

**THE EFFECTIVENESS OF PREVENTIVE CARE FOR MALARIA
PROJECTS IN TANZANIA: A CASE OF ILALA DISTRICT
IN THE DAR ES SALAAM REGION**

A Dissertation

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In Partial Fulfillment of the Requirements for the Degree
Of Master Of Arts In Project Planning And Management

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October, **2010**

DECLARATION A

"I, Martin Jane, declare that this Thesis is my original work and has never been presented to any other institutions of learning for any academic award.


MARTIN JANE

Name and Signature of Candidate

Date

DECLARATION B

"I confirm that the work reported in this thesis was carried out by the candidate under my supervision".


Dr. Képha Natchoua

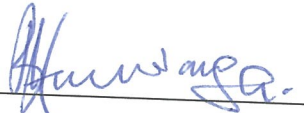
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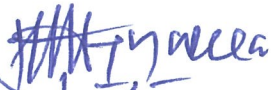
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APPROVAL SHEET

This thesis entitled " Effectiveness of Preventive Care for Malaria Project in Tanzania" prepared and submitted by Martin Jane in partial fulfillment of the requirements for the degree of Master in Project Planning and Management has been examined and approved by the panel on oral examination with a grade of PASSED.

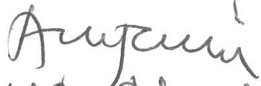


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DEDICATION

To my beloved Husband, Mr. Vedasto Nsanzugwanko, and my daughter, Lisah, for their endurance in filling the gap of my absence when I was busy with my studies.

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I wish to acknowledge all persons whose help enabled me to succeed in this work. I am very grateful to my Supervisor: Dr Kepha Natolooka of Kampala International University who guided me at every stage of my Thesis; his diligent effort to support transformation of this Thesis from the draft stage to completion is very much appreciated.

My sincere appreciation are due to Ilala District Authority in Dar es Salaam for allowing me to work on my research. I also extend my thanks to the Management and all respondents of the organisations I selected the sample for their consent given to carry out research and for their valuable time and sincere effort in responding to the questionnaires and interview during my field work.

Finally, I thank my family members for their moral support, encouragement and patience throughout the long hours I spent writing and re-writing this Thesis. Needless to say, the imperfections and limitations found in this Thesis are mine alone and not for any other organisations or individuals mentioned herein.

GOD BLESS YOU ALL.

MJ

ABSTRACT

The purpose of this study was to examine the effectiveness of preventive care for malaria projects in Ilala district in the Dar es Salaam region. The specific objectives were: to evaluate the effectiveness of Community sensitization in malaria prevention; to evaluate the effectiveness of mosquito net usage in malaria prevention; and to evaluate the effectiveness of insecticide in malaria prevention. A case study design, which involved the use of both qualitative and quantitative methods of data collection, was used to study a sample of 120 respondents from a study population of health staff and members of the local community of Ilala District. The study revealed that community sensitization was less effective on malaria prevention; regular mosquito net usage leads to effective prevention of malaria and spraying using insecticide was effective on malaria prevention. In order for preventive care for malaria projects in Tanzania to be more effective, the researcher recommends as follows; the need for the government to mobilize and empower communities to participate in health development and take responsibility for their own health rather than be reminded by community leaders; the need for the Government and Ministry of Health to ensure provision of affordable treated mosquito nets to each member in a household, including pregnant women at their first antenatal visit, children and old people; and the need of government and other stakeholders to enhance the distribution of free insecticide for mosquitoes.

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Acronyms

MOH	Ministry of Health
ITN	Insecticide Treated Nets
UNDP	United Nations Development Programme
WHO	World Health Organization
USAID	United States Agency for International Development
UNICEF	United Nations International Children Education Fund
EMVI	European Malaria Vaccine Initiative
HIV/AIDS	Human Immune Virus or Acquired Immune Deficiency Syndrome
GDP	Gross Domestic Product
TB	Tuberculosis
AFRO	Africa Regional Office
AFM	Africa Fighting Malaria
IRS	Infected Regions of Sub Saharan Africa
DDT	Dichloro Diphenal Trichloro ethane

CHAPTER ONE

INTRODUCTION

Background to the study

Malaria is one of the leading public health problems in the world. In 2006, it was estimated to be the cause of nearly a million deaths, most of them young children in Sub-Saharan Africa. Malaria in humans is caused by a protozoon of the genus *Plasmodium* and the four subspecies, *falciparum*, *vivax*, *malariae*, and *ovale*. Malaria parasites are transmitted by the female anopheles mosquito. The males do not transmit the disease as they feed only on plant juices. There are about 380 species of anopheles mosquito, but only 60 or so are able to transmit the parasite. Like all other mosquitoes, the anopheles breeds in water, each species having its preferred breeding grounds, feeding patterns and resting place. Their sensitivity to insecticides is also highly variable (WHO, 2005).

Fever is the main symptom of malaria. The most severe manifestations are cerebral malaria (mainly in children and persons without previous immunity), anemia (mainly in children and pregnant women), and kidney and other organ dysfunction (e.g., respiratory distress syndrome). Persons repeatedly exposed to the disease acquire a considerable degree of clinical immunity, which is unstable and disappears after a year away from the endemic-disease environment. Immunity reappears after malarial bouts if the person returns to an endemic-disease zone. Most likely to die of malaria are persons without previous immunity, primarily children or persons from parts of the same country (e.g., high altitudes) where

transmission is absent, or persons from more industrialized countries where the disease does not exist.

According to UNDP (2004), approximately 300 million people worldwide are affected by malaria and between 1 and 1.5 million people die from it every year. Previously extremely widespread, the malaria is now mainly confined to Africa, Asia and Latin America. The problems of controlling malaria in these countries are aggravated by inadequate health structures and poor socioeconomic conditions. The situation has become even more complex over the last few years with the increase in resistance to the drugs normally used to combat the parasite that causes the disease.

UNDP (2004) further indicates that Eighty per cent of malaria cases occur in tropical Africa, where malaria accounts for 10% to 30% of all hospital admissions and is responsible for 15% to 25% of all deaths of children under the age of five. Around 800,000 children under the age of five die from malaria every year, making this disease one of the major causes of infant and juvenile mortality. Pregnant women are also at risk since the disease is responsible for a substantial number of miscarriages and low birth weight babies.

In Senegal, malaria accounts for 35% of all out patients attendance and is the most common cause of morbidity and mortality. Approximately 7 – 10,000 deaths occur each year due to malaria (WHO 2000). Patients pay for services such as consultation, hospitalization, drugs and care during their visit to the health structure (hospital or health centre).

According to European Malaria Vaccine Initiative, USAID, and the Malaria Vaccine Initiative (2001), in Sudan, there are 7.5 million cases and 35,000 deaths every year due to malaria. Whilst the whole population is at risk from the disease, there is higher incidence among pregnant women and children under five years of age. This results in complicated pregnancies, low birth weight and infant mortality. In Ethiopia, Approximately 53 million Ethiopians (63 percent of the population) live in malaria-risk areas. Of these, 33 million almost 40 percent of the total population are in endemic areas, and nearly one quarter of Ethiopians reside in endemic-prone areas.

The World Bank (2004) indicates that malaria is a leading cause of death in children and adults in Ethiopia. In 2000 alone it killed over 29,000 children, equivalent to almost 80 children per day. In a country where 81 percent of the population lives on less than two dollars a day, reversing the spread of malaria and its destructive impact on poor households and their livelihoods is a formidable challenge.

Tanzania has more than 30 million people at risk from malaria. It is estimated that there are 16 million cases of malaria each year, contributing to approximately 80,000 deaths annually of children under the age of five annually. Economic losses due to malaria are estimated to equal approximately 3.4 percent of the country's gross domestic product each year.

Both preventives and curative measures are being taken against the disease. Government, non- government institutions and private health-

based institution are working hard to combat the disease in the country. Many drugs has been in use or trials, partly seem to have worked out with the problem, because is tend to cure the diseases. However, there is undeniable fact that the measures have not been able to show effects in combating the disease.

Statement of the Problem

Community sensitization, mosquito net usage and insect side spraying are a powerful and cost-effective means to fight malaria. Availability and use of insecticidal bednets, indoor residual spraying and the use of environmental management approaches, must be promoted together with community awareness about malaria prevention. Malaria seems to be common among people in Ilala district. People living in area infested by Malaria have suffered the illnesses which in some cases have contributed to death. To make matters worse, while various malaria preventive measures have been put in place many people continue to be infected and affected by the disease. This study, therefore, sought to make an evaluation of the effectiveness of such measures for malaria project in Tanzania.

Purpose

The purpose of this study was to evaluate the effectiveness of preventive care for malaria project in Tanzania with particular reference to Ilala district in the Dar es Salaam region.

Specific objectives

- i. To evaluate the effectiveness of Community sensitization in preventing Malaria in Ilala District in Dar-es-Salaam region.
- ii. To evaluate the effectiveness of mosquito net usage in preventing Malaria in Ilala District in Dar-es-Salaam region.
- iii. To evaluate the effectiveness of insecticide spraying in preventing Malaria in Ilala District in Dar-es-Salaam region.

Research questions

- i. How effective is Community sensitization in preventing Malaria in Ilala District in Dar-es-Salaam region?
- ii. How effective is mosquito net usage in preventing Malaria in Ilala District in Dar-es-Salaam region?
- iii. How effective is insecticide spraying in preventing Malaria in Ilala District in Dar-es-Salaam region?

Hypothesis

- i. There is no relationship between Community sensitization and prevention of Malaria in Ilala District in Dar-es-Salaam region?
- ii. There is no relationship between mosquito net usage and prevention of Malaria in Ilala District in Dar-es-Salaam region?
- iii. There is no relationship between insecticide spraying and prevention Malaria in Ilala District in Dar-es-Salaam region?

Significance of the study

This study would help the following categories of people:

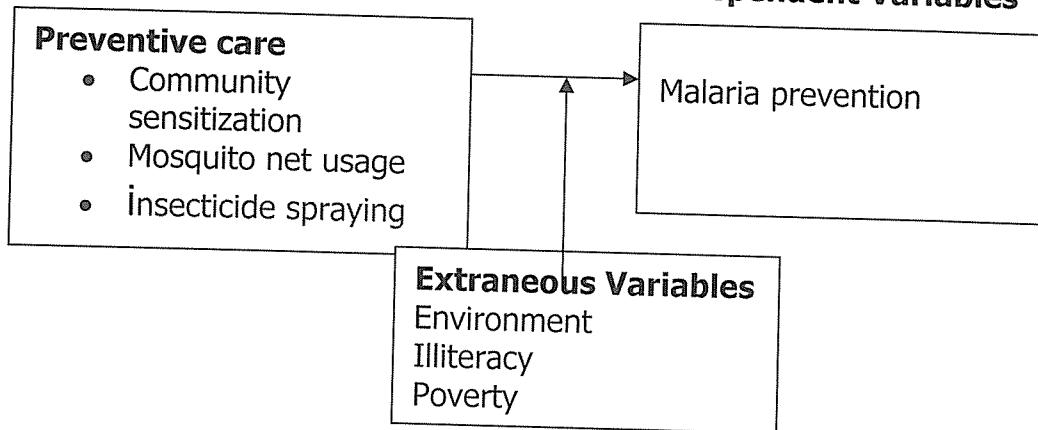
- i. The Ministry of health, in particular as it may benefit a lot in formulating health policies to further curb down the spread of the disease.
- ii. Government officials at different levels, as they may, too have an advantage of using this study in their daily health activities because it gives a way forward on how preventive care system can work extremely well to reduce malaria infections in the country.
- iii. Researchers and other health workers, through its contribution or addition to the existing literature and knowledge on Malaria in Tanzania and Ilala in particular.
- iv. The community members, as it may, help them come up with appropriate procedures of preventing malaria.

Scope

The study took place at Ilala district in Dar es Salaam region because of high prevalence of malaria. The area is characterized by mixed ethnic group. Among the dominant ethnic groups are the Zaramo, Chagga, Nyakyusa and Nyamwezi. Most of the houses are brick walls and corrugated iron roofs. The study focused on the effectiveness of preventive care for malaria.

Conceptual framework

Independent



Source: Developed by the researcher

The conceptual framework indicates that malaria prevention is a function of preventive care which in the context of this study include; Community sensitization, Mosquito net usage and insecticide spraying. There are however, other factors (extraneous variables) that affect malaria prevention and these include; environment, illiteracy and poverty among the masses. The researcher therefore wanted to establish whether the above conceptual framework fits in what actually happens in Ilala District in Dar-es-Salaam in relation to malaria prevention.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter deals with what other scholars have written about malaria; the prevention measures and what may be added to what they have done. Specifically, the chapter focuses on the extent of malaria in developing countries, the effectiveness of Community sensitization, mosquito nets usage and insecticide spraying on malaria prevention.

Overview of global malaria pandemic and prevention programmes

Malaria remains a major public health problem in certain areas of the world. The World Health Organization (WHO) estimates that people living in as many as 107 countries are at risk of malaria transmission. Approximately 350 to 500 million clinical cases occur each year (WHO, 2005). Within a country, the transmission of malaria varies considerably between regions. Factors that affect these differences amongst the regions include: the type of malaria parasites, ecological conditions, and socioeconomic factors such as poverty and inaccessibility to effective health care and preventive services.

In Africa, malaria parasite (*Plasmodium Falciparum*) accounts for about 25% of all childhood mortality below five years old, excluding neo-natal mortality (World Bank, 1999). Malaria is the first cause of mortality disease

in Africa especially in the sub-Saharan Africa and pre mature mortality (World Bank, 1999). For many years malaria has been a concern for many sub-Saharan countries including Tanzania. It is one of the diseases which continue to threaten the health of the people and the population in general in the developing countries. Recent studies show that malaria is the second killer diseases after HIV/AIDS. Therefore, malaria is and continues to be a critical health problem to many African countries and more worse to those countries found in the sub-Saharan Africa.

The World Bank (1999) further indicates that the vast majority of malaria deaths occur in Africa, south of the Sahara, where malaria also presents major obstacles to social and economic development. Malaria has been estimated to cost Africa more than US\$ 12 billion every year in lost GDP, even though it could be controlled for a fraction of that sum.

In addition, there are at least 300 million acute cases of malaria each year globally, resulting in more than a million deaths. Around 90% of these deaths occur in Africa, mostly in young children. Malaria is Africa's leading cause of under-five mortality (20%) and constitutes 10% of the continent's overall disease burden. It accounts for 40% of public health expenditure, 30-50% of inpatient admissions, and up to 50% of outpatient visits in areas with high malaria transmission.

The World Health Organization (2005) states that there are several reasons why Africa bears an overwhelming proportion of the malaria burden. Most malaria infections in Africa south of the Sahara are caused by *Plasmodium falciparum*, the most severe and life-threatening form of the disease. This

region is also home to the most efficient, and therefore deadly, species of the mosquitoes which transmit the disease. Moreover, many countries in Africa lacked the infrastructures and resources necessary to mount sustainable campaigns against malaria and as a result few benefited from historical efforts to eradicate malaria.

UNICEF & WHO (2003) indicate that in Africa today, malaria is understood to be both a disease of poverty and a cause of poverty. Annual economic growth in countries with high malaria transmission has historically been lower than in countries without malaria. Economists believe that malaria is responsible for a growth penalty of up to 1.3% per year in some African countries. When compounded over the years, this penalty leads to substantial differences in GDP between countries with and without malaria and severely restrains the economic growth of the entire region. Malaria also has a direct impact on Africa's human resources. Not only does malaria result in lost life and lost productivity due to illness and premature death, but malaria also hampers children's schooling and social development through both absenteeism and permanent neurological and other damage associated with severe episodes of the disease.

Besides, Southeast Asia has the highest rate of malaria drug resistance in the world, and the multi-drug-resistance has contributed to a re-emergence of malaria in many areas, especially along international borders (WHO, 2005). Migratory laborers who work in forested areas are especially at high risk (Chaveepojnkamjorn & Pichainarong, 2004). In Thailand, malaria cases are found the highest in the border areas,

particularly along the Thai-Myanmar border (Ministry of Public Health, 2004).

Numerous methods for malaria prevention are used by migrants such as bed net, mosquito repellent, clothes, etc. A number of field trial studies have evaluated those prevention strategies; however, there is no systemic review for those prevention strategies in Ilala. The results of this systemic review will help national and international decision makers to determine which malaria prevention methods will most effectively curtail the spread of malaria in Ilala Region, finally resulting in reduction of malaria reservoirs.

According to Shellenbers (1995), a recent upsurge of malaria in endemic-disease areas with explosive epidemics in many parts of Africa is probably caused by many factors, including rapidly spreading resistance to ant malarial drugs, climatic changes, and population movements. In Africa, malaria is caused by *Plasmodium falciparum* and is transmitted by *Anopheles gambiae* complex. Control efforts have been piecemeal and not coordinated. Strategies for control should have a solid research base both for developing antimalarial drugs and vaccines and for better understanding the pathogenesis, vector dynamics, epidemiology, and socioeconomic aspects of the disease. An international collaborative approach is needed to build appropriate research in a national context and to effectively translate research results into practical applications in the field. The Multilateral Initiative for Malaria in Africa can combine all of the above strategies to plan and coordinate partnerships, networking, and

innovative approaches between African scientists and their Northern partners.

In the last decade, the prevalence of malaria has been escalating at an alarming rate, especially in Africa. An estimated 300 to 500 million cases each year cause 1.5 to 2.7 million deaths, more than 90% in children under 5 years of age in Africa (WHO, 1996). Malaria has been estimated to cause 2.3% of global disease and 9% of disease in Africa (WHO, 1996); it ranks third among major infectious disease threats in Africa after pneumococcal acute respiratory infections (3.5%) and tuberculosis (TB) (2.8%). Cases in Africa account for approximately 90% of malaria cases in the world (WHO1996). Between 1994 and 1996, malaria epidemics in 14 countries of sub-Saharan Africa caused an unacceptably high number of deaths, many in areas previously free of the disease (Harare declaration on malaria prevention and control, 1997). Adolescents and young adults are now dying of severe forms of the disease. Air travel has brought the threat of the disease to the doorsteps of industrialized countries, with an increasing incidence of imported cases and deaths from malaria by visitors to endemic-disease regions. The estimated annual direct and indirect costs of malaria were US\$800 million in 1987 and were expected to exceed US\$1.8 billion by 1995 (Anderson, 1996).

Malaria is Uganda's is among the killer diseases known to the country and according to the World Health Organization (WHO), the parasite-borne illness kills between 70,000 and 100,000 children in Uganda annually, and at least one million people worldwide every year. Every day, 400 people in

the East African country die of malaria, mainly young children and pregnant women.

Tools for Malaria Control

The present strategy for malaria control, adopted by the Ministerial Conference on Malaria in Amsterdam in 1992, is to prevent death, reduce illness, and decrease social and economic loss due to the disease (WHO, 1996). Its practical implementation requires two main tools: first, drugs for early treatment of the disease, management of severe and complicated cases, and prophylactic use on the most vulnerable population (particularly pregnant women); second, insecticide-treated nets for protection against mosquito bites. Each tool has its own problems in regard to field implementation.

Chloroquine remains the first-line therapy for malaria. However, the alarming increase in resistance in eastern and southern Africa requires that sulfadoxine-pyrimethamine replace chloroquine as the first-line drug. Currently, 20% to 30% of strains are highly resistant (RIII) with in vivo levels of 40% to 60%. Resistance has been spreading westward, attaining levels of 20% to 35% in West Africa. Chloroquine remains the drug of choice in most of sub-Saharan Africa (WHO, 1996).

WHO (1996) indicates that resistance to mefloquine, another first-line drug, developed in the early 1980s, was noticed soon after its introduction and is now almost at the same level as chloroquine. Sulfadoxine-pyrimethamine (Fansidar, Hoffman la Roche) is the second-line drug in many countries of West and Central Africa, but so much resistance

appears to be rising in countries of East Africa that atovaquone/dapsone. Intravenous quinine is still the main therapy for cerebral malaria, although resistance is increasing. Development by the African strains of malaria parasites of the pattern of drug resistance now seen in Southeast Asia would be a major disaster.

However, while the above views are seemingly correct and indicate that malaria is a big problem in Africa and Tanzania inclusive, none of the scholars have conducted a study in Ilala district to point out which preventative measure is more significant. This called for more research, for example, it is necessary to initiate systematic monitoring of drug resistance in Africa using standardized methods. Drug efficacy studies using in vivo methods have now been standardized by the World Health Organization (WHO)/Regional Office for Africa (AFRO) and carried out in a large number of countries in West, Central, and East Africa. Sentinel sites have also been established for monitoring resistance. No new methods are being developed. The feasibility of using polymerase chain reaction techniques should be explored. Also, management guidelines should be developed concerning when and under what conditions to change the treatment regimen for different levels of resistance at the district, regional, and central level. Development and field testing of inexpensive, effective new malaria drugs are urgently needed to replace present drugs when resistance patterns make them unusable. Drugs developed because of the more serious problem of drug resistance in Asia should be field tested in Africa. The most promising ones, artemisinin and its derivatives artemether, arteether, and artesunate, are being tested for use in cerebral

malaria and cases of proven resistance to chloroquine (World Health Organization); some are already used in some countries.

Research carried out in Dakar (Alonso, 1991) demonstrated the efficacy of insecticide-treated nets for reducing infant death; subsequent large-scale multicenter studies in six countries across Africa confirmed this finding (Nevill, 1996). However, costs of the nets and treatment still inhibit wide-scale use. Ongoing research seeks ways of reducing these costs, such as social marketing, possible involvement of the private sector, cost-effective methods for net treatment, the most appropriate nets, and proper procurement of insecticides and treatment of the nets. Eventually, the long-term effects on natural acquisition of partial immunity to malaria in endemic-disease areas should be evaluated. The old vector-control method of house spraying persists in some countries. The relative merits and cost-effectiveness of house spraying versus the use of treated nets should be evaluated.

Effectiveness of Community sensitization in malaria prevention

Community sensitization aims at providing information on malaria transmission. In a study conducted by Castro et al (2009), about community-based environmental management for malaria control in Dar es Salaam, Tanzania, it was found out that individual awareness of health risks and intervention goals were significantly higher among sensitized neighborhoods. A reduction in the odds of malaria infection during the post-cleaning period in intervention neighborhoods was observed when compared to the pre-cleaning period.

In the same study, it was found out that community sensitization about malaria and environment had a significant impact on community participatory manner, followed by continued maintenance, a reduction in flooding during the rainy season, the flow of water in the drain would be restored, and the number of Anopheles breeding sites reduced. In addition, the analyses showed a significant impact of community sensitization, because majority of the residents knew about cleaning activities, mostly communicated in meetings or by local leaders (Castro et al, 2009).

However, this indicator did not account for costs related to the community sensitization activities, capital costs (e.g., vehicles and building space), some recurrent costs (such as operating costs of vehicles and buildings), and short-term experts/advisors, which according to this study also affects the effectiveness of community sensitization.

In another study conducted by UNICEF & WHO (2003) in North East Tanzania, the provision of insecticide-treated nets (ITNs) in Malaria infected regions was widely accepted as an essential public health service partly due to community sensitization. The communities learnt that when used properly, intact ITNs provide almost complete protection from mosquito bites.

In addition, the best tools will not necessarily lead to malaria control. African populations have traditional perceptions about disease causation and management. Some diseases are considered suitable for management

by western medicine, while others are considered the exclusive domain of local traditional health practitioners.

However, management of disease in the household devolves on mothers. Fever remains the most recognized symptom of malaria. Studies are ongoing to determine the proportion of fevers actually due to malaria. Mothers should be taught to recognize the symptoms of malaria, to provide home management, and to know when to refer cases to health centers. Four countries in Africa have developed and tested teaching guides to facilitate home management of malaria (WHO, 1996). Also, guidelines for the management of fever at the periphery have been developed and field tested within the Sick Child Initiative and has been recommended for wide-scale application. Socioeconomic and community studies are needed to understand the extent to which the communities will participate in new malaria control measures. Finally, cost recovery of health care, including costs of drugs (the Bamako Initiative), has been the subject of many recent studies and probably holds the key to health care in rural populations.

Some study results indicate an initial fall in use of services following the introduction of cost-recovery schemes. However, a recent study indicates the opposite. Community health workers were trained to administer prepackaged antimalarial drugs only when paid. They also received direct remuneration for their work rather than being supported by the village on a voluntary basis. This plan seems to have increased attendance. This subject needs large-scale multicenter studies.

Effectiveness of mosquito nets usage in malaria prevention

According to WHO (2006), insecticide Treated Nets (ITNs), have been shown to reduce deaths in young children by an average of 20 percent, but increasing coverage is not an easy task. Even with cost-effective interventions, more than 95 percent of children in malaria-endemic regions of sub-Saharan Africa are not using ITNs. In general, the cost of an ITN is a major barrier to ownership and usage. Rural and poorer households where people are at higher risk of malaria thus have less access to ITNs than urban and relatively wealthy households, which are more likely to own ITNs. In most cases, the best way to achieve universal coverage of ITNs is free distribution of nets to as many people as possible. Several countries have undertaken free distribution schemes to rapidly increase ITN coverage Eritrea, Ghana, Nigeria, Togo, and Zambia.

In Togo, a national campaign of ITN distribution accompanied a measles and polio vaccination drive to reach 920,000 children under age 5. Preceding the campaign, volunteers from the Togolese Red Cross Society conducted door-to-door and community social mobilization to inform people about the importance of protecting their children and the location of the vaccination and distribution centers and all this was being done using malaria funds. As a result, coverage in Togo increased from 6 percent to 62 percent of households, and an estimated 98 percent of families with children under age 5 had at least one ITN. Under the innovative mechanism of delivering ITNs using the platform of measles immunization, the incremental delivery cost was less than 50 cents per ITN (WHO, 2006).

In addition, Malawi and Tanzania have had success with social-marketing approaches for ITN distribution. In Malawi, ITNs were marketed through commercial outlets as well as in antenatal clinics and through community-based groups (at a highly subsidized price). In 2003 alone, 1 million ITNs were sold in Malawi; boosting coverage from 13 percent of the country's households in 2000 to 43 percent by the end of 2004 to 60 percent in 2005. The average cost per net delivered through this approach was US\$2.63, with the cost per net decreasing with greater volume distributed.

But even with recent achievements in ITN distribution in more than 45 sub-Saharan African countries, only one country, Eritrea, has reached the Abuja target. Indeed, surveys from 1999 to 2004 in 34 African countries show that coverage of children under age 5 using ITNs was still only 3 percent. This is a further indication that malaria is still a problem in Africa.

Moreover, in most African countries, many more households have mosquito nets that are not treated with insecticide, warranting a scaling up of ITNs to provide full coverage. Because the standard ITN needs to be re-treated every 6-12 months with insecticide, scaling up coverage should include parallel provision of re-treatment packets. Importantly, a new kind of net, which retains its insecticidal properties without needing frequent re-treatment, has been developed. These long-lasting insecticidal nets work for four to five years (WHO, 2005).

There can be no doubt about the effectiveness of insecticide-treated mosquito nets (ITNs). The results of studies completed in 2000 and 2001

by UNICEF confirm and supplement the findings of the major studies of the 1990s to evaluate the impact of ITNs. The widespread use of ITNs can be expected to reduce all cause child mortality in malaria endemic areas by about 20%.

The use of insecticide-treated bed nets (ITNs) to protect children from malaria has risen six-fold in the past seven years, according to research funded by the Wellcome Trust. Despite this success, however, 90 million children still do not have access to this simple protective tool, and remain at risk from the life-threatening disease.

USAID (2008) indicates that malaria kills nearly a million people in Africa every year. For over 15 years it has been known that sleeping under a net treated with an insecticide can substantially reduce the chances of a young African child dying. When African heads of state met in 2000, the Abuja Declaration stated that they would work towards protecting 60% of their vulnerable populations with insecticide treated nets. Now, a study published in the Lancet today highlights what has been achieved since this historic declaration, but this study is short of the effectiveness of malaria preventative care in Illala district.

Kenyan and British scientists have published data from 40 African countries which shows that at the time of the Abuja meeting in 2000 just over 3% of Africa's young children were protected by a treated mosquito net. Seven years later this increased to only 18.5%. In 2007 90 million children have not yet received this simple protective tool, and remain at

risk from life-threatening malaria. Most of these children live in only seven African countries; one country in particular stands out - a quarter of all African children living without nets are Nigerian (USAID, 2008). The authors reported that bed net use increases faster in countries that distribute them free of charge compared to countries that make people to pay for them. Accordingly, usage rises to an average of 25% when they are given free, but is much lower at 4% when people have to pay for them.

Effectiveness of insecticide spraying in malaria prevention

According to USAID (2008), this approach has a substantial effect on transmission if it is possible to eliminate nearly all the breeding sites. This is never easy, especially when the breeding sites of the local vectors are numerous, scattered and shifting, but it can be possible in situations where the breeding sites are few, fixed, and easy to identify.

USAID (2008) indicates that one of the insecticides used is DDT. DDT has long been used as an insecticide to protect populations against malaria by targeting the mosquitoes transmitting the disease when biting people. The derivatives of DDT persist in the environment for many years and can accumulate in living organisms. They are transported through the water cycle by rainfall and surface water runoff, and can be carried to remote areas throughout the global ecosystems. DDT is known to be harmful to the environment and to some animals; there is now increasing support for suspicions that it may also be harmful to human health. The problems of

persistence and bioaccumulation related to DDT are widely acknowledged, and with this the needs to reduce reliance on insecticides like DDT.

Curtis (1991) states that in term of reducing malaria episodes among communities, insecticide spraying is the most effective amongst all prevention methods. The use of insecticide spraying can reduce the malaria morbidity by 74% (Kamolratanakul et al., 2001). The study by Kamolratanakul et al., 2001 explained the reduction in malaria episodes due to DDT spraying when compared with only surveillance. However, the impregnated bed nets program was more cost-effective than DDT spraying in mitigating the spread of malaria. The cost per year of DDT spraying was US\$ 1,199.18 while the cost per year of insecticide-impregnated bed nets was US\$ 492.71 Insecticide impregnated bed nets also work well in protecting moving populations such as soldiers against vector-borne diseases.

It should be noted that the relative risks calculated in this study suggest that a significant number of malaria cases could be prevented by the use of insecticide-treated bed nets, insecticide spraying, as well as insecticide-treated clothing, bed-sheets, and top-sheets.

According to Van den Berg, Henk, (2008), the WHO's anti-malaria campaign of the 1950s and 1960s relied heavily on DDT and initially the results were promising, though short lived. Experts tie the resurgence of malaria to numerous factors, including poor leadership, management, and funding of malaria control programs; poverty; civil unrest; and increased irrigation. The evolution of resistance of the malaria parasite to the drugs

traditionally used to treat the disease (e.g. chloroquine) and evolution of resistance of mosquitoes to insecticides have greatly exacerbated the situation (Feachem & Sabot, 2007).Resistance of mosquitoes to DDT was largely fueled by its often unrestricted use in agriculture. This coupled with the awareness that DDT may be harmful both to humans and the environment led many governments to restrict or curtail the use of DDT in vector control.Chapin G, Wasserstrom R (1981).Once the mainstay of anti-malaria campaigns, as of 2006 only 13 countries were still using DDT, including India and some southern African states, though the number is expected to rise.

Regarding the overall effectiveness of DDT against malaria, Dunlap, (1981) indicates that when it was first introduced in World War II, DDT was very effective in reducing malaria morbidity and mortality. The WHO's anti-malaria campaign, which consisted mostly of spraying DDT, was initially very successful as well. For example, in Sri Lanka, the program reduced cases from about 3 million per year before spraying to just 29 in 1964. Thereafter the program was halted to save money, and malaria rebounded to 600,000 cases in 1968 and the first quarter of 1969. The country resumed DDT spraying, but it was largely ineffective because mosquitoes had acquired resistance to the chemical in the interim, presumably because of its continued use in agriculture. The program was forced to switch to malathion, which though more expensive, proved effective, (Harrison, 1978).

Today, DDT remains on the WHO's list of insecticides recommended for Infected Regions of Sub-Saharan Africa. Since the appointment of Arata Kochi as head of its anti-malaria division, whose policy has shifted from recommending IRS only in areas of seasonal or episodic transmission of malaria, to also advocating it in areas of continuous, intense transmission. The WHO has none-the-less affirmed its commitment to eventually phasing DDT out, aiming "to achieve a 30% cut in the application of DDT world-wide by 2014 and its total phase-out by the early 2020s if not sooner" while simultaneously combating malaria. The WHO plans to implement alternatives to DDT to achieve this goal. DDT may be phased out because it is said to have a health hazard to human beings.

South Africa is one country that continues to use DDT under WHO guidelines. In 1996, the country switched to alternative insecticides and malaria incidence increased dramatically. Returning to DDT and introducing new drugs brought malaria back under control. According to DDT advocate Donald Roberts, malaria cases increased in South America after countries in that continent stopped using DDT. Research data shows a significantly strong negative relationship between DDT residual house sprayings and malaria rates. In a research from 1993 to 1995, Ecuador increased its use of DDT and resulted in a 61% reduction in malaria rates, while each of the other countries that gradually decreased its DDT use had large increase in malaria rates, Roberts Donald (1997).

Rousell (2000), indicates that the evolution of resistance to DDT in mosquitoes has greatly reduced its effectiveness in many parts of the

world, and current WHO guidelines require that before the chemical is used in an area, susceptibility of local mosquitoes to DDT must be confirmed. The appearance of DDT-resistance is largely due to its use in agriculture, where it was used in much greater amounts than the relatively small quantities used for disease prevention. According to one study that attempted to quantify the lives saved by banning agricultural uses of DDT and thereby slowing the spread of resistance, "it can be estimated that at current rates each kilo of insecticide added to the environment will generate 105 new cases of malaria.

However, resistance was noted early in spray campaigns, with Paul Russell, a former head of the Allied Anti-Malaria campaign, observing in 1956 that eradication programs had to be wary of relying on DDT for too long as "resistance has appeared [after] six or seven years." DDT has lost much of its effectiveness in many parts of the world including Sri Lanka, Pakistan, Turkey and Central America, and it has largely been replaced by organophosphate or carbamate insecticides, *e.g.* malathion or bendiocarb.

In many parts of India, DDT has largely lost its effectiveness. Agricultural uses were banned in 1989, and its use for anti-malarial purposes has been declining. Its use in urban areas has been halted completely. Nevertheless, DDT is still manufactured and used in the country, and one study had concluded that "DDT is still a viable insecticide in indoor residual spraying owing to its effectivity in well supervised spray operation and high excito-repellency factor."

Studies of malaria-vector mosquitoes in KwaZulu-Natal Province, South Africa found susceptibility to 4% DDT (the WHO susceptibility standard), in 63% of the samples, compared to the average of 86.5% in the same species caught in the open. The authors concluded that "Finding DDT resistance in the vector *An. arabiensis*, close to the area where we previously reported pyrethroid-resistance in the vector *An. funestus* Giles, indicates an urgent need to develop a strategy of insecticide resistance management for the malaria control programmes of southern Africa."

It has been argued that DDT can still be effective against resistant mosquitoes, and that the avoidance of DDT-sprayed walls by mosquitoes is an additional benefit of the chemical. For example, a 2007 study reported that DDT-resistant mosquitoes still avoided DDT-treated huts. The researchers argued that DDT was the best pesticide for use in IRS (even though it did not afford the most protection from mosquitoes out of the three test chemicals) because the others pesticides worked primarily by killing or irritating mosquitoes—modes of action the authors presume mosquitoes will develop resistance to. Others have argued that the avoidance of DDT sprayed walls by mosquitoes is detrimental to the actual eradication of the disease. Unlike other insecticides such as pyrethroids, DDT requires a long period of contact before mosquitoes pick up a lethal dose; however its irritant property makes them fly off before this occurs. "For these reasons, when comparisons have been made, better malaria control has generally been achieved with pyrethroids than with DDT." In India, with its outdoor sleeping habits and frequent night duties, "the excito-repellent effect of DDT, often reported useful in other countries, actually promotes outdoor transmission.

According to Bouwman, and Meinhardt (2006), People living in areas where DDT is used for IRS have high levels of the chemical and its breakdown products in their bodies. Compared to contemporaries living in countries where DDT is not used, South Africans living in sprayed homes have levels that are several orders of magnitude greater. Breast milk from regions where DDT is used for malaria control contains enough DDT to greatly exceed the allowable daily intake of breast feeding infants. These levels have been associated with neurological abnormalities in babies ingesting relatively large quantities of DDT in their milk.

Most studies of DDT's health effects on human have been conducted in developed countries where DDT is not used and exposure is relatively low. Many experts are therefore concerned about the health consequences of its use in IRS, as these results in very high exposure. They urge that alternatives been used instead. Epidemiologist Brenda Eskenazi argues that "We know DDT can save lives by repelling and killing disease-spreading mosquitoes. But evidence suggests that people living in areas where DDT is used are exposed to very high levels of the pesticide. The only published studies on health effects conducted in these populations have shown profound effects on male fertility. Clearly, more research is needed on the health of populations where indoor residual spraying is occurring, but in the meantime, DDT should really be the last resort against malaria rather than the first line of defense', (Eskenazi, 2009).

Illegal diversion of DDT from the public health sector to agriculture is also a concern, as it is almost impossible to prevent, and its subsequent use on

crops is totally unregulated. For example, DDT use is wide spread in Indian agriculture, particularly mango production, and is reportedly used by librarians in the country to protect books. Another example is in Ethiopia, where DDT intended for malaria control is reportedly being used in coffee production. "The consequent insecticidal residues in crops at levels unacceptable for the export trade have been an important factor in recent bans of DDT for malaria control in several tropical countries", (Katima and Mng'anya, 2009).

Robert, (2007) said that "The ban on DDT may have killed 20 million children." These arguments have been called "outrageous" by former WHO scientist Socrates Litsios, and May Berenbaum, an entomologist at the University of Illinois, says that "to blame environmentalists who oppose DDT for more deaths than Hitler is worse than irresponsible." Investigative journalist Adam Sarvana characterizes this notion as a "myth" promoted principally by Roger Bate of the pro-DDT advocacy group Africa Fighting Malaria (AFM) in service of his anti-regulatory, free market ideology.

Criticisms of a "ban" on DDT often specifically reference the 1972 US ban (with the erroneous implication that this constituted a worldwide ban and prohibited use of DDT in vector control). Reference is often made to Rachel Carson's *Silent Spring* even though she never pushed for a ban on DDT. Quiggin and Lambert, (2008) have written that "the most striking feature of the claim against Carson is the ease with which it can be refuted. Carson actually devoted a page of her book to considering the

that "I believe that the strategies we are using are as effective as spraying with DDT. So, politically correct or not, I am very confident that what we are doing is the right strategy." (Stossel, 2007).

According to Kent, (2005), the agency has been misrepresented: "USAID strongly supports spraying as a preventative measure for malaria and will support the use of DDT when it is scientifically sound and warranted". With regard to decision to start funding the use of the chemical, the Agency's website states that "USAID has never had a 'policy' as such either 'for' or 'against' DDT for IRS. The real change in the past two years [2006/07] has been a new interest and emphasis on the use of IRS in general with DDT or any other insecticide as an effective malaria prevention strategy in tropical Africa, USAID, (2008). The website further explains that in many cases alternative malaria control measures were judged to be more cost-effective than DDT spraying, and so were funded instead.

However, the literature about malaria in Tanzania is fragmented with few statistical figures from the ministry of health. While various measures for malaria prevention have been put in place, no research has been conducted to find out their effectiveness.

Population

The study population included the health staff and the members of the local community of Ilala District in Tanzania because they are believed to be knowledgeable about the subject under study. There are about 360 households in Ilala district and the research used 1/3 of the population to get the sample.

Sample selection

I used purposive sampling, because the researcher wanted respondents who are equipped with knowledge of the subject matter. In total, 120 respondents were selected. These included ten (10) people from nearby health centers and the rest were members of the local community. Using 360 as the population, the sample size was obtained as follows;

$$1/3 \text{ of } 360 = 120$$

$$n = 120$$

Table 3.1 Category of respondents

Category of respondents	Number	Percentage (%)
Health department	10	8.3
Community members	110	91.7
Total	120	100

According to Musaazi (2005), any sample which is 1/8 of the population or more is representative and for this study, we took a sample of 1/3 (120 is 1/3 of 360).

Data collection methods

Questionnaires

Self administered questionnaires were used to obtain information from members of the local community and were designed in accordance with the objectives of the study. According to Amin (2005), questionnaires are popular with researchers because information can be obtained fairly, easily and the questionnaire responses are easily coded. The researcher hired research assistants who helped in the administration of questionnaires.

Interview to health staff

The researcher also carried out personal interviews to collect data from the respondents. The questions were planned in advance and the researcher used an interview guide which contained a list of questions for the respondents. Interviews were used because it is easy to fully understand someone's impressions or experiences, or learn more about their answers to questionnaires. The people interviewed were health officials.

Validity and Reliability of Instrument

Validity is the accuracy and meaningfulness of inferences, which are based on the research results (Mugenda, 1999). Validity of instruments was ascertained by first of all discussing the questionnaire and interview schedule drafts with the supervisor. The content validity of the instrument was found worthy executing for the pilot run and thus the study.

According to Mugenda, (1999), reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. The reliability of instruments was established basing on the preliminary results derived from the pilot study. The study instruments were set for the pilot run. Results realized were discussed with the supervisor and the content reliability of the instrument was accepted.

Data analysis

Questionnaires were sorted, numbered and data entered accordingly. Data was checked by the principal investigator for completeness and internal consistency. Data collected was cleaned, edited, categorized, coded and summarized. The relationship between malaria preventive measures and malaria control was evaluated using Pearson's correlation co efficiency where unclear responses were left out. According to Amin (2005), given a set of observations $(x_1, y_1), (x_2, y_2) \dots (x_n, y_n)$, the formula for computing the correlation co-efficient is given by

$$r = \frac{1}{n-1} \sum \left(\frac{x - \bar{x}}{s_x} \right) \left(\frac{y - \bar{y}}{s_y} \right)$$

Where,

r=correlation coefficient

n=sample

X-X=differences in mean

S_x =Standard error of sampling distribution.

Source: Amin (2005).

Using SPSS programme, the correlation coefficient always takes a value between -1 and 1, with 1 or -1 indicating perfect correlation (all points would lay along a straight line in this case). A positive correlation indicates a positive association between the variables (increasing values in one variable correspond to increasing values in the other variable), while a negative correlation indicates a negative association between the variables (increasing values in one variable correspond to decreasing values in the other variable). A relationship value close to 0 indicates no association between the variables.

Since the method for calculating the correlation coefficient standardizes the variables, changes in scale or units of measurement wouldn't affect its value. For this reason, the correlation coefficient is often more useful than a graphical depiction in determining the strength of the association between two variables. Data from questionnaires was presented in form of frequency tables, pie charts and bar graphs.

In qualitative data (interviews), common responses were categorized according to objectives and this information was used to supplement that from questionnaires.

Ethical considerations

Permission to do the study was sought from Kampala International University. The researcher first sought consent to conduct the study. Strict confidentiality was observed. Names of study participants were not recorded on questionnaires and interview guides. Filled questionnaires

were kept under lock and only the principal investigator had access to keys.

Limitations and Solutions:

A number of limitations were encountered and these included the following;

- i. Some of the respondents were unwilling to give information; this problem was solved by assuring them that this study was purely for academic purposes.
- ii. Funds were limited however; a problem solved by seeking financial assistance from friends and relatives.
- iii. Respondents were busy with their work, thus much time was spent particularly in getting responses to questionnaires.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

Introduction

This chapter mainly presents the findings of the study according to the objectives: to evaluate the effectiveness of community sensitization in preventing malaria; to evaluate the effectiveness of mosquito net usage in preventing malaria in Ilala District in Dar-es-Salaam region; to evaluate the effectiveness of insecticide spraying in preventing Malaria in Ilala District in Dar-es-Salaam region. It however, starts with presentation of demographic characteristic of respondents.

Demographic characteristics of respondents

Respondents' demographic characteristics include the age, sex, level of education, marital status and period of stay in the area.

Sex of respondents.

Respondents studied were both female and male as indicated in table 4.1

Table 4.1: Sex of respondents

Sex	Frequency	Percentage (%)
Male	72	60
Female	48	40
Total	120	100

Majority of the respondents were males as indicated by 60% response and females were 40% of the total respondents, an implication that between sexes (males & females) were included in the study.

Age of respondents

Respondents studied were of varying ages as shown in table 4.2

Table 4.2 Age of respondents

Age	Frequency	Percentage (%)
15-20	20	16.7
21-25	23	19.2
26-40	50	41.7
Above 40	27	22.5
Total	120	100

Source: *field study*

Most of the respondents were aged between 26-40 as shown by 41.7% response and this was followed by those aged between above 40 years of age. 19.2% also were aged between 21-25 years. From the table in 4.2, it can be noted that the researcher obtained information from people of sound age groups and with adequate experience about malaria disease.

Respondents' level of education.

Respondent studied had various education levels as show in table 4.3

Table 4.3 Level of education

Level of education	Frequency	Percentage (%)
None	23	19.2
Certificate	41	34.2
Diploma	35	29.2
Degree	21	17.5
Total	120	100

Source: field study

Majority of the respondents had attained certificate level of education as shown by 34.2% whereas 29.2% had attained a diploma level of education and very few had attained a degree as indicated by 17.5%. This indicated that certificate holders were more than diploma holders, while the illiterate are more than degree holder. This finding was an indication that there were still many people who were not educated and such people affected the use of various malaria preventative cares. In addition, while many people were educated, they hard economic hardships in acquisition of malaria.

Table 4.5 Respondents' tenure in the area

Period	Frequency	Percentage (%)
Less than a year	26	21.7
1-5 years	36	30
6-9 years	26	21.7
Above 10 years	32	26.7
Total	120	100

Source: field study

A big proportion of respondents noted that they had stayed in the area for a period between 1-5 years as indicated by 30% response; 26.7% had stayed in the area for more than 10 years, 21.7% had stayed in the areas for a period less than one year and 21.7% had 6-9 years. The fact that majority of the respondents had stayed in the area for a long period of time was an indication that they had adequate knowledge about malaria in their area.

Presentation of findings.

How respondents rated preventive care for malaria project.

The researcher was interested in finding out how respondents rated the preventive care for malaria project. Effectiveness in the context of this study was measured in terms of how well a preventive measure helps to curb malaria. Findings are showed in table 4.6

Table 4.6 General rating the preventative care for malaria project

Rate	Frequency	Percentage (%)
Very effective	14	11.7
Effective	18	15
Less effective	46	38.3
Not effective	42	35
Not sure	-	-
Total	120	100

Source: field study

Most of the respondents rated the preventative care for malaria project as less effective as shown by a 38.3% response; while 35% indicated that the preventative care was not effective. Only 11.7% and 15% response noted that the preventative care project was very effective and effective, respectively. This generally implied that the preventative care for malaria project was not effective and the lack of effectiveness was attributed to limited resources for acquisition of mosquito nets, insect side and sensitization of the people.

How respondents rated the effectiveness of malaria preventive methods.

The researcher was interested in finding out how respondents rated the effectiveness of malaria preventive methods. Findings are showed in table 4.7

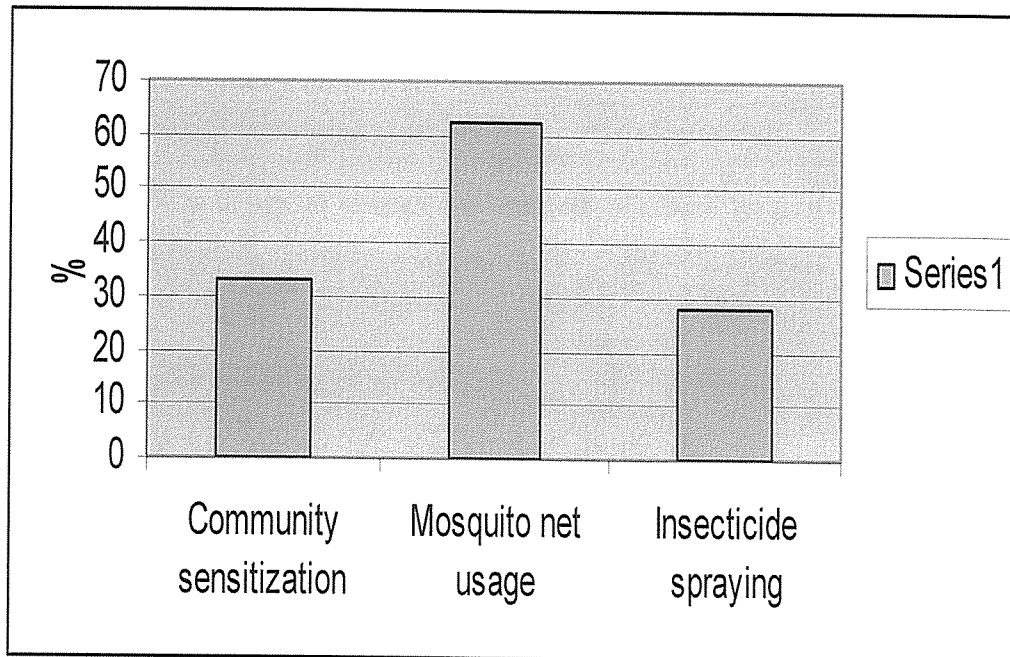
Table 4.7: Rating the effectiveness of malaria prevention methods

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Community sensitization	22(18.3%)	18(15%)	54(45%)	26(21.7%)	-
Mosquito net usage	14(11.7%)	49(40.8%)	34(28.3%)	14(11.7%)	9(7.5%)
Insecticide spraying	19(15.8%)	15(12.5%)	54(45%)	32(26.7%)	-

Source: field study

Greater part of the respondents indicated that community sensitization was less effective in prevention of malaria as shown by 45% response while 40.8% respondents indicated that mosquito net usage plays an effective role in malaria prevention. Also 45% response showed that insecticide spraying was less effective in malaria prevention. These therefore implied that regular and effective use of treated nets was important in prevention of malaria. The ranking of effectiveness of malaria prevention methods is also illustrated in figure 1

Figure 2: Ranking of effectiveness of malaria prevention methods



From the above chart, mosquito net usage was more effective than insecticide spraying sensitisation. This was attributed to the fact that insecticides had more negative side effects on human beings.

The effectiveness of community sensitization in malaria prevention.

Objective number one of the study was: 'to evaluate the effectiveness of Community sensitization in preventing Malaria in Ilala District in Dar-es-Salaam region.' In relation to this objective, the finding revealed the following (as shown in table 4.8).

Table 4.8 Effectiveness of community sensitization in malaria prevention in Ilala district

Statement	Very Effective	Effective	Less effective	Not effective	Not sure
Radio	18(15%)	41(34.2%)	37(30.8%)	19(15.8%)	5(4.2%)
Television	19(15.8%)	23(19.2%)	62(51.7%)	16(13.3%)	-
Newspapers	15(12.5%)	26(21.7%)	58(48.3%)	21(17.5%)	-
Community leaders	50(41.7%)	37(30.8%)	22(18.3%)	11(9.2%)	-
Use of medical personnel	22(18.3%)	51(42.5%)	30(25%)	17(14.2%)	-
Community plays and drama	43(35.8%)	45(37.5%)	19(15.8%)	13(10.8%)	-
Songs and music	43(35.8%)	32(26.7%)	31(25.8%)	14(11.7%)	-

Most of the respondents noted that community sensitization using radio was effective for malaria prevention as indicated by 34.2% while also 30.8% showed that using radio was less effective. More so, using television was shown as being less effective on malaria prevention as indicated by 51.7% response and news papers were noted as less effective on sensitizing the community on malaria prevention as shown by 48.3% response.

Further more, using community leaders in awareness was indicated as very effective in sensitizing on malaria prevention as shown by 41.7% response. In addition, using medical personnel, community plays/drama

and songs were indicated as effective in sensitizing the people on malaria prevention as shown by 42.5%, 37.5% and 35.8% responses respectively. These implied that using community leaders, radio and drama/songs were the most effective ways of sensitizing the people on malaria prevention in their communities.

Outcome of community sensitization in malaria prevention.

Findings revealed the following outcome of community sensitization in malaria preventions as shown in table 4.9.

Table 4.9 Outcome of community sensitization in malaria prevention

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Community sensitization has provided information on malaria transmission	19(15.8%)	24(20%)	47(39.2%)	30(25%)	-
There has been individual awareness of health risks and intervention significantly reduce malaria	13(10.8%)	17(14.2%)	34(28.3%)	41(34.2%)	15(12.5%)
Community sensitization about malaria helps residents know about cleaning activities	17(14.2%)	16(13.3%)	50(41.7%)	37(30.8%)	-
Community sensitization about malaria is cost effective	45(37.5%)	34(28.3%)	18(15%)	15(12.5%)	8(6.7%)

Source: field study

Regarding the outcome of community sensitization on malaria prevention, most of the respondents disagreed with the view that community sensitization had provided the information on malaria transmission as indicated by 64.2% response and majority also disagreed on the idea that there was individualized awareness of health risks and intervention significantly reduce malaria as indicated by 62.5% response. Furthermore, majority disagreed with the idea that Community sensitization about malaria helped residents know about cleaning activities as shown by 72.5% response although 65.8% agreed that community sensitization about malaria is cost effective.

Correlation between community sensitization and malaria prevention

The correlation between community sensitization and malaria prevention is shown in table 4.10.

Table 4.10 Correlation between community sensitization and malaria prevention

Statement	Malaria prevention		
	Chi-square value	Pearson correlation value	Sign value
Radio	36.7	0.256**	0.005
Television	46.3	-0.080	0.387
Newspapers	36.9	0.650**	0.000
Community leaders	29.1	-0.269	0.003
Use of medical personnel	22.5	-0.168	0.066
Community plays and drama	26.8	-0.330	0.000
Songs and music	14.3	-0.217*	0.017

Using Pearson correlation coefficient, it was indicated that there was a less significant relationship between community sensitization and malaria prevention since most of the variables had a negative relationship as shown above. Using a radio and newspapers during sensitization had a positive relationship as indicated by (correlation value=0.256, sign value=0.005) and (0.650, sign value=0.000) respectively. However, all the other forms of sensitization had a less significant relationship as shown below. Using television (-0.080, sign value=0.387), community leaders (-0.269, sign value=0.003), use of medical personnel (-0.168, sign

value=0.066),community plays/drama (-0.330,sign value=0.000) and songs/music (-0.217,sign value=0.017).

The effectiveness of mosquito net usage in malaria prevention malaria in Ilala district.

The second objective of the study was: 'to evaluate the effectiveness of mosquito net usage in preventing Malaria in Ilala District in Dar-es-Salaam region. The study revealed the following findings as shown in table 4.11

Table 4.11 Effectiveness of mosquito net usage in malaria prevention malaria in Ilala district

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Use of mosquito treated nets	57(47.5%)	27(22.5%)	20(16.7%)	16(13.3%)	-
Use of non treated nets	-	17(14.2%)	47(39.2%)	45(37.5%)	11(9.2%)
Availing nets to children	17(14.2%)	18(15%)	51(42.5%)	34(28.3%)	-
Availing nets to only old people	7(5.8%)	16(13.3%)	31(25.8%)	54(45%)	12(10%)
Availing nets to both old and young people	32(26.7%)	59(49.2%)	28(23.3%)	1(0.8%)	-
Use of nets regularly	30(25%)	53(44.2%)	19(15.8%)	16(13.3%)	2(1.7%)
Use of mosquito nets	25(20.8%)	15(12.5%)	61(50.8%)	19(15.8%)	-

Source: field study

A good number of respondents noted that the use of mosquito treated nets was very effective on malaria prevention as indicated by 47.5% response and the use of non treated nets were shown to be less effective as indicated by 76.7% response. Availing nets to only children and old people was shown as less effective on prevention of malaria as indicated by 70.8% respectively.

people was shown as less effective on prevention of malaria as indicated by 70.8% respectively.

More so, availing mosquito nets to both old and young people complimented by using the nets regularly were shown as effective ways in prevention of malaria as indicated by 75.9% and 69.2% response respectively but 50.8% indicated that using mosquito nets during mosquito seasons was less effective on prevention of malaria.

Outcome on the usage of insecticide treated mosquito nets usage and malaria prevention.

The outcome of the usage of insecticide treated mosquito nets and malaria prevention is shown in table 4.12.

Table 4.12 Outcome on the usage of insecticide treated mosquito nets usage and malaria prevention

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Treated Nets (ITNs) have been effective tools for malaria control	6(5%)	18(15%)	47(39.2%)	36(30%)	13(10.8%)
ITNs are cost-effective interventions	18(15%)	15(12.5%)	47(39.2%)	32(26.7%)	8(6.7%)
The cost of an ITN is a major barrier to ownership and usage	38(31.7%)	36(30%)	23(19.2%)	15(12.5%)	8(6.7%)
The best way to achieve universal coverage of ITNs is free distribution of nets	56(46.7%)	30(25%)	15(12.5%)	19(15.8%)	-
Households have mosquito nets that are not treated with insecticide	23(19.2%)	54(45%)	13(10.8%)	20(16.7%)	10(8.3%)

Source: field study

Regarding the outcome on usage of insecticide treated nets usage, majority disagreed with the view that treated nets have been effective tools for malaria control and they also disagreed to the idea that nets are not cost effective interventions as indicated by 69.2% and 65.9% responses respectively. 61.7% though agreed to the view that the cost of an ITN is a major barrier to ownership and usage and 71.7% also agreed to the idea that the best way to achieve universal coverage of ITNs was free distribution of nets. Further more, majority of the respondents agreed to the view that households have mosquito nets that are not treated with insecticide as indicated by 64.2% response. However, one of the negative effects of insecticides was that some people were allergic to it since in most cases it was sprayed before they slept.

Correlation of mosquito net usage and malaria prevention

The correlation of mosquito net usage and malaria prevention is shown in table 4.13 below.

Table 4.13 Correlation of mosquito net usage and malaria prevention

Statement	Malaria prevention		
	Chi-square value	Pearson correlation value	Sign value
Use of mosquito treated nets	34.5	0.495**	0.000
Use of non treated nets	34.8	0.470**	0.000
Availing nets to children	25.7	0.818**	0.000
Availing nets to only old people	60.3	-0.375**	0.000
Availing nets to both old and young people	56.3	0.034	0.712
Use of nets regularly	60.4	0.724	0.000
Use of nets during mosquito seasons	44.4	0.624**	0.000

From the matrix above, its shown that there was a positive and significant relationship between mosquito net usage and malaria prevention since most of the variables had a positive relationship, thus, usage of treated nets (correlation value= 0.495,sign value=0.000),usage of non treated nets (0.470,sign value=0.000),availing nets to children (0.818,sign value=0.000),availing nets to old people (-0.375,sign value=0.000),availing nets to both young and old (0.034,sign

value=0.712). The use of nets regularly (0.724,sign value=0.000) also indicated a positive relationship. This implied that effective and regular mosquito net usage leads to effective prevention of malaria.

Effectiveness of insecticide spraying in malaria prevention in Ilala district.

Objective three of the study was: 'to evaluate the effectiveness of insecticide spraying in preventing Malaria in Ilala District in Dar-es-Salaam region'. In relation to this objective, the study revealed as shown in table 4.14.

Table 4.14 Effectiveness of insecticide spraying in malaria prevention in Ilala district

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Regular spraying	31(25.8%)	42(35%)	32(26.7%)	11(9.2%)	4(3.3%)
Use of DDT	16(13.3%)	21(17.5%)	50(41.7%)	29(24.2%)	4(3.3%)
Spraying before sleep at night	14(11.7%)	58(48.3%)	28(23.3%)	20(16.7%)	-
Spraying mosquito breeding grounds	13(10.8%)	21(17.5%)	46(38.3%)	33(27.5%)	7(5.8%)

Source: field study

Majority of respondents noted that regular spraying was effective on malaria prevention as indicated by 60.8% whereas 41.7% showed that the use of DDT was less effective on malaria prevention. Spraying before

sleeping was also taken to be effective in malaria prevention as indicated by 60% response and 38.3% indicated that spraying mosquito breeding grounds was less effective on malaria prevention. This implied that regular spraying and spraying before sleeping were the most effective ways of preventing malaria.

Outcome of insecticide spraying in malaria prevention.

The outcome of insecticide spraying in malaria prevention is shown in table 4.15

Table 4.15 Outcome of insecticide spraying in malaria prevention

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Insecticide spraying has a substantial effect on transmission	38(31.7%)	49(40.8%)	13(10.8%)	16(13.3%)	4(3.3%)
Insecticide spraying where the breeding sites are few, fixed, and easy to identify	25(20.8%)	62(51.7%)	13(10.8%)	16(13.3%)	4(3.3%)
The derivatives of DDT persist in the environment for many years	29(24.2%)	54(45%)	13(10.8%)	16(13.3%)	8(6.7%)
The derivatives of DDT can accumulate in living organs	40(33.3%)	33(27.2%)	22(18.3%)	10(8.3%)	15(12.5%)
DDT is known to be harmful to the environment	53(44.2%)	37(30.8%)	21(17.5%)	9(7.5%)	-

Source: field study

Regarding the outcome of insecticide spraying on malaria prevention, majority of the respondents agreed to the view that insecticide spraying has a substantial effect on transmission of malaria and they further

agreed to the idea that insecticide spraying where the breeding sites are few, fixed, and easy to identify as shown by 72.5% responses each.

The derivatives of DDT persist in the environment for many years and can accumulate in living organs as shown by 69.2% and 60.5% responses respectively who agreed to these ideas whereas 75% respondents agreed to the view that DDT was known to be harmful to the environment

Correlation between insecticide spraying of mosquito and malaria prevention.

The correlation between insecticide spraying of mosquito and malaria prevention as shown in table 4.16.

Table 4.16: Correlation between insecticide spraying of mosquito and malaria prevention

Statement	Malaria prevention		
	Chi-square value	Pearson correlation value	Sign value
Regular spraying	41.9	-0.668**	0.000
Use of DDT	48.9	0.562**	0.000
Spraying before sleep at night	38.1	0.096	0.298
Spraying mosquito breeding grounds	41	0.433**	0.000

Using Pearson correlation coefficient, it was revealed that there was a significant relationship between spraying mosquitoes using insecticide and malaria prevention as shown below. Regular spraying (Pearson correlation -0.668, sign value=0.000), use of DDT (0.562, sign value=0.000), spraying before sleeping (0.096, sing value=0.298) and spray of breeding grounds (0.433, sign value=0.000). The above finding was an implication that spraying using insecticide was effective on malaria prevention among the population.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter deals with discussion, conclusions and recommendations of the study. The discussion is presented in accordance with the objectives, that is; to evaluate the effectiveness of Community sensitization on malaria prevention; to evaluate the effectiveness of mosquito net usage on malaria prevention; and to evaluate the effectiveness of insecticide spraying on malaria prevention.

Discussion

Effectiveness of Community sensitization in malaria prevention.

Most of the respondents disagreed with the view that community sensitization had provided the information on malaria transmission and prevention as indicated by 64.2% response and majority also disagreed on the idea that there was individualized awareness of health risks and intervention significantly reduce malaria as indicated by 62.5% response. Further more, majority disagreed with the idea that Community sensitization about malaria helped residents know about cleaning activities as shown by 72.5% response although 65.8% agreed that community sensitization about malaria is cost effective. According to the study, community sensitization was found to be less effective on malaria prevention in the area.

Using Pearson correlation coefficient, it was indicated that there was a less significant relationship between community sensitization and malaria prevention since most of the variables had a negative relationship, that is; use of television, community leaders, use of medical personnel, community plays/drama and songs/music (-0.217, sign value=0.017). The findings from the above correlation matrix indicated that community sensitization was less effective in the project to prevent the spread of malaria which is in line with the study done by Castro et al (2009) who noted that there was reduction in the odds of malaria infection during the post-cleaning period in intervention neighborhoods due to community sensitization. The study contradicts the findings done by UNICEF & WHO which indicated that the provision of insecticide-treated nets (ITNs) in malaria affected regions was widely accepted as an essential public health service partly due to community sensitization.

In an interview with health workers, it was found out that community mobilization was not an easy task because many of them were more pre-occupied with their domestic work than listening to malaria matters. The use of radio was also found with disadvantages since many poor households could not afford the economic cost of acquiring one.

Effectiveness of mosquito net usage in malaria prevention

Regarding the outcome on usage of insecticide treated nets usage, majority disagreed with the view that treated nets have been effective tools for malaria control and they also disagreed to the idea that nets are not cost effective interventions as indicated by 69.2% and 65.9%

responses respectively. 61.7% though agreed to the view that the cost of an ITN is a major barrier to ownership and usage and 71.7% also agreed to the idea that the best way to achieve universal coverage of ITNs was free distribution of nets. Further more, majority of the respondents agreed to the view that households have mosquito nets that are not treated with insecticide as indicated by 64.2% response. This finding is in line with the research done by WHO (2006) which showed that insecticide Treated Nets (ITNs) have been shown to reduce deaths in young children by an average of 20 percent, but increasing coverage is not an easy task due to their cost and thus recommended free distribution of nets to achieve universal coverage.

Despite the respondents disagreement that treated nets have been effective tools for malaria control, using the correlation matrix between mosquito net usage and malaria prevention, it was shown that there was a positive and significant relationship between mosquito net usage and malaria prevention since most of the variables had a positive relationship, thus, usage of treated nets, usage of non treated nets, availing nets to children and availing nets to old people (-0.375, sign value=0.000), availing nets to both young and old (0.034, sign value=0.712), use of nets regularly (-0.724, sign value=0.000) and usage of nets during mosquito seasons (0.624, sign value=0.000). This implied that effective and regular mosquito net usage leads to effective prevention of malaria. There can be no doubt about the effectiveness of insecticide-treated mosquito nets (ITNs). The results of this study was in line with the studies completed in 2000 and 2001 by UNICEF which confirmed and supplemented the findings of the

major studies of the 1990s that the widespread and effective use of ITNs can be expected to reduce all cause child mortality in malaria endemic areas by about 20%.

In addition to the above, in interviews with some households it was found out that some were too poor to afford mosquito nets; while others pointed out that mosquito nets were easily burnt by candles by children, which therefore, affected their usage.

Effectiveness of insecticide spraying in malaria prevention

Majority of respondents noted that regular spraying was effective on malaria prevention as indicated by 60.8% whereas 41.7% showed that the use of DDT was less effective on malaria prevention. Spraying before sleeping was also taken to be effective in malaria prevention as indicated by 60% response and 38.3% indicated that spraying mosquito breeding grounds was less effective on malaria prevention. This implied that regular spraying and spraying before sleeping were the most effective ways of preventing malaria. The findings of this study was supplemented by the findings done by Kamolratanakul et al., 2001 who noted that to reduce malaria episodes among communities, insecticide spraying is the most effective amongst all prevention methods. The use of insecticide spraying can reduce the malaria morbidity by 74%.

Using Pearson correlation coefficient, it was revealed that there was a significant relationship between spraying mosquitoes using insecticide and malaria prevention as shown below. Regular spraying (Pearson correlation

-0.668, sign value=0.000), use of DDT (0.562, sign value=0.000), spraying before sleeping (0.096, sign value=0.298) and spray of breeding grounds (0.433, sign value=0.000). The above finding was an implication that spraying using insecticide was effective on malaria prevention among the population which was inline with the findings done by Curtis in 1991.

However, through interviews with some households, the use of insecticide spraying was disliked because it was assumed to be dangerous to human life. This view is supported by Bouwman and Meinhardt (2006), who pointed out that People living in areas where DDT is used for IRS have high levels of the chemical and its breakdown products in their bodies. Compared to contemporaries living in countries where DDT is not used, South Africans living in sprayed homes have levels that are several orders of magnitude greater. Breast milk from regions where DDT is used for malaria control contains enough DDT to greatly exceed the allowable daily intake of breast feeding infants. These levels have been associated with neurological abnormalities in babies ingesting relatively large quantities of DDT in their milk.

Conclusions arising out of the study findings.

(i) Community sensitization in prevention of malaria in Ilala district is not effective. Nonetheless, community leaders, community plays and drama, as well as songs and music, are useful means that have been applied to raise community sensitization in malaria prevention in the area.

(ii) The majority of people in Ilala district looked at the use of mosquito treated nets as an important mode of preventing malaria. This is evidenced by the fact that 62.5% of the respondents looked at mosquito treated nets usages as useful.

(iii) Regular spraying and spraying were less effective (28.3%) in prevention of malaria in Ilala district. Nonetheless, spraying mosquito breeding grounds was considered an ineffective mode of malaria prevention in the area.

Recommendations

Objective one was to evaluate the effectiveness of community sensitization in preventing malaria in Ilala District in Dar es salaam region, the study indicated that community sensitization was less effective in the project to prevent the spread of malaria. To rectify this, the researcher recommends as follows.

a). There is a need for the government to mobilize and empower communities to participate in health development and take responsibility for their own health rather than be reminded by community leaders. This should be done through election of community leaders who will be in-charge of community mobilization.

b). Community leaders need to be motivated in order to pass on the information of control and prevention of malaria by giving them daily allowance for the sensitization drive. Motivation factors may be

distribution of mobile phones to leaders, other incentives like bicycles and mosquito nets.

Objective number two was to evaluate the effectiveness of mosquito net usage in preventing Malaria in Ilala District in Dar-es-Salaam region. The study showed that effective and regular mosquito net usage leads to effective prevention of malaria. This notwithstanding, the researcher recommends as follows to strengthening the use of mosquito nets.

a). There is a need for the government and Ministry of Health to ensure the provision of affordable treated mosquito nets to each member in a household including pregnant women at first antenatal visits, children and old persons.

b) The distribution of insecticide-treated nets by government should be emphasized on radios and news papers, so that people may value the use of nets and also take them for treatment periodically. This should be done by ensuring that all people who attend immunization are given mosquito nets.

c). There is a need for a monitoring or follow-up to ensure that individuals use the treated nets instead of keeping them at home after the distribution by the ministry of health.

Objective number three was: 'to evaluate the effectiveness of insecticide spraying in preventing Malaria in Ilala District in Dar-es-Salaam region'. The research revealed that spraying using insecticide was effective on

malaria prevention among the population. Despite this, the researcher recommends the following to further improve usage of insecticides.

a). There is a need for the government and Ministry of Health to increase the distribution of free insecticide for mosquitoes for both the breeding areas plus the households and to use chemicals for spraying mosquitoes that are less or not pollutant to the environment and to the humans. This will save people from mosquitoes which cause malaria.

b). Ministry of health needs to sensitize the masses on the how to use insecticide so as to not compromise their health by contaminate their foods and drinks. This may be done by informing the people the right time to spray their houses and after what duration they can enter their rooms to sleep.

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**OFFICE OF THE DIRECTOR
SCHOOL OF POSTGRADUATE STUDIES**

May 15, 2009

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: RECOMMENDATION FOR MARTIN JANE

This is to inform you that the above named is our registered student in the School of Postgraduate Studies pursuing a Master of Arts in Project Planning and Management (MPP)

She has completed her first semester and left with three semesters of her two years course, and later she will be awarded a Master of Arts in Project Planning and Management of Kampala International University.

I therefore have the pleasure in recommending her to you for appointment that calls for her qualification.

Yours faithfully,

Prof. Owolabi O. Samuel

DIRECTOR-SCHOOL OF POSTGRADUATE STUDIES

APPENDIX II

RESEARCH INSTRUMENT

QUESTIONNAIRE TO RESPONDENTS

Dear Sir / Madam,

This study is about the effectiveness of preventive care for malaria project in Tanzania Please choose by ticking only one option that suits your level of agreement or disagreement for each of the following items. The information you will give is purely for academic purposes and will be treated with confidentiality.

SECTION A: BACKGROUND INFORMATION

1. Sex of respondent Male ☐ Female ☐
2. Age of the respondent
15 – 20 ☐ 21 – 25 ☐ 26 – 40 ☐ Above 40 ☐
3. What is your level of education?
Certificate ☐ Diploma ☐ Degree ☐ None ☐
5. What is your marital status?
Married ☐ widowed ☐ Divorced ☐ Not married ☐
6. What is your job title? -----
7. For how long have you worked or lived in this area?
Less than a year ☐ 1 – 5 Years ☐ 6 – 9 Years ☐
Above 10 ☐

Preventive care

8. How do you rate the preventative care for malaria project?

Very effective	Effective	Less effective	Not effective	Not sure

9. How do you rate the effectiveness of the following on malaria prevention?

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Community sensitization					
Mosquito net usage					
Insecticide spraying					

Effectiveness of Community sensitization on malaria prevention

10. Indicate the effectiveness of the following forms of Community sensitization on malaria prevention.

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Radio					
Television					
Newspapers					
Community leaders					
Use of medical personnel					
Community plays and drama					
Songs and music					

11. Outcome of community sensitization on malaria prevention

Indicate your level of agreement on the following statements regarding the outcome of community sensitization on malaria prevention.

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Community sensitization has provided information on malaria transmission					
There has been individual awareness of health risks and intervention significantly reduce malaria					
Community sensitization about malaria helps residents know about cleaning activities					
Community sensitization about malaria is cost effective					

Effectiveness of mosquito net usage on malaria prevention

12. Indicate the effectiveness of the following forms of mosquito net usage in prevention of malaria.

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Use of mosquito treated nets					
Use of non treated nets					
Availing nets to children					
Availing nets to only old people					
Availing nets to both old and young people					
Use of nets regularly					
Use of nets during mosquito seasons					

13. Indicate your level of agreement on the following statements regarding the outcome on the usage of insecticide treated mosquito nets usage and malaria prevention.

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Treated Nets (ITNs) have been effective tools for malaria control					
ITNs are cost-effective interventions					
The cost of an ITN is a major barrier to ownership and usage					
The best way to achieve universal coverage of ITNs is free distribution of nets					
Households have mosquito nets that are not treated with insecticide					
Effectiveness of insecticide-treated mosquito nets					

Effectiveness of insecticide spraying on malaria prevention

14. Indicate the effectiveness on the following statements regarding the insecticide spraying on malaria prevention.

Statement	Very effective	Effective	Less effective	Not effective	Not sure
Regular spraying					
Use of DDT					
Spraying before sleep at night					
Spraying mosquito breeding grounds					

15. Indicate your level of agreement and disagreement with the following statements regarding the outcome of insecticide spraying on malaria prevention

Statement	Strongly agree	Agree	Strongly disagree	Disagree	Not sure
Insecticide spraying has a substantial effect on transmission					
Insecticide spraying where the breeding sites are few, fixed, and easy to identify					
The derivatives of DDT persist in the environment for many years					
The derivatives of DDT can accumulate in living organs					
DDT is known to be harmful to the environment					

APPENDIX III

A INTERVIEW GUIDE TO HOUSEHOLDS AND HEALTH WORKERS

- i. How do you control malaria
- ii. What is the effectiveness of Community sensitization on malaria prevention?
- iii. What the effectiveness of mosquito net usage on malaria prevention?
- iv. What is the effectiveness of insecticide spraying on malaria prevention?
- v. Are there people who complain about DDT?

Thanks for your cooperation

RESEARCHER'S CURRICULUM VITAE

Personal Profile

Surname:	Jane
First Name	Martin
Middle Name:	Kiango
Date of Birth:	26 th July 1973
Marital Status:	Married
Sex:	Female
Citizen:	Tanzanian
Present Address:	P.O Box 734 Dar es salaam. Tanzania
Telephone Number:	+255 592909
Present Post:	Sociologist
Employer:	NIL

Educational Background

Date	Place	Award
1983 – 1989	Pangani Primary School	Certificate
1990 – 1993	Korogwe Secondary School	O' Level Certificate
1994 – 1997	Mtwara Medical College	Diploma in Medicine
2004 – 2007	University of Dar es Salaam	BA. Sociology
2008 – 2010	KIU	Masters of Arts in Project Planning and Management

Work Experience

October 2002 to January 2004, Childcare and SGBV Officer at South African Extension Unit (SAEU), in Kibondo, Tanzania.

Seminar and Workshops Participated

Date	Place	Issue under Discussion
Oct 2000	UNHCR, Tanzania	Medical Care on Sexual and Gender Based Violence
Dec 2001	UNHCR, Kigoma	Gender in Programme Implementation
March 2003	Kigoma, Tanzania	HIV/AIDS Prevention and Case Management Training

