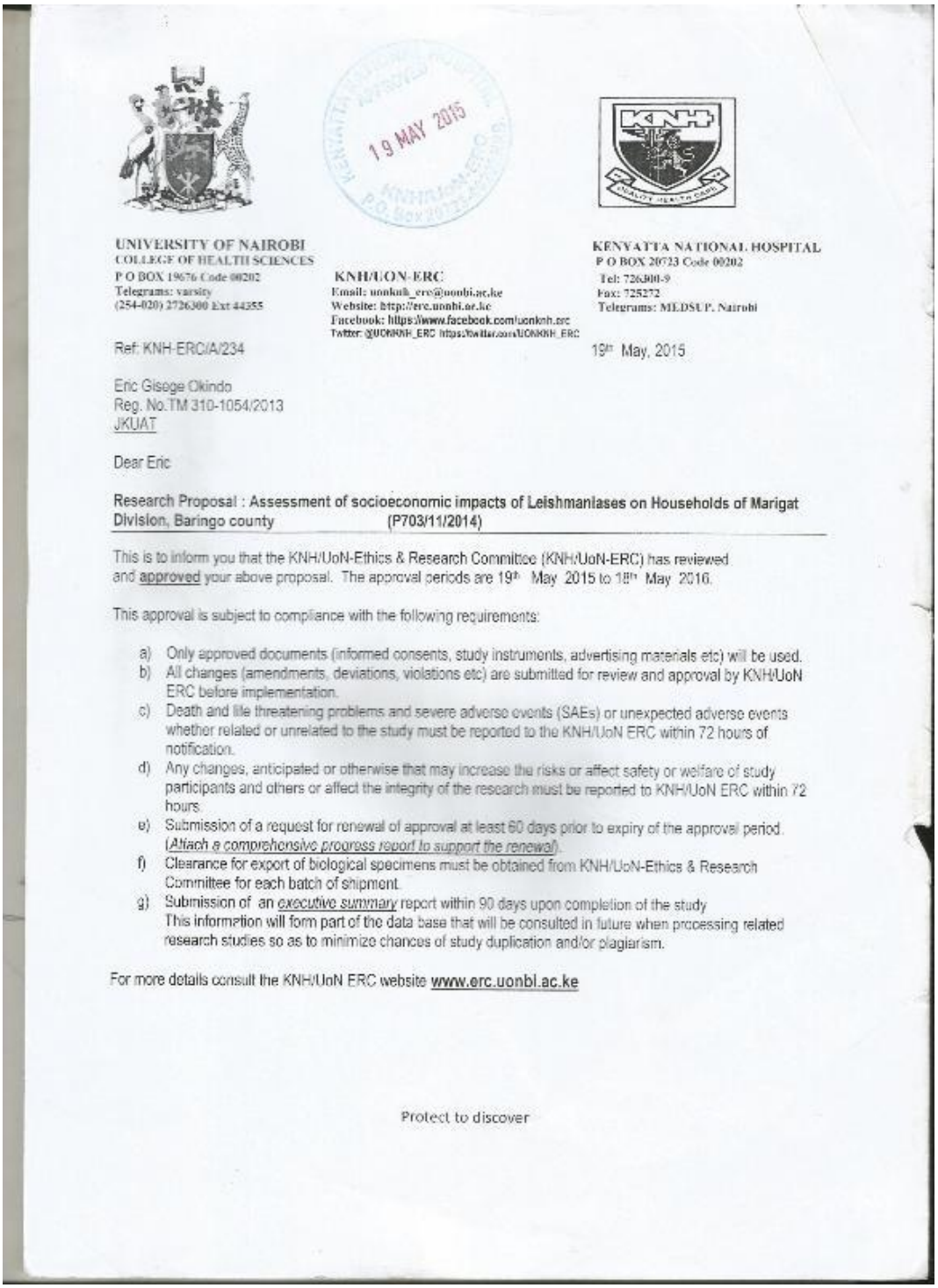
### Section C: Practices

6. How do people prevent kala azar in your community?
7. what are the methods most preferred for kala-azar treatment in the community?
8. What do most people do to protect themselves from kala-azar?

### Section D: Assessing the costs of the disease

9. What are the costs associated with leishmaniases?
10. How are the schools going children affected by leishmaniases?
11. What is the major source of money for the treatment of patients?
12. How much does it cost to buy drugs from chemists outside the hospital?
13. How long are the patients unable to carry out their normal duties?

## Appendix IV: ERC research approval



19 MAY 2015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KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
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Ref: KNH-ERC/A/234

19th May, 2015

Eric Gisege Okindo
Reg. No.TM 310-1054/2013
JKUAT

Dear Eric

**Research Proposal : Assessment of socioeconomic impacts of Leishmaniases on Households of Marigat Division, Baringo county (P703/11/2014)**

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and approved your above proposal. The approval periods are 19th May 2015 to 18th May 2016.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.erc.uonbi.ac.ke**

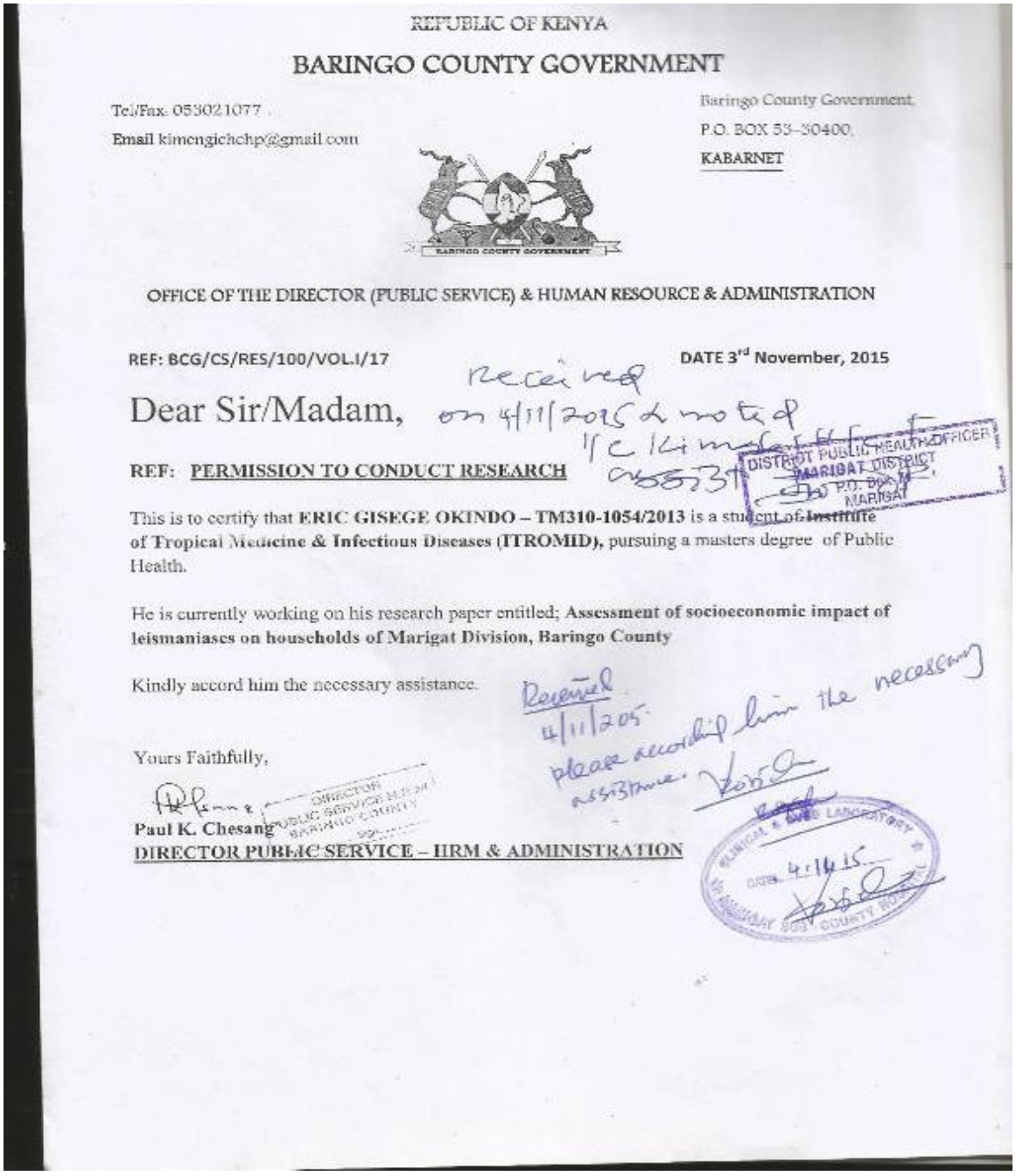
Protect to discover

Yours sincerely,

PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c. The Principal, College of Health Sciences, UoN
The Deputy Director CS, KNH
The Chair, KNH/UoN-ERC
Supervisors: Prof.Hellen Lydia Kutima, Dr. Joseph Mutai

## Appendix V: Permission to conduct research from Baringo County



REPUBLIC OF KENYA

BARINGO COUNTY GOVERNMENT

Tel/Fax. 053021077
Email kimengichchp@gmail.com

Baringo County Government,
P.O. BOX 53-30400,
KABARNET

OFFICE OF THE DIRECTOR (PUBLIC SERVICE) & HUMAN RESOURCE & ADMINISTRATION

REF: BCG/CS/RES/100/VOL.I/17

DATE 3rd November, 2015

Received on 4/11/2015 & noted

Dear Sir/Madam,

REF: PERMISSION TO CONDUCT RESEARCH

DISTRICT PUBLIC HEALTH OFFICER MARIGAT DISTRICT P.O. BOX MARIGAT

This is to certify that **ERIC GISEGE OKINDO – TM310-1054/2013** is a student of **Institute of Tropical Medicine & Infectious Diseases (ITROMID),** pursuing a masters degree of Public Health.

He is currently working on his research paper entitled; **Assessment of socioeconomic impact of leismaniases on households of Marigat Division, Baringo County**

Kindly accord him the necessary assistance.

Received 4/11/205. please accord him the necessary assistance.

Yours Faithfully,

DIRECTOR PUBLIC SERVICE BARINGO COUNTY

**Paul K. Chesang**
**DIRECTOR PUBLIC SERVICE – HRM & ADMINISTRATION**

CLINICAL & VET LABORATORY MARIGAT SUB COUNTY HOSPITAL 4/11/15

## Appendix VI: Published article on Social-economic impact

Socioeconomic Impacts of Leishmaniases on Households of Marigat Sub County, Baringo County of Kenya

**Eric Gisege Okindo*, Sichangi Kasili, Helen Lydiah Kutima I, Joseph Mutai M**

*Jomo Kenyatta University of Agriculture and Technology, Kenya*

***Corresponding author:** Okindo EG, Jomo Kenyatta University of Agriculture and Technology, Kenya, Tel: +254 722677510; E-mail: ericokindo@yahoo.com

**Received date:** November 10, 2016; **Accepted date:** November 19, 2016; **Published date:** November 30, 2016



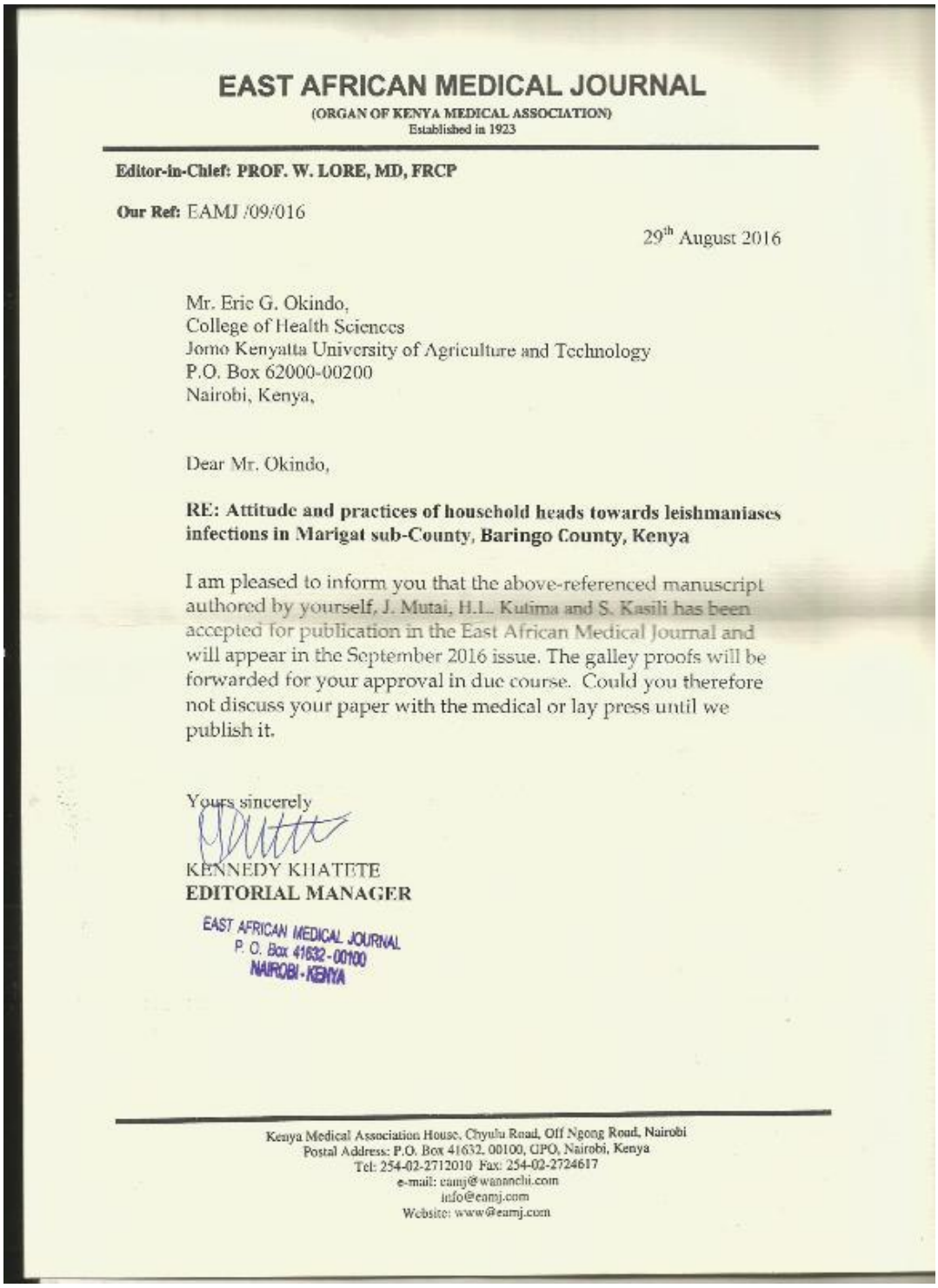
**Abstract**

The global burden of leishmaniases has remained stable for some years, causing a morbidity and mortality mainly to the poor proportion of the population. An estimated 5 million people are at risk of infection in Kenya with 4,000 cases occurring annually. Despite these prevailing statistics, the socio-economic costs to the leishmaniases are not known. A cross-sectional study, which employed administration of structured questionnaires, was carried out in Marigat Sub County of Baringo County in 2015. Household heads were randomly selected whereas participants of key informant interviews (KIIs) were selected by purposive sampling. Data was analyzed by Chi-square test using SPSS version 20 software. The study recruited 405 respondents, 53% and 48% females and males respectively. The majority (29%) of respondents were illiterate. Whereas 44% had normal monthly expenditure of US$ 10.01-50, the mean total expenditure due to visceral leishmaniasis (VL) was US$ 259.83 per household with 50.26% using over US$ 200.The mean number of economic days lost was 178 days.

9.1% of the respondents reported isolation of VL patients. The cost of treating a patient with VL was way above the monthly expenditure of residents resulting in sinking the affected families in poverty. Days lost in the course of patient treatment of leishmaniasis could be used to improve livelihoods. There is need for interventions to increase access to affordable leishmaniases prevention, diagnosis and treatment. Poverty alleviation programmes should also be increased in Marigat Sub County and neighboring communities.

**Keywords:** Leishmaniases; Economic impacts; Social impacts;
Baringo County

## Appendix VII: Publication article on attitudes and practices



**EAST AFRICAN MEDICAL JOURNAL**

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**Our Ref:** EAMJ /09/016

29th August 2016

Mr. Eric G. Okindo,
College of Health Sciences
Jomo Kenyatta University of Agriculture and Technology
P.O. Box 62000-00200
Nairobi, Kenya,

Dear Mr. Okindo,

**RE: Attitude and practices of household heads towards leishmaniases infections in Marigat sub-County, Baringo County, Kenya**

I am pleased to inform you that the above-referenced manuscript authored by yourself, J. Mutai, H.L. Kutima and S. Kasili has been accepted for publication in the East African Medical Journal and will appear in the September 2016 issue. The galley proofs will be forwarded for your approval in due course. Could you therefore not discuss your paper with the medical or lay press until we publish it.

Yours sincerely

KENNEDY KHATETE
**EDITORIAL MANAGER**

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