ECONOMIC AND SOCIAL FACTORS ASSOCIATED WITH MALARIA PREVALENCE IN MTWARA DISTRICT, TANZANIA.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL DEVELOPMENT OF SOKOINE UNIVERSTITY OF AGRICULTURE. MOROGORO, TANZANIA.

2011

ABSTRACT

The government of Tanzania and some NGOs have been making a lot of efforts to control malaria, but its prevalence is still high in Mtwara Region. Therefore, the research for this dissertation was conducted in Mtwara District in November and December 2010 with the main objective to determine the association between prevalence of malaria, some economic and social factors in rural and urban areas of the district. The specific objectives of the study were to: assess levels of economic and social factors related to frequencies of household members suffering from malaria; assess respondents' knowledge on symptoms and preventive measures for malaria; estimate the frequency of malaria occurrence among household members; and determine linkages among income levels, education levels of household heads, use of ITNs, use of anti-malaria drugs, distance to health facilities and prevalence of malaria. Data were collected using interview guides and a structured questionnaire. The data were analyzed by using SPSS computer software. Research findings showed that malaria prevalence in urban areas was 18.8% while that in rural areas was 19.2%. However, the difference was not statistically significant at 5% level ($p = 0.916$). On the linkage between malaria prevalence and some economic and social factors, it was found that malaria prevalence was significantly different in households with higher and those with lower income levels ($p = 0.038$), and between households located nearby health facilities and those located far ($p = 0.006$). However, the prevalence wasn't significantly different between households whose heads had different levels of education ($p = 0.069$) and those who used ITNs ($p = 0.738$). Therefore, it is concluded that the economic and social factors mentioned above are significantly associated with malaria prevalence. Based on the above conclusion, it is recommended that the government and other stakeholders should assist the people of Mtwara to eradicate malaria by addressing the above factors with which it is associated.

DECLARATION

I, FATUMA AYOUB KASSUKU, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work and it has not been submitted for a higher degree award in any other University.

_____ _____

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The above declaration is confirmed

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ACKNOWLEDGEMENTS

I thank the Almighty God for making this work possible. I also express my most sincere gratitude to my supervisor Dr. Kim A. Kayunze of the Development Study Institute, Sokoine University of Agriculture, for his devoted support and exceptional guidance. He gave me sincere and useful ideas, suggestions and comments; his support and encouragement have been invaluable for this dissertation.

I am very grateful to my father Prof. A.A. Kassuku and my mother Mrs. T.S. Kassuku for believing in me and investing in my education. Their physical and moral support has always led me to aim for the highest; nothing can ever compare to what they have invested in me. Thank you for the sacrifice you made in order to shape my future. My sincere thanks go to my Uncle Dr. R.Mlekwa and Aunt L. Mlekwa who, in one way or another, made sure that my staying in Mtwara during the data collection exercise was at ease.

I owe many thanks to Dr. Mdoe of Ligula Hospital in Mtwara; Mrs. Mkama- Mtwara Regional Malaria Control Focal Person; Mr. Magafu- Malaria Control Focal Person for Mtwara Rural District and Mr. Lingu of P.S.I. Mtwara-Mikindani Municipality for their assistance, guidance and time every time I consulted them regarding the study.

I appreciate and feel indebted to all interviewed respondents as without them this study would have been incomplete. Their answers are greatly acknowledged to be the basis of this study. Lastly, but not least, I express my gratitude to my classmates and all who have contributed to the accomplishment of my studies in one way or another. Their assistance and encouragement are highly appreciated.

DEDICATION

This work is dedicated to my beloved parents Prof. Ayoub Ahmed Kassuku and Mrs Tatu Saidi Kassuku who have laid a valuable foundation for my education.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

AMREF-	African Medical and Research Foundation
CBOs-	Community Based Organizations
IPT-	Intermittent Preventive Treatment
IRS-	Indoor Residual Spraying
ITNs-	Insecticides Treated mosquito bed Nets
LGA-	Local Government Authorities
MDG-	Millennium Development Goals
NGOs-	Non Government Organizations
RBM-	Roll Back Malaria
SPSS-	Statistical Package for Social Sciences
TACAIDS-	Tanzania Commission for AIDS
UNICEF-	United Nations Children's Fund
URT-	United Republic of Tanzania
USAID-	United States Agency for International Development
WHO-	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Overview

This chapter describes the introduction of this study. The chapter is divided into six main sections. The first section describes the background introduction of the study. This is followed by description of the problem statement, justification, objectives, null hypotheses and conceptual framework respectively.

1.2 Background Information

In Tanzania, 125 000 people die from malaria each year and nearly two-thirds of them are children. Malaria kills more children under the age of five in Tanzania than any other disease (USAID, 2009). Its epidemiology in Tanzania must be viewed in the context of two very different transmission settings: the Mainland and Zanzibar, and approximately 35.6 million in Mainland and 1.1 million in Zanzibar. However, Zanzibar has succeeded and continues to accomplish dramatic reductions in malaria cases, but malaria is endemic across nearly all of Mainland Tanzania, with 93% of the population living in areas where *Plasmodium falciparum* (malaria causing parasite) is transmitted, except variation exists in the degree of endemicity. The principal malaria vector in the Mainland and Zanzibar is *Anopheles gambiae*. Malaria has such a severe impact on the health of the population that it accounts for a 3.5% loss in gross domestic product each year. Approximately 14 to 18 million clinical malaria cases are reported each year by public health facilities. Nationally, it is estimated that a Tanzanian child under five years of age will have 0.7 cases of malaria per year. It has been estimated that there are approximately 1.7 million cases of malaria in

pregnant women, and up to 20% of deaths among pregnant women can be attributed to malaria (USAID, 2009).

There are striking differences in the prevalence of malaria among regions in Tanzania Mainland. TACAIDS *et al.,* (2008) reports that malaria prevalence was 1% or less in Arusha, Kilimanjaro, Manyara, and Dar es Saam compared with more than 30% in Kagera (41%), Mwanza (31%), Mtwara (34%) and Lindi (36%). Mtwara is the centre of this research; it is one of the poorest areas in Tanzania. Being isolated from development centres in the north of Tanzania, it is also an underdeveloped region, and consequently its ability to deliver good health services is low. The health sector in Mtwara Region is faced by a variety of basic problems such as poor communications, poor water supplies, poverty, poorly run health services and malnutrition which work against the development of a healthy and productive population (URT, 1997). Because of its coastal setting and relative impoverishment, Mtwara District suffers from malaria mortality rates twice the national average. The majority of the deaths are among infants and young children. The under-five mortality rate there is twice the national average (AMREF, 2010).

1.3 Problem Statement

The government of Tanzania and some NGOs have been making a lot of efforts to stem malaria in line with MDG Number 6 which stipulates a target to have halted, by 2015, and begun to reverse the incidence of malaria. However, in Mtwara Region the prevalence of malaria is higher than that in most other regions. For example, according to TACAIDS *et al.,* (2008), in Mtwara the prevalence of malaria among children under five is 33.6% while the national figure is 18%. Although the prevalence of malaria in rural areas of Mtwara Region is not given it is higher than that in urban areas since the national rural prevalence

of malaria is 19.9%, while the national urban prevalence is 6.8%. Probably high malaria prevalence in Mtwara region is due to the same reasons as those in other regions. According to TACAIDS *et al.,* (2008), factors behind malaria prevalence include family well-being level, education level of the mother, use of insecticide-treated mosquito nets (ITNs), availability of anti-malarial drugs, indoor spraying, traditional beliefs and dependence on traditional healers. However, it was not known whether any of the above mentioned factors applied to Mtwara. Therefore, the aim of this research was to find all the major factors that affect malaria prevalence in Mtwara District.

1.4 Justification

Malaria is an international disaster, but is a disaster that we can avoid; it leads to widespread suffering and deaths. Patients suffer because of increasing drug and insecticide resistance and underfunded health care systems. Malaria is the single biggest killer of children under five and a serious threat to pregnant women and their newborns. Though there is no single cure for malaria and an effective vaccine is considered years away, the keys to prevention, the causes, and clinical responses are well understood but poorly implemented (RBM, 2010).

The international Roll Back Malaria (RBM) Initiative was introduced to reduce the malaria burden. It aimed at increasing access to the most effective and affordable protective measures, such as use of insecticide-treated mosquito nets (ITNs) for sleeping, use of Intermittent Preventive Treatment (IPT) of malaria for pregnant women, and other measures such as Indoor Residual Spraying (IRS). The simple act of sleeping under an ITN would halve the number of children who die of malaria. Currently, 15% of African

children sleep under a net, but only 2% sleep under nets that are regularly treated with insecticides, says the report.

Malaria is the leading killer disease in Tanzania. In spearheading the campaign against the disease, the Ministry of Health and Social Welfare joined hands with prominent Tanzanian musicians, international partners, senior government officials and the business sector to stage the Zinduka! Even the president of Tanzania, Jakaya Mrisho Kikwete, has got involved in the war against malaria and declared a total war against it when he was launching an anti-malaria campaign *Zinduka- Malaria Haikubaliki* in February 2010; the campaign aims to promote the people's awareness about the disease and the danger it poses to the nation, “eradicating malaria was no longer an option” he argued (Mushi, (2010). This research is important because Tanzania has not yet succeeded to eradicate malaria so far, and it shows that we won’t be able to meet the target of the MDG Number 6 by the year 2015. Other countries have succeeded in the war against malaria; even Zanzibar has done it too as its recent prevalence is 1%. So, if others have succeeded why not Tanzania Mainland? Ignoring the problem will impoverish the country instead of developing; it will have negative impact on economic development of the district as people will waste most of their time and money in hospitals instead of working for the betterment of the community. Thus, stemming malaria will influence social and economy development not only of the district but also of the country at large. The assessment is likely to be useful to the government, CBOs, NGOs and other sectors in coordinating, planning and implementing their interventions involved in the fight against malaria epidemic.

1.5 Objectives

1.5.1 Main objective

The main objective of the study was to determine the association between prevalence of malaria, some economic and social factors in rural and urban areas of Mtwara District.

1.5.2 Specific objectives

i. To assess levels of economic and social factors related to frequencies of household members suffering from malaria.
ii. To assess respondents' knowledge on symptoms and preventive measures for malaria.
iii. To estimate the frequency of malaria occurrence among household members.
iv. To determine linkages among income levels, education levels of household heads, use of ITNs, use of anti-malaria drugs, distance to health facilities and prevalence of malaria.

1.6 Null Hypotheses Tested

1. There is no significant difference in the prevalence of malaria between rural and urban areas of Mtwara District.
2. There is no significant difference in malaria prevalence among households with various economic and social factors.

1.7 Conceptual Framework

The conceptual framework shows the relationships between the dependent and independent variables. The independent variables were categorized into economic and social factors. Whereas, economic factors included income status of households; social

factors included level of education, basic knowledge about malaria, availability and use of ITNs, availability and use of anti-malarials, indoor spray and distance to health care facilities. These independent variables were conceived of having a direct influence on malaria prevalence. Back-ground variables were classified according to age, gender and marital status as variables influencing independent variables as shown Figure 1.

Income of the household can influence malaria prevalence. As households with high income status can afford a balanced diet meal which can boost their immune systems; they can also afford mosquito repellants. And the end result would be that household's members have high income status are less likely to fall sick from malaria compared to those who with lower income status. Moreover, education level may be associated with malaria prevalence. Household heads who are better educated are more likely to mind about their hygiene and sanitation compared to uneducated household heads. Given that educated household heads have basic knowledge about malaria, they can easily monitor the symptoms and get treatment very early and thus reduce the prevalence of malaria.

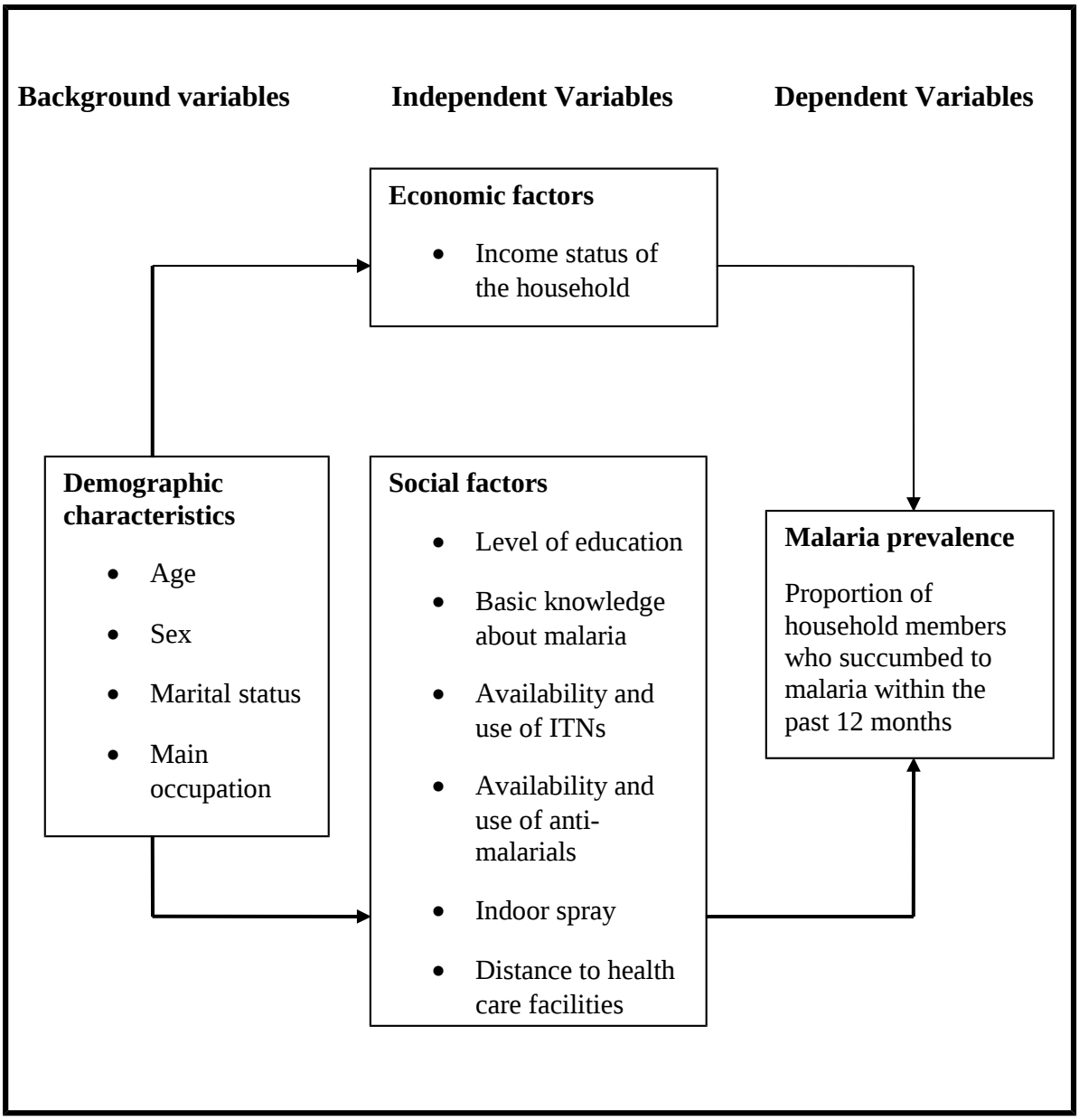

Figure 1: Conceptual framework of the research

Availability and use of ITNs is also noted to have an influence on malaria prevalence as ITNs are externally effective and practical barriers against mosquito bites, as when used properly, ITNs repel mosquitoes that come near human beings. The inability to access and use an ITN in some cases may relate to malaria prevalence. In addition, availability and use of anti-malarials may as well influence malaria prevalence, as it is expected that the rate of malaria prevalence for people who use anti-malarials for malaria prevention to be lower than those who aren't using anti-malarials. Nevertheless, indoor spray can also influence malaria prevalence. It is expected that for those households which are sprayed with insecticides to have lower malaria prevalence compared to households which aren't sprayed. However, indoor spraying may be associated with housing types, income and education level etc. Households located nearby health services are expected to have lower malaria prevalence as they get treatment early compared to households located far from health centres. The above hypothetical relationships were analysed to find their applicability to explaining the malaria prevalence.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview

This chapter describes the relevant literature on the research purpose and variables of the research. It presents a review of related data on how income status of the household, level of education, basic knowledge about malaria, availability and use of ITNs, availability and use of anti-malarials, indoor spray and distance to health care facilities relate to malaria prevalence.

2.2 Malaria and its Prevalence

Malaria is a life threatening parasitic disease transmitted by mosquitoes. It was once thought that the disease came from fetid marshes, hence the name *mal aria* (bad air). In 1880, scientists discovered the real cause of malaria, a one-cell parasite called plasmodium; it is transmitted from one person to another through bites of a female *Anopheles* mosquito which requires blood to get her eggs nurtured. This species of mosquitoes is prevalent throughout sub-Saharan Africa (RBM, 2010). It is widespread in tropical and subtropical regions such as Asia, America and Africa. 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 affects not only people's lives, but also their livelihoods. It is an obstacle to development, costing Africa an estimated $12bn every year in lost productivity and swallowing up 40% of health expenditures as it causes up to 15 missed work days per person per year, and families can spend up to 25% of their household income on malaria across the continent (RBM, 2010). It is the single largest disease in Africa and a primary cause of poverty. Everyday 3 000 children die from

malaria due to cerebral malaria and severe malaria (International conference on malaria in Africa, 1997).

2.3 Determinants of Malaria Prevalence

Malaria prevalence can be influenced by different factors. In this research factors influencing to malaria prevalence have been categorized into different economic and social factors, and they are as follows:

2.3.1 Economic determinants of malaria prevalence

A study of investing health and health services (Bowling, 1997) has reported that those in higher social-economic groups are more likely to pursue a good healthy life style than those in lower social - economic groups. Malaria prevalence has been linked to socio economic factors. The disease is argued to impose financial hardship on poor households, and hold back economic growth and improvement in living standards. It has been argued that the poor are less likely not only to use the effective preventive measures but also in an appropriate manner, this is because they live in poor houses, vulnerable rooms, and normally can't afford medicines or good hospitals. The expenses on prevention methods are related to income, wealth, education and occupation, though, the relationships are often not clear. However, studies examining malaria incidence by socio-economic status at the household level have not yet been able to provide reliable results on the distribution of malaria incidence between poor and less poor population groups because they are always contradictory (Worrall *et al.,* 2003).

2.3.2 Social determinants of malaria prevalence

Social determinants of malaria are the social conditions under which people live which determine their malaria prevalence. These determinants are not individual risk factors but they are societal risk conditions, which can either increase or decrease the risk for malaria prevalence.

2.3.2.1 Level of education

The effect of education on people is seen most clearly in relation to standard of living and life style of an individual. Nam (1968), states that levels of living standards and the life styles are associated with the given amount of education, which identifies the social milieu within which individuals regulate their health care. The knowledge an individual has gained about the way to avoid death improves his life chances and person with high level of education usually have greater knowledge about the means of mortality postponement than persons with little education. Moreover, there are increasing skills and benefits which come with increasing educational levels that may include ability to interact with health practitioners and among the benefits, there is socialization to adopt health promoting behaviors (Gaseka, 2009).

At the household level, mothers are responsible for management of the diseases, while fathers as the heads of households and have a final say on treatment seeking. Their education levels are important on reducing the malaria prevalence as education can reduce the number of malaria cases in some areas of the developing world by recognition of the disease symptoms earlier, or can help in eradication of breeding grounds for the parasite and mosquito, thus cutting down the risk of the transmission among people. In addition,

education level is strongly associated with contraceptive use, fertility and health (Tach, 1998).

2.3.2.2 Basic knowledge about malaria

Most of mosquito larval habitats in urban and rural communities of Africa are man-made such as man-made pools, drainage canals and burrow pits. People's knowledge influences their attitude and actions towards malaria. With knowledge, it is easier to control malaria incidents. For instance, in a research conducted in Kenya by Imbahale *et al.*, (2010), it was found that peri-urban residents knew more about mosquitoes' role in malaria transmission compared to rural people.

2.3.2.3 Availability and use of ITNs

Insecticide treated bed nets (ITN) have been shown to be the most cost-effective prevention method against malaria and are part of Millennium Development Goals (MDGs). ITNs are more effective in preventing bites than untreated nets ITNs reduce the transmissions of malaria within individuals by both repelling and when they land on the net killing mosquitoes that have come to feed on an asleep person Nakato (1999), as cited by Gaseka (2009), argues that the inability to afford an ITN in some cases due to lack of financial resources and others may relate to the low value people place on ITNs compared to their market price. Other household members believe that they do not need one and this relates to malaria prevalence (Gaseka, 2009).

Thus by investing in expansion of public knowledge on ITNs and how to use them, the government of Tanzania has succeeded at raising awareness on how serious malaria is. But the issue is whether the ITNs reach the poor rural. Studies have shown that in most

communities, mosquito net use is lowest among the poorest. For instance, TACAIDS *et al.,* (2008) report that 49% of urban children sleeps under ITN while in rural areas it is only 21% of the people who sleeps under ITN.

2.3.2.4 Availability and use of anti-malarial

Delaying for treatment can mean life or death especially to a child suffering from malaria; thus, availability of anti-malaria drugs is very crucial for decrease in malaria prevalence. According to TACAIDS *et al.*, (2008), children living in urban places are more likely to receive anti-malaria drugs (69%) compared to those of rural areas (54%). Nevertheless, those children of mothers with education or wealthy families are more likely to receive anti-malaria drugs. Cognisant of that; UNICEF, through integrated child survival programming, works with governments and communities affected by malaria to improve and promote effective malaria case management ensuring that children have access to medications within 24 hours of the onset of illness (UNICEF, 2009).

2.3.2.5 Indoor residual spraying (IRS)

IRS is the practice of spraying insecticides on the interior walls of homes in malaria affected areas. This helps in killing the mosquitoes that are sheltered within the houses before they can infect people. However, there are variations in household spraying due to wealth; wealthier households are more likely to use IRS compared to poorer households (5% to 1%) (TACAIDS *et al.,* 2008). Except there is one problem encountered with all forms of IRS, and that problem is insecticide resistance. Insecticide resistance is caused by evolution of mosquitoes, and that is a fact why new researches on malaria are conducted everyday.

2.3.2.6 Distance to health care facilities

The distance to health services is also an influential factor on malaria prevalence. People living in malaria endemic areas and who live at great distances from health services, whether governmental, non governmental or commercial markets and pharmacist, are more likely to suffer more from the disease than those who have such services close at hand. However, access may be limited by other factors apart from distance, close-by health facilities that have unreliable drug supplies, poorly trained and unsupervised staff, or charge fees unaffordable to affected populations are no better than non-existent or distant services. Moreover, malaria is more common in those people living in particularly poor and hard to reach areas. These communities often have limited access to primary health care and to simple and effective preventive tools such as insecticide-treated mosquito nets. In addition, they are less likely to have access to basic information regarding the disease and how to avoid it (Olumese, 2005). For instance, in a research which was done in Zambia by Baume *et al.,* (2000) it was found that children living within 1 hour travel time were more likely (79%) to be taken to health centres compared to those living more than 1 hour away (58%). However, another research in Kenya about the impact of primary health care on malaria morbidity revealed that good access to primary health services might reduce the burden of disease by as much as 66% (O'Meara *et al*., 2008). This shows that there is a relationship between malaria prevalence and distance to health services. Insufficient access is among the risk factors which might not be escaped by the poorest households.

2.4 Arguments about Determinants of Malaria Prevalence

Kacey *et al.,* (2009) have argued that the education level of female heads of household was inversely associated with malaria risk, though, Worrall *et al*., (2003) saw the

relationship between education and malaria knowledge is still unclear. The uncertainty regarding the role of education may be due to lack of clarity on whose education is being measured, mother or head of the house. Not only that, but also the level of education acquired, and its measurement vary greatly by study and location. Thus, it is still difficult to generalise it to other places; it is still ambiguous.

Brooker *et al.*, (2004) claimed that they had discovered that there is no association between household wealth and malaria risk. Their index may not have precisely differentiated levels of household wealth or variation may have been too limited to impact risk. Having a kitchen separate from the sleeping area was strongly associated with increased malaria odds, perhaps because smoke repels vector mosquitoes, although sleeping in a smoky room was not linked with the risk in another study in the Kenyan highlands. They also argued that house construction influences mosquito access to people sleeping inside and they found out that having a ceiling in the home was linked with decreased risk of malaria.

On the issue of care seeking, a research done in Gambia revealed that there was no difference between groups studied in the time before mothers sought some form of health care but mothers of children with severe disease were less ready to take their child to hospital than mothers of mild cases, signifying that there is a need for educating mothers on the importance of taking a child with features of malaria to a health centre as soon as possible before it developed into a severe disease. However, the general result of their study suggested that socio-economic and behavioural factors are not the major determinants for severe malaria in African children (Koram *et al.*, 1995). Another research done by Schellenberg *et al.*, (2003) on “Inequities among the very poor: health care for

children in rural southern Tanzania" revealed that care-seeking behaviour is worse in poorer than in relatively rich families, even within a rural society that might easily be assumed to be uniformly poor.

Malaria prevalence is still high in Tanzania maybe due to delay in seeking modern medical care (De Savigny *et al.,* 2004). Although there are strong reasons for believing that the burden of malaria is greatest among the poor, the evidence from literature supports these mixed arguments. One important consideration is whether this burden is measured in terms of malaria incidence, or vulnerability to more serious consequences of malaria arising from, for example, delayed treatment seeking. There do appear to be inequalities in the uptake of interventions, including treatment seeking patterns. However, the inconsistency and questionable reliability of the various ways in which socio-economic status is measured limit the strength of conclusions (Worrall *et al*., 2003).

2.5 Researchers Review of Factors Influencing Malaria Prevalence

The particular reasons for the higher risk of complications from malaria infection in the rural/poor have yet to be elucidated. Many have pointed to the possibility that financial barriers limit access to both preventive and curative preventive measures of malaria. Other factors including the educational level, distance from health services and traditional practices may also be the underlying reasons for malaria prevalence. Although researches on the use of ITNs and access and use of malaria treatment revealed lower coverage in the poorest compared with the least-poor, there is a need to clarify whether the malaria prevalence in Mtwara is primarily due to economic and social factors.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Overview

This chapter describes the methodology used in collecting and analyzing data for this study. The chapter is divided into five main sections. The first section describes the study area. This is followed by description of the research design, sample size and sampling procedures, data collection methods, and data analysis in section two, three, four and five respectively.

3.2 Study Area

Mtwara Region is where this research was conducted. It is situated in the southern part of Tanzania between longitudes 38° and 40° 30’ East Greenwich, and latitudes 10° 05’ and 11° 25’ South of the Equator. Further more it is bordered by Lindi Region in the North, the Indian Ocean in the East, Mozambique in the South and Ruvuma Region in the West. The region covers an area of 16 720 sq. Km and is divided in five administrative units which are Mtwara-Mikindani Municipality, Mtwara Rural District, Masasi, Newala, and Tandahimba. Moreover, it has 21 divisions, 98 wards and 554 villages (URT, 1997). The district was chosen for the study because it is among the places where malaria prevalence is higher compared to other places (malaria prevalence being 34%). The study was on rural-urban comparison. Therefore, it was conducted in Mtwara-Mikindani Municipality and Mtwara Rural District.

3.3 Research Design

A Cross–sectional research design was used. The approach enables data collection on a sample at one point in time. This study design has been recommended because it is economical in terms of time and allows comparison of variables of interest (Kothari, 2004).

3.4 Sample Size and Sampling Procedure

3.4.1 Study population

The population for this research was all the households of Mtwara District. The sample was drawn from households in Mtwara Municipality and Mtwara Rural District. Households were preferred as sampling units since they are the most appropriate units of sampling and measurement when assessing the prevalence of malaria. The researcher visited every selected household with a local village leader as a guide. If interview could not be fulfilled with a particular household, that household was replaced with another one situated in the same locality. This substitution procedure was continued until the desirable sample was obtained. Each interview took approximately half an hour to complete.

3.4.2 Sample Size

The sample of this research constituted 115 respondents from the selected wards whereby 60 respondents were taken from rural and 55 respondents were taken from urban areas. The respondents included household heads and other household members. Moreover, key informants such as ward leaders, local government and health personnel were also sampled.

3.4.3 Sampling techniques

Purposive sampling was used to select four wards, two from urban and two from rural areas. Purposive sampling was used also to select one ward with high prevalence of malaria and another one with low prevalence of malaria. On the same criteria, two villages/ streets were also selected, one in each ward. Simple random sampling was used to select respondent households from the selected village/ street to obtain a total of 115 households.

3.5 Data Collection Methods

3.5.1 Primary data

Primary data were obtained through interview schedules and key informant interviews. Interview schedules were administered to the chosen households at random and included both open and closed ended questions. With this method, non-responses were minimized, and risk of collecting incomplete data also declined. It helped in collecting supplementary information and improved the management of data collection (Kothari, 2004). Checklist questions were used to obtain information from key informants; mainly the ward leaders, local government officers and health personnel. The key informants were involved in order to capture more information on malaria in the surveyed areas.

3.5.2 Secondary data

Secondary data sources constituted documentary materials from government reports (internal and external), books, journals, newspapers, reports and publications from hospitals, health centers, NGOs, departments and agencies dealing with health issues.

3.6 Data Analysis

The survey data were coded and analyzed using the Statistical Package for Social Sciences (SPSS) whereby descriptive statistics including mean, median, mode, percentage, range, minimum and maximum values of individual variables were computed to demonstrate the demographic and socio-economic and cultural characteristics of the study population. Key indicators included age, gender, education, occupation, and housing size. Additionally, a "knowledge" index was constructed in order to provide a more comprehensive measure of respondents' knowledge related to malaria. The main knowledge categories focused on malaria symptoms, preventive measures and malaria knowledge in general.

Correlation was used to examine the association between malaria prevalence and respondents' knowledge about malaria. Indicators used in the test included malaria prevalence, knowledge on malaria symptoms, knowledge on malaria preventive measures and malaria knowledge in general. This method was used in order to test whether there were significant differences in malaria prevalence between households with people having different and knowledge levels about malaria.

Malaria prevalence was obtained by using the percentage number of household members who had succumbed to malaria within the previous 12 months. Frequency distribution tables were used to show the total number of people who had succumbed to malaria. Furthermore, in order to compare malaria prevalence among households with different levels of economic and social factors, One Way ANOVA and t-test were used. To know if there was a linkage between malaria prevalence and economic levels of households, income status of the households and percentage of people who had succumbed to malaria within the previous twelve months were compared using One-Way ANOVA. Moreover, to

compare malaria prevalence based on some social factors; One-Way ANOVA was used to compare malaria prevalence by education levels of household heads. In addition, t-test was used to compare malaria prevalence between households owning ITNs and households without ITNs; between households where anti-malaria drugs were used and where they were not used; between households where insecticides were sprayed and households where insecticides were not sprayed. Moreover, correlation was used to determine the relationship between distance to health facilities and malaria prevalence.

3.7 Data Limitations

A major drawback of clinical data from the hospitals, clinics, health centres, etc. was that no information was available concerning malaria prevalence at the ward level as they only had malaria prevalence data at the district level; thus since the study needed two wards with high malaria prevalence and two with lower malaria prevalence; the wards were suggested basing on the areas being more or less conducive to mosquito breeding.

Some respondents had poor cooperation arguing that every now and then people had been going there and asking them questions but no feed back was being given to them. They asserted that they were tired of answering questions. But after detailed explanations, they responded willingly to the questions.

Another limitation was that since the sample of the study was drawn from household heads only, it was not easy to find all household heads at home during the time of interview because they were the bread winners of the households. And when the heads of the households were not at home during the time of interview then members of the family with age above 18 were selected to fulfill the interview on behalf of the household heads.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Overview

This chapter presents the results and discussion of the results. It gives an overview on economic and social factors related to malaria prevalence in Mtwara District. The results of this study are presented and discussed in relation to the study objectives and hypotheses. The results are divided into seven sections. Section 4.1 describes demographic characteristics of respondents i.e. age, sex and marital status. Section 4.2 describes various levels of economic and social factors associated with malaria prevalence. Malaria occurrence among household members is described in section 4.3. Section 4.4 is on respondents' knowledge on symptoms and preventive measures for malaria while section 4.5 describes linkage between malaria prevalence and households with different economic and social levels. Moreover, hypothesis testing results are described in section 4.6.

4.2 Demographic Characteristics

Three aspects of socio-economic characteristics which are age, sex and marital status are considered in this section.

4.2.1 Ages of household heads

Age is an important demographic variable and is the primary basis for demographic classification in vital statistics, censuses, and surveys (URT, 2005). In this study, the age distribution of household heads as presented in Table 1 illustrates that the minimum household head age for all the surveyed households was 18 while the maximum age was 86 years. This shows that all respondents were adults and for that reason they were able to take household responsibilities. Out of the 115 households surveyed, about half of the

households heads were at most 35 years old, a group which is considered to be the group of the working ages; while household heads with 64 years and above, which are considered as a group of age-dependency ratio, were only 14.8%. The 2002 Population and Housing Census showed that the proportion of the population aged below 15 years was about 44 % while those aged 65 years and above were 4 %, indicating that Tanzania has a young population. This youthful age structure entails a larger population growth in future, as the young people move into their reproductive life irrespective of whether fertility declines or not (URT, 2006). In addition, the average age for all surveyed household heads was 41.8. The mean age for rural population was 42.7; thus these findings show that rural populations were relatively older, unlike urban populations whose mean age was 40.8. Moreover, the group of 35 years for urban people was 54.5% while that of rural people was 43.3%. These findings show that urban areas have higher proportion of young people compared to that of rural people. This is because most young people move from rural to urban areas seeking employment due to poor living conditions in rural areas. In fact, one of the key informants was quoted saying as follows: “Many young people migrate to Mtwara Urban areas seeking employment, and if there are no jobs they employ themselves and work as small scale traders (machingas). As a consequence that is why you find rural people having more aged people while urban people are younger”.

Moreover, the proportion of the population living in urban areas increased from 5% in 1967 to 13% in 1978, and from 21% in 1988 to 27% in 2002. Between the years 1978 and 1988, the urban population in Tanzania increased by 53 percent (URT, 2006).

Table 1: Age of household heads in relation to ward of residence

Age of household heads	Ward of residence		All (n=155)
	Rural (n=60)	Urban (n=55)	
<35 years	43.3%	54.5%	**48.7%**
36-64 years	43.4%	28.8%	**36.5%**
64<	13.3%	16.7%	**14.8%**
Mean	42.7	40.9	**41.8**
Minimum	19	18	**18**
Maximum	80	86	**86**

4.2.2 Sex of household heads

The findings show that out of the 115 households surveyed, 38.3% of household heads were male while female household heads were 61.7%. In urban Mtwara a total of 55 household heads were interviewed and 41.8% of those household heads were male while female household heads were 58.2%. On the other hand, out of 60 rural household heads, 35% were male while females were 65%. It shows that the sample had more female household heads compared to male household heads. This is because the region has more females compared to males. The 2002 census reported that the region has 47.4% male and 52.6% female (URT, 2002). Moreover, the 2002 census showed that a substantial proportion of households (up to 32.7% of all households) were headed by females. In the rural areas 32.4 % of the households and in urban areas 33.6% of the households were female-headed (URT, 2006).

4.2.3 Marital status of surveyed household heads

Among the surveyed households, 74.8% of the households heads were married (73.3% in rural areas and 76.4% in urban areas) while 4.3% were divorced (5.0% in rural areas and 3.6% in urban areas); 3.5% were widowed (6.7% in rural areas and 0.0% in urban areas);

4.3% were never married (8.3% in rural areas and 0.0% in urban areas) and others were only 13.0% (6.7% in rural areas and 20.0% in urban areas). These results show that more respondents were married, thus these results resemble those in many Tanzanian communities whereby 60% women and 50% men are married (NBS, 2005).

Table 2: Marital status of the household head

Marital status of household heads	Ward of residents		Total (n=115)
	Rural (n=60)	Urban (n=55)	
	(%)	(%)	(%)
Married	73.3	76.4	**74.8**
Divorced	5.0	3.6	**4.3**
Widowed	6.7	0.0	**3.5**
Never Married	8.3	0.0	**4.3**
Others (single)	6.7	20.0	**13.0**
Total	**100.0**	**100.0**	**100.0**

4.2.4 Occupations of the household heads

In this study 80.9% of household heads were peasants, followed by 11.3% traders, 3.5% fishermen, while 1.7% were housewives. In addition, those who were engaged in carpentry, teaching and salaried employment occupations were reported to be 0.9%. The results showed that rural people were more likely to engage in peasantry (95.0%) compared to urban people (65.5%). The National Strategy for Growth and Reduction of Poverty II (URT, 2010) states that a large proportion of the poor in rural areas who depend on agriculture as their mainstay, agriculture is central to poverty reduction in general and hunger/ food poverty reduction in particular. It is argued that agriculture constitutes the most important sector of the Tanzanian economy, by providing about 25.0% of the GDP. Moreover, it is reported that in Mtwara Region agriculture is the foremost economic

sector. About 90% of the agricultural output is by smallholder farmers (URT, 1997). The occupational statuses of the household heads are presented on Table 3.

Table 3: Main occupation of the household head

Occupations of the household heads	Ward of residents		All (n=115)
	Rural (n=60)	Urban (n=55)	
	(%)	(%)	(%)
Peasant	95.0	65.5	**80.9**
Fisherman	0.0	7.3	**3.5**
Employed	1.7	0.0	**0.9**
Housewife	0.0	3.6	**1.7**
Trader	1.7	21.8	**11.3**
Carpenter	0.0	1.8	**0.9**
Teacher	1.7	0.0	**0.9**
Total	**100.0**	**100.0**	**100.0**

4.3 Various Economic and Social Factor Levels

4.3.1 Economic factors levels

4.3.1.1 Assets owned by households

Assets owned by household heads are shown in Table 4. The leading asset owned was insecticide-treated mosquito nets which was owned by 111 (96%) followed by beds owned by 108 (93.9%) and houses 92 (80.0%). The least owned assets were cars and sofa sets which were owned by 0 (0.0%). Others are as shown in Table 4.

Table 4: Showing household assets

Assets owned by the households	Frequency	Percentage
House	92	80.0
Land	88	76.5
Shop	11	9.6
Car	0	0.0
Bicycle	57	49.6
Motorcycle	6	5.2
Sewing machine	4	3.5
Radio	79	68.7
Television	5	4.3
Sofa	0	0.0
Mobile phone	39	33.9
Beds	108	93.9
Mosquito nets	8	7.0
Insecticide-treated mosquito nets	111	96.5
An axe and machete	57	49.6

Table 5 shows the number, minimum, maximum, sum and mean of assets owned in the surveyed household heads. The leading numbers of assets owned by parents were beds 7 maximum, followed by insecticides mosquito nets, axes and machetes.

Table 5: Numbers of assets owned by household heads

Number of assets owned	n	Min	Max	Sum	Mean
Houses	92	1	2	98	1.07
Land	88	1	4	106	1.20
Shops	11	1	1	11	1.00
Cars	0	0	0	0	0.0
Bicycle	57	1	4	68	1.19
Motorcycles	6	1	1	6	1.00
Sewing machine	4	1	3	6	1.50
Radio	79	1	3	85	1.08
Television	5	1	1	5	1.00
Sofa	0	0	0	0	0.0
Mobile phone	39	1	3	46	1.18
Beds	109	1	7	284	2.61
Mosquito nets	8	1	4	19	2.38
Insecticide-treated mosquito	113	1	6	314	2.78
Axes and machete	57	1	5	91	1.60

4.3.1.2 Monetary values of the assets

Household heads were asked to rank the monetary values of their assets. The descriptive statistics as presented in Table 6, demonstrate that the leading valuable assets were houses with a maximum of Tshs 5 000 000 followed by land and shops, of which were worth Tshs 3 000 000.

Table 6: Current monetary values of assets owned by household heads

Number of assets owned	Min	Max	Sum	Mean
Current monetary value of the house/s	0	5 000 000	58 315 000	507 086.96
Current monetary value of land/s	0	3 000 000	62 750 000	545 652.17
Current monetary value of the shop/s	0	3 000 000	13 500 000	117 391.30
Current monetary value of the car/s	0	0	0	0.00
Current monetary value of the bicycle/s	0	220 000	3 525 000	30 652.17
Current monetary value of the motorcycle/s	0	1 500 000	6 100 000	53 043.48
Current monetary value of the sewing machine/s	0	360 000	664 000	5 773.91
Current monetary value of the radio/s	0	150 000	2 158 500	18 769.57
Current monetary value of the television/s	0	200 000	800 000	6 956.52
Current monetary value of the sofa/s	0	0	0	0.00
Current monetary value of the mobile phone/s	0	400 000	3 750 000	32 608.70
Current monetary value of the beds	0	2 000 000	17 864 000	155 339.13
Current monetary value of the mosquito nets	0	20 000	77 000	669.57
Current monetary value of the insecticide-treated mosquito nets	0	36 000	1 876 000	16 313.04
Current monetary value of axes and machete/s	0	30 000	540 500	4 700.00

The monetary values of assets were grouped into five quintiles as follows: the first quintile was that of the assets' monetary value of at most 415 000 Tshs; the second quintile was that of assets' monetary value from 415 001 to 812 000 Tshs; the third quintile was that of assets' monetary valued from 812 001 to 1 495 000 Tshs; the fourth quintile was that of assets' monetary value from 1 495 001 to 2 306 000 Tshs and the last quintile was that of the assets' monetary value of more than 2 306 000 Tshs). Furthermore, the monetary

values of assets owned by the household heads are summarized in Table 7, which shows that people in the lowest quintile of the assets' monetary value of at most 415 000 Tshs were 31.7% for rural areas and 7.3% for urban areas while people in the highest quintile of the assets' monetary value of more than 2 306 000 Tshs were 15.0% in rural areas and 25.5% in urban areas. These results illustrate that rural households' assets were relatively low in quality and values compared to those of urban households. This might be due to the fact that most of rural people are poor unlike urban people.

Table 7: Monetary values of the assets owned by the households

Quintiles of net income	Ward of residents		All(n=115)
	Rural (n=60)	Urban (n=55)	
	(%)	(%)	(%)
First Quintile	31.7	7.3	20.0
Second Quintile	20.0	20.0	20.0
Third Quintile	16.7	23.6	20.0
Fourth Quintile	16.7	23.6	20.0
Fifth Quintile	15.0	25.5	20.0
Total	100.0	100.0	100.0

4.3.1.3 Income status

The households' income per capita descriptive statistics revealed that the minimum income per capita per year for rural households was Tshs 40 000 while for urban households it was Tshs 41 667 and the maximum income per capita per year was Tshs 1 440 000 and Tshs 1 250 000 for rural and urban areas respectively.

Table 8: Descriptive statistic on households' income per capita

Net income per capita	N	Minimum	Maximum	Sum	Mean
Rural households	60	40 000	1 440 000	11 045 714	184 095.24
Urban households	55	41 667	1 250 000	11 833 429	215 153.25
All households	115	40 000	1 440 000	22 879 143	198 949.07

Furthermore, the household heads were grouped into five quintiles based on income per capita per year. The first quintile was that of the lowest income (income at most 70 000 Tshs; the second quintile was of lower income (income from 70 001 to 120 000 Tshs; the third quintile was of average income (income from 120 001 to 160 000 Tshs; the fourth quintile was of higher income (income from 160 001 to 262 500 Tshs; and the last quintile was of the highest income (income more than 262 500 Tshs.

The result shows that in the first quintile, the lowest income quintile (income of at most 70 000) for all surveyed populations, there were 19.1% while for rural households there were 25.0% and among urban households there were 12.7%. In the second quintile i.e. the lower income (income from 70 001 to 120 000 Tshs) there were 20.9% (30.0% rural areas and 10.9% urban areas). Those results show that rural households were relatively poor compared to the urban population.

In addition, in the third quintile (income from 120 001 to 160 000 Tshs) there were 19.1% (11.7% rural areas and 27.3% urban areas). In the fourth quintile (income from 160 001 to 262 500 Tshs) there were 20.0% (13.3% rural areas and 27.3% urban areas); and in the fifth quintile (income more than 262 500 Tshs) there were 20.9% (20.0% rural areas and 21.8% urban areas). All these three quintiles show that the urban people were far rich compared to the rural people.

Table 9: Income status of the household heads

Quintiles of net income	Ward of residents		All (n=115)
	Rural (n=60)	Urban (n=55)	
	(%)	(%)	(%)
First Quintile	25.0	12.7	**19.1**
Second Quintile	30.0	10.9	**20.9**
Third Quintile	11.7	27.3	**19.1**
Fourth Quintile	13.3	27.3	**20.0**
Fifth Quintile	20.0	21.8	**20.9**
Total	**100.0**	**100.0**	**100.0**

4.3.2 Social factors levels

4.3.2.1 Level of education for household heads

Education levels of the household heads are expected to play a great role in ensuring households' access to basic needs such as food, shelter and clothing (Person and Swanson, 1966). The level of education was obtained through asking the household heads to list the number of years they had spent on formal education. The findings show that educational attainment was quite low; sizeable proportions of people had not attended primary school (38.3% in rural areas and 21.8% in urban areas) while 54.8% of the interviewed household heads had attained primary education (50.0% in rural areas and 60.0% in urban areas). However, 7.8% of all household heads had dropped out of primary schools (5.1%.in rural areas and 10.9% in urban areas). Moreover, 6.1% of household heads had managed to acquire secondary education (6.7% in rural areas and 5.5% in urban areas). However, only 0.9% had dropped out of secondary education (0.0% in rural areas 1.85% and in urban areas). The Tanzanian Government has implemented different programmes like the Primary Education Development Programme (PEDP), Secondary Education Development Programme (SEDP), Higher Education Development Programme (HEDP), Adult and Non-formal Education Strategy (ANFES), Universal Primary Education (UPE) etc. to ensure that education is accessible at all levels. And the high rates of household heads of

this study having acquired primary education may be attributed to those efforts (URT, 2010).

Table 10: Number of years spent on schooling between rural and urban population

Level of education	Ward of residents		All (n=115)
	Rural (n=60)	Urban (n=55)	
	(%)	(%)	(%)
Didn't attend primary school at all	38.3	21.8	**30.4**
Less than primary education	5.1	10.9	**7.8**
Completed primary education	50.0	60.0	**54.8**
Less than secondary school	0.0	1.8	**0.9**
Secondary education	6.7	5.5	**6.1**
Total	**100.0**	**100.0**	**100.0**

4.3.2.2 Basic knowledge about malaria

Three malaria knowledge index scales were created in order to measure household heads' basic knowledge about malaria. The first scale was about knowledge on the symptoms of malaria on which the minimum possible score was 0 while the maximum possible score was 30. Knowledge scores were calculated based on respondent answers to six statements each statement scoring a minimum of 0 and a maximum of 5. Based on this scale, the range of points for lower knowledge of respondents towards malaria symptoms ranged from 0 to 10 while the range of points higher knowledge ranged from 11 to 30. The findings show that the proportion of people with high awareness of malaria symptoms was 80.9% (80.0% in rural areas and 81.8% in urban areas) while the proportion of people with awareness of malaria symptoms was 19.1% (20.0% in rural areas and18.2% in urban areas). Table 11 shows that most of household heads had higher awareness about malaria symptoms.

Table 11: Rural-urban scores on overall awareness of malaria symptoms

Awareness on malaria symptoms	Ward of residents		All (n=115)
	Rural (n=60)	Urban(n=55)	
	%	%	%
Lower score of awareness of malaria symptoms (0 to 10 points)	20.0	18.2	19.1
Higher score of awareness of malaria symptoms (11 to 30 points)	80.0	81.8	80.9
Total	**100.0**	**100.0**	**100.0**

The second index scale was on knowledge of respondents about malaria prevention, which was determined using a 35 point scale that comprised 7 statements. The knowledge about malaria preventive measures was categorized into two levels i.e. lower knowledge and higher knowledge. Lower knowledge of household heads towards malaria prevention ranged from 0 to 20 points while higher knowledge ranged from 21 to 35 points. The cutting of points was based on the average of overall knowledge which was 35 points. The results show that household heads with higher knowledge about malaria prevention were 51.3% (33.3% in rural areas and 70.9% in urban areas) while those with lower score of awareness of malaria prevention were 48.7% (66.7% in rural areas and 29.1% in urban areas). These findings demonstrate that knowledge related specifically to malaria prevention was generally higher among urban household heads relative to rural household heads.

The third index scale was on knowledge about malaria in general. This was a 50 points index scale which comprised 10 statements. The minimum possible score was 0, and the maximum possible score was 50 points. The range of points based on the average of overall knowledge about malaria ranged from 0 to 35 for lower knowledge while for

higher knowledge the points ranged from 36 to 50. Household heads with higher knowledge about malaria were 53.0% (36.7% in rural areas and 70.9% in urban areas) while those with lower awareness of malaria were 47.0% (63.3% in rural areas and 29.1% in urban areas). These findings reveal that knowledge about malaria was relatively lower among rural household heads vis-a-vis urban household heads.

4.3.2.3 Mosquito net ownership

In Tanzania, the use of insecticide treated mosquito nets (ITNs) is considered as a primary health intervention to reduce malaria transmission, as it reduces biting intensities and offers protection against malaria (USAID, 2009). The findings indicate that 98.3% of the households surveyed owned at least one ITN (98.3% in rural areas and 98.2% in urban areas) while only 1.7% didn't own an ITN (1.7% in rural and 1.8% in urban areas).

4.3.2.4 Sources of mosquito nets

Before 2008, mosquito nets were mainly obtained through the commercial sector. The Tanzanian Government, through different programmes, managed to distribute mosquito nets almost all over the country. In spite of steady increases in ITN distribution and the special contributions of the *Hati Punguzo* programme whereby vouchers for obtaining ITNs are provided to all pregnant women and infants who attend health facilities, coverage of ITNs did not reach the set target of 60% of households by 2007. Thus, the government responded by increasing the scope and scale of ITNs distribution through subsidized national schemes (USAID *et al.*, 2009). In this survey, in order to test the availability of mosquito nets, household heads were asked where they had got the mosquito nets that they were using; the results showed that Local Government Authorities (LGA) were the leading source of mosquito nets for Mtwara District as 65.2% of all household heads said that the

nets they were using had been provided to them by the LGAs (78.3% in rural areas and 50.9% in urban areas). Shops were the second most common source of mosquito nets whereby 32.2% of household heads said that they had bought mosquito nets from shops (18.3% in rural areas and 47.3% in urban areas). Health facilities were the least important source of mosquito net since only 0.9% claimed that they had got the nets from health facilities (1.7% in rural areas and 0.0% in urban areas). Table 12 clearly shows that LGAs were more important sources of mosquito nets in rural households than in urban households since the urban populations had two options, either from the LGAs or buying from them shops.

Table 12: Source of mosquito nets

Where did you get mosquito nets	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
Shop	18.3	47.3	**32.2**
Health facilities	1.7	0.0	**0.9**
Government	78.3	50.9	**65.2**
Not applicable	1.7	1.8	**1.7**
Total	**100.0**	**100.0**	**100.0**

4.3.2.5 How much it would cost a household to buy a mosquito net

A half of all surveyed households claimed that a mosquito net would cost Tshs 6000. The minimum cost would be Tshs 3000 and the maximum would be Tshs 7500. The minimum cost of mosquito net for urban areas was Tshs 3500 while the maximum was Tshs 7500. The minimum cost for a mosquito net for rural people was Tshs 3000 and the maximum was Tshs 6000. These findings show that the costs for a mosquito net were almost the same in rural and urban areas.

Table 13: How much it would cost a household to buy a mosquito net

Variable	Rural	Urban	All
N	60	55	115
Mean	5625	5527	5578
Minimum	3000	3500	3000
Maximum	6000	7500	7500

4.3.2.6 Mosquito net uses in household

Table 14 shows that mosquito net use was extremely high among the household surveyed, as 90.4% of the respondents stated that everyone in their households slept under a mosquito net; 5.2% claimed that only women and children slept under mosquito nets; 0.9% argued that only father and mother slept under mosquito nets; and 3.5% of the people hadn't slept under mosquito nets. A greater proportion of rural people slept under mosquito nets compared to urban people. Overall, 93.3% of rural household members were sleeping under mosquito nets while 87.3% household members of urban households were sleeping under mosquito nets. Moreover, only 3.3% of rural people and 3.6% of urban people were not sleeping under mosquito nets.

Table 14: Mosquito net use at a household

Who sleeps under mosquito net in your household	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
Children and women	1.7	9.1	**5.2**
Everyone	93.3	87.3	**90.4**
No one	3.3	3.6	**3.5**
Father and mother	1.7	0.0	**0.9**
Total	**100.0**	**100.0**	**100.0**

4.3.2.7 Household frequency of sleeping under mosquito nets

Table 15 shows the proportion of all rural and urban households where people slept under a mosquito net. There was a slight difference by ward of residence in the use of mosquito nets; overall, 90.4% of all people claimed that they were sleeping under mosquito nets

throughout the year (93.3% rural areas and 87.3% urban areas); 6.1% were only sleeping under mosquito nets during rainy seasons (3.3% rural areas and 6.1% urban areas); and in 3.5% of all surveyed people were never sleeping under mosquito nets (3.3% rural areas and 3.6% urban areas).

Table 15: Household members' frequency of sleeping under mosquito nets

How often you or your family sleep under mosquito nets	Rural		Urban		All	
	Number	%	Number	%	Number	%
Throughout the year	56	93.3	48	87.3	104	90.4
Rainy season	2	3.3	5	9.1	7	6.1
Never	2	3.3	2	3.6	4	3.5
Total	**60**	**100.0**	**55**	**100.0**	**115**	**100.0**

4.3.2.8 Usage of drugs for malaria prevention

The vast majority (93.1%) of all household heads had never used anti-malarials (93.3% in rural areas and 94.5% in urban areas) while merely 6.1% of household heads had been using anti-malarials for malaria prevention (6.7% in rural areas and 5.5% in urban areas).

4.3.2.9 Types of anti-malarials used

In order to know which type of medicines were usually used by the households for malaria prevention, the household heads were asked to name the types of medicine they normally used. Out of all surveyed people the results showed that SP (5.5%) was the regularly used drug for malaria prevention, while other medicines like Hommaquine, Traditional medicine and Malafin were not commonly used by the households as the results show that only 0.9% of the people had used each of them.

Table 16: Malaria drugs used for prevention

Type of malaria prevention drugs used	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
SP	1.7	5.5	**3.5**
Hommaquin	1.7	0.0	**0.9**
Traditional medicine	1.7	0.0	**0.9**
Malafin	1.7	0.0	**0.9**
Not applicable	93.3	94.5	**93.9**
Total	**100.0**	**100.0**	**100.0**

4.3.2.10 Numbers of time per year anti-malarial drugs were used

The respondents were asked about the number of times all the household members had used anti-malarial drugs within the previous 12 months. The responses are presented in Table 17, which shows that out of those households using anti-malarial drugs only 0.9% were using them 3 times per year (1.7% rural areas and 0.0% urban areas); 3.5% were using them 4 times per year (1.7% rural areas and 5.5% urban areas); and 1.7% were using them 12 times per year (3.3% rural areas and 0.0% urban areas).

Table 17: Numbers of times per year anti-malarial drugs were used

Numbers of times per year anti-malarial drugs were used	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
3	1.7	0.0	**0.9**
4	1.7	5.5	**3.5**
12	3.3	0.0	**1.7**
Not applicable	93.3	94.5	**93.9**
Total	**100.0**	**100.0**	**100.0**

4.3.2.11 Malaria treatment

The respondents were asked if they had ever used any drugs for malaria treatment. The finding show that 92.2% of the people in all surveyed households had used drugs for malaria treatment (93.3% in rural areas and 90.9% in urban areas); and only 7.8% of all households had never used drugs for malaria treatment (6.7% in rural areas and 9.1% in

urban areas). These figures show that rural people are more likely to treat malaria compared to urban people.

4.3.2.12 Drugs used for malaria treatment

Alu was the most used medicine while SP and Cotexin were the least used medicines as presented in Table 18.

Table 18: Drugs often used for malaria treatment

Anti-malaria drugs used for malaria treatment	Rural (n=60)	Urban (n=55)	All(n=115)
	%	%	%
Alu	78.3	72.7	**75.7**
Cotexin	3.3	0.0	**1.7**
Metakelfin	3.3	1.8	**2.6**
Quinine	0.0	5.5	**2.6**
None	8.3	9.1	**8.7**
Malafin	5.0	0.0	**2.6**
Amodiaquin	1.7	7.3	**4.3**
SP	0.0	3.6	**1.7**
Total	**100.0**	**100.0**	**100.0**

4.3.2.13 Source of anti-malaria drugs

In order to know the respondents' source of anti-malaria, household heads were asked whether they normally got anti-malaria drugs. The results, as presented in Table 20, show that the availability of drugs varied between rural and urban households. More than a half (52.2%) of household heads claimed that they had got anti-malarials from dispensaries (46.7% in rural areas and 58.2% in urban areas); and 37.4% had got anti-malarials from hospitals (43.3% in rural and 30.9% in urban areas). Moreover, 8.7% had got anti-malarials from pharmacies (6.7% in rural areas and 10.9% in urban areas); and only 1.7% had got anti-malarials from nearby shops (3.3% in rural areas and 0.0% in urban areas). This means that urban people were more likely to opt for dispensaries and pharmacies as

sources of anti-malarials instead of nearby shops, unlike rural people who still considered nearby shops and hospitals as more important sources of anti-malarials in addition to dispensaries and pharmacies.

Table 19: Sources of anti-malarials

Source for anti-malarial	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
Nearby shop	3.3	0.0	**1.7**
Pharmacy	6.7	10.9	**8.7**
Dispensary	46.7	58.2	**52.2**
Hospital	43.3	30.9	**37.4**
Total	**100.0**	**100.0**	**100.0**

4.3.2.14 Availability of anti-malarial drugs at the nearest public health facilities

In order to know the availability of anti-malarials, the household heads were asked whether anti-malarial drugs were always available at the nearby public health facilities. The results illustrate that 73.9% of all household heads claimed that anti-malarials were always available at nearby public health facilities (70.0% in rural areas and 78.2% in urban areas) while 24.3% argued that the anti-malarials were not always available at nearby health facilities (30.0% in rural areas and 18.2% in urban areas). Overall, 1.7% of all the respondents stressed that they did not know the status of availability of anti-malarial drugs at their nearby health facilities (0.0% in rural areas and 3.6% in urban areas).

4.3.2.15 Where household members often spent the evenings

According to Wood (1993), malaria transmission occurs primarily between dusk and dawn because of the nocturnal feeding habits of mosquitoes. Therefore, precautions during these hours are most important. The findings of this study showed that nearly all people in the

sample spent their evenings outdoors. In summary, 92.2% of all surveyed people spent their evenings outdoors (95.0% in rural areas and 89.1% in urban areas) while only 7.8% spent their evenings indoors (5.0% in rural areas and 10.9% in urban areas). These results show that rural people were more likely to spend their evenings outdoors compared to urban people.

4.3.2.16 Mosquito repellents usage

Respondents were asked if they were using mosquito repellents in order to know the link between malaria prevalence and the use of mosquito repellents. The results illustrated that 98.3% (98.3% in rural and in 98.2% urban areas) of all surveyed household were not using mosquito repellents while 1.7% of the surveyed households (1.7% in rural and 1.8% in urban areas) were using mosquito repellents. These findings show that mosquito repellent usage in the surveyed area was still low.

4.3.2.17 Types of mosquito repellents used

Burning and spraying were the types of mosquito repellents usually used in the surveyed households. Out of 60 rural households surveyed only one household head was using mosquito repellents, and out of 55 urban households surveyed only 1 household was using mosquito repellent. The only difference was that in rural households burning repellents were being used while in urban areas spray repellents were being used. That proportion shows that most of the surveyed households were not acquainted with mosquito repellents.

Table 20: Type of mosquito repellents used

Mosquito repellent used	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
Burning	1.7	0.0	**0.9**
Spray	0.0	1.8	**0.9**
Not applicable	98.3	98.2	**98.3**
Total	**100.0**	**100.0**	**100.0**

4.3.2.18 Whether sampled households' houses had wire gauze

To know whether the respondents' houses had wire gauze, the respondents were asked if the houses they were living in had wire gauze. Three-fifths (60%) of all surveyed households were living in houses with no wire gauze on windows (71.7% in rural areas and 47.3% in urban areas) while 40.0% were living in houses with wire gauze (28.3% in rural areas and 52.2% in urban areas). That shows that rural people were more likely to live in houses with no wire gauze unlike urban people.

4.3.2.19 Household insecticides spray

One of the primary prevention measures against malaria is basically through indoor residual insecticide spraying (IRS); the results show that only 7.8% of surveyed households reported that they had sprayed their houses (3.3% in rural areas and 12.7% in urban areas) while the majority (92.2%) had not sprayed their houses with insecticides (96.7% in rural areas and 87.3% in urban areas). These figures indicate that a large proportion of rural people had not sprayed their houses over the previous twelve months compared to urban people. It might have been due to the fact that many of the surveyed people lived in rural areas in poor quality houses constructed using mud or mud bricks with grass thatch for roofs; thus, it was hard for them to spray their houses.

4.3.2.20 Responsibility for household insecticides spraying

In order to know who was responsible for spraying the house with insecticides, the respondents were asked to state the person who was responsible for the spray. Out of four choices that were presented; government worker, private company, household member and others (specify); all household heads whose houses were sprayed answered that household members were responsible for the spray.

4.3.2.21 Distance to health care facilities

To estimate the distance from the place of residence to health care facilities, respondents were asked how many kilometres they walked or travelled from their place of residence to a nearby dispensary or hospital.

Table 21: Distance from home to the nearest dispensary

Distance in kilometers	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
1.00	8.3	100.0	**52.2**
1.50	1.7	0.0	**0.9**
2.00	40.0	0.0	**20.9**
5.00	25.0	0.0	**13.0**
7.00	25.0	0.0	**13.0**
Total	**100.0**	**100.0**	**100.0**

The results in Table 21 show that all members in the surveyed urban households walked only 1 kilometre from their homes to nearby dispensaries while 8.3%, 1.7%, 40.0% and 25% of rural population walked 1, 1.5, 2.0, and 5 kilometres respectively. The farthest distance to a nearest dispensary was 7 kilometres which was scored by 25% of rural households. This shows that health services were more accessible to urban people compared to rural people. Table 22 demonstrates that rural people lived far from hospitals compared to urban people.

Table 22: Distance from home to the nearest hospital

Distance in kilometers	Rural (n=60)	Urban (n=55)	All (n=115)
	%	%	%
12	0.0	54.5	**26.1**
13	0.0	45.5	**21.7**
16	50.0	0.0	**26.1**
26	50.0	0.0	**26.1**
Total	**100.0**	**100.0**	**100.0**

4.4 Malaria Occurrence among Household Members

4.4.1 Malaria prevalence

In this study malaria prevalence was measured by the percentage of household members who had succumbed to malaria within the previous 12 months. The prevalence of malaria reported in this study was determined through the number of household members who had succumbed to malaria and reported to health facilities. All the 115 households that were surveyed had a total of 479 individuals; and out of those individuals, the numbers of people who had been sick and reported to health facilities were 91 while the numbers of people who were sick and didn't report to health facilities were 388. The results showed that 19.0% of surveyed households had been succumbed to malaria within the previous12 months.

In order to know whether the area had higher or lower malaria prevalence, descriptive statistics were used. The cut off point for the whole group was 17% which was at most equal to 51.3% where 48.7% suffered more. Moreover, the results showed that 51 households out of 115 households surveyed had not reported their households' malaria cases to healthy facilities within the previous 12 months. By these results it means 64 households had reported their households' malaria cases to healthy facilities. And if the

study was only to those households which had members who had been succumbed to malaria and reported to healthy facilities, then malaria prevalence for those households where members had succumbed to malaria would have been 34.19% i.e. as low as a minimum of 13 and as high as a maximum of 100. The cut-off point for higher and lower prevalence of malaria was 25%,. Based on this cut-off point households' with lower prevalence were 53.1% while those with higher prevalence were 46.1%.

Slightly more than one-third (34.8%) of the respondents claimed that they preferred buying medicines at the pharmacies and use them once they felt malaria symptoms and if the sickness persisted they had to go to hospital. Others claimed they didn't report to hospitals when they felt ill because of the costs of treatment, long distances to the hospitals and scarcity of medicines at the nearby dispensaries. That is why the results showed that 19.0% of 115 households had succumbed to malaria; however it could have been more than that if all of the surveyed households had reported to health facilities when they were ill.

4.4.2 Differences in prevalence of malaria in rural and urban areas

Differences in malaria prevalence between rural and urban areas of Mtwara District were determined using a t-test. Table 23 displays a summary of the results on the differences. The results show that malaria prevalence in urban areas was 18.8% while that in rural areas was 19.2%. By those results it means that malaria prevalence was higher in urban than in rural areas. This shows that rural areas were more prone to malaria prevalence compared to urban areas and this might be due to poor economy of many rural respondents, scarcity of insecticides and houses of most of rural respondents which were

of poor condition, and they lacked ceiling boards while the windows had no mosquito gauze, thus not conducive for insecticide spraying.

Table 23: Group Statistics showing differences in prevalence of malaria in rural and urban Areas

Ward of residents	N	Mean	t-value	Significance (p-value)
Percentage of household members in urban areas who succumbed to malaria within the past twelve months	55	18.80	-0.106	0.916
Percentage of household members in rural areas who succumbed to malaria within the past twelve months	60	19.23		

Nevertheless, the difference was not that high since p-value was 0.916, which was not statistically significant at the level of 0.05 while t-value was reported to be -0.106. Despites the lack of significance, the records showed that malaria was the number one killer disease in Mtwara, both urban and rural. Therefore, by these results, the null hypothesis 1 which stated that "There is no significant difference in the prevalence of malaria between rural and urban areas of Mtwara Region" is accepted and the alternative hypothesis 1 is rejected.

4.5 Respondents' Knowledge on Symptoms and Preventive Measures for Malaria

This section attempts to examine the correlation between respondents' knowledge on symptoms and preventive measures and awareness of malaria. Pearson's correlation coefficients (Pearson's r) for correlation between some independent variables and malaria prevalence are shown in Table 24. According to Cohen and Holiday (1982) cited by Bryman and Cramer (1992); correlation coefficients (regardless of positive, or negative signs) are interpreted as follows: below 0.19 is very low, 0.20 to 0.39 is low, 0.40 to 0.69

is modest, 0.70 to 0.89 is high, and 0.90 to 1.00 is very high. Therefore, overall score of awareness of malaria symptoms had a positive correlation with the percentage of household members who succumbed to malaria within the previous twelve months (i.e. malaria prevalence). The correlation coefficient between them was 0.204 and significant at the 0.05% level ($p = 0.029$).

Both overall scores on awareness of how to protect oneself against malaria and overall scores on people's awareness towards malaria had no significant correlation with the percentage of household members who had succumbed to malaria within the previous twelve months. The correlations were 0.052 ($p = 0.579$) and 0.118 ($p = 0.209$) respectively. These results mean that people who have high awareness of how to protect themselves against malaria and those who have high general awareness about malaria have almost the same chances of succumbing to malaria.

Furthermore, the findings showed that overall scores of awareness of malaria symptoms had a positive and high correlation with overall scores on people's awareness about malaria in general whereby, the correlation was 0.392 and significant at 0.01% level ($p=0.000$). These findings show that a person having knowledge on malaria symptoms is more likely to have malaria knowledge in general compared to a person who doesn't have knowledge on malaria symptoms. In addition, overall scores on awareness of how to protect oneself against malaria also had a positive and high correlation with the overall scores on people's awareness towards malaria. With the coefficient correlation of 0.842 and a significant level of 0.01% (0.000), these results show that people with knowledge on how to protect themselves against malaria are more likely to have general knowledge of

malaria compared to people lacking knowledge on how to protect themselves against malaria.

Table 24: Correlation between some independent variables and malaria prevalence (n=115)

Variables correlated		Correlation coefficient (r-value)	Significance (p-value)
a	b		
Overall score of awareness of malaria symptoms	Percentage of household members who succumbed to malaria within the previous twelve months	0.204*	0.029
Overall scores on awareness of how to protect themselves against malaria	Percentage of household members who succumbed to malaria within the previous twelve months	0.052^{ns}	0.579
Overall scores on peoples awareness towards malaria	Percentage of household members who succumbed to malaria within the previous twelve months	0.118^{ns}	0.209
Overall score of awareness of malaria symptoms	Overall scores on awareness of how to protect themselves against malaria	0.268**	0.004
Overall score of awareness of malaria symptoms	Overall scores on people's awareness towards malaria	0.392**	0.000
Overall scores on awareness of how to protect themselves against malaria	Overall scores on people's awareness towards malaria	0.842**	0.000

*=Correlation is significant at the 0.05 level (2-tailed).

**=Correlation is significant at the 0.01 level (2-tailed).

^{ns}=Correlation is not significant

4.6 Linkage between Malaria Prevalence and Households with various Economic and Social levels

4.6.1 Economic levels

4.6.1.1 Assets' monetary values and malaria prevalence

In this study, one of the ways of determining the linkage between malaria prevalence and economic level was through respondents' assets value basing on prevailing monetary values of the assets. The results show that the lowest malaria prevalence (13.0%) group among the surveyed households was the first quintile assets' monetary values of at most Tshs 415 000 while the highest malaria prevalence (24.1%) group among the households was the second quintile of assets' monetary values from Tshs 415 001 to Tshs 812 000. Moreover, the second lowest malaria prevalence (15.0%) group was of the quintile with assets monetary value from 1 Tshs 495 001 to Tshs 2 306 000; the middles malaria prevalence (21.1%) group was the fifth quintile with assets monetary value more than Tshs 2 306 001/=; and lastly the second quintile to the highest malaria prevalence (22.3%) basing on assets monetary value was of the third quintile with assets monetary value from Tshs 812 001 to Tshs 1 495 000. These results illustrate that malaria prevalence does not differ significantly among households with more monetary values of assets and those with less monetary values of assets ($p=0.340$). Table 25 illustrates the above discussions.

Table 25: One-way ANOVA results comparing assets monetary value by malaria prevalence

Assets monetary value levels quintiles	n	Malaria prevalence (%)	Sum of Squares		df	Mean Square	F	Sig.
First Quintile	23	12.97	Between Groups	2174.525	4	543.631	1.143	0.340
Second Quintile	23	24.06	Within Groups	52338.304	110	475.803		
Third Quintile	23	22.25						
Fourth Quintile	23	14.78						
Fifth Quintile	23	21.07						
Total	**115**	**19.03**	**-**	**54512.828**	**114**	**-**	**-**	**-**

4.6.1.2 Income status of the household and malaria prevalence

Since the respondent households were grouped into five quintiles based on income per capita in order to compare malaria prevalence based on income, one-way ANOVA was used to compare malaria prevalence levels, and the results are presented in Table 26. The findings showed that the highest prevalence (25.5%) among households was that of the best income quintile of more than Tshs 262 500 and the lowest malaria prevalence (8.9%) was that of the lowest income quintile of income at most Tshs 70 000. However, the converse was expected. The lowest income quintile having low malaria prevalence maybe because malaria cases for poor households are under reported compared to the households of the best income quintile. Most of the household heads with lowest income live in poor conditions houses; houses with no ceilings, windows with no wire gauze, and can hardly report to hospitals basically because they can't afford the transport and medical expenses while the households with the best income easily report to the hospitals whenever they feel sick as they can afford transport and medical expenses thus why their malaria cases are highly reported.

The prevalence levels of malaria for the third and fourth quintiles were smaller compared to the second quintile; it was probably because these household heads had standard houses with windows having wire gauze, and could protect themselves against malaria compared to the second quintile which had lower income. The differences in the prevalence of malaria among the five categories of households were significant (p=0.038). Malaria prevalence was the highest in the best income quintile, and it was lowest in the quintile with the least income. This might be because malaria cases are reported to the hospitals only by the households who can afford the transport and medical expenses thus the malaria cases for the lowest income quintile are often under reported.

Table 26: One-way ANOVA results comparing income levels by malaria prevalence

Income level quintiles	**n**	**Malaria prevalence (%)**	**Sum of Squares**		**Df**	**Mean Square**	**F**	**Sig.**
First Quintile (income at most 70000)	22	8.9	Between Groups	4773.0	4	1193.3	2.64*	0.038
Second Quintile (income from 70001 to 120000)	24	25.1	Within Groups	49739.8	110	452.2		
Third Quintile (Income from 120001 to 160000)	22	13.8						
Fourth Quintile (Income from 160001 to 262500)	23	20.6						
Fifth Quintile (income more than 262500)	24	25.5						
Total	**115**	**19.0**	-	**54512.8**	**114**	-	-	-

* Significant at the 5% level

4.6.2 Social well-being levels

4.6.2.1 Education level of the household and malaria prevalence

Linkage between malaria prevalence and education levels were obtained through one-way ANOVA. The quintile with the highest malaria prevalence was that of the highest education level (had completed secondary education) with malaria prevalence of 27.4% while the lowest prevalence of malaria by quintiles of education was that of the fourth quintile (had less than secondary education) with malaria prevalence 0.0%. Moreover, Table 27 shows that the significant level (p=0.069) was higher than 0.05, which means that there was no significant difference among households with various education levels and malaria prevalence. These results were totally opposite to what was expected**, a**s other studies have shown that improving level of education is significantly associated with promptness in taking action for ill people (Tarimo et' al., 1998).

Table 27: One-way ANOVA results comparing education levels by malaria prevalence

Education level quintiles	n	Malaria prevalence (%)	Sum of Squares		df	Mean Square	F	Sig.
Didn't attend primary school	35	11.7	Between Groups	4108.5	4	1027.1	2.24	0.069
Less than primary education	9	13.8	Within Groups	50404.3	110	458.2		
Completed primary education	63	23.2						
Less than secondary education	1	0.0						
Secondary education	7	27.4						
Total	115	19.0	-	54512.828	114	-	-	-

4.6.2.2 Comparison of malaria prevalence between households owning ITNs and households without ITNs

T-test was used to determine the linkage between malaria prevalence and ITNs ownership in households. The results, as presented in Table 28, show that p-value was 0.738 indicating that there was no significant difference in malaria prevalence between households where mosquito nets were owned and where they were not. This might be because malaria was endemic in the area; so whether ITNs were used or not still the malaria prevalence was high.

4.6.2.3 Comparison of malaria prevalence between households where anti-malaria drugs were used and where they were not used

In order to determine the relationship between anti-malaria usage and malaria prevalence. The t-test was used, and the results showed that p-value was 0.532. These findings illustrate that there was no significant difference in malaria prevalence between households where anti-malaria drugs were used and where they were not used.

4.6.2.4: Comparison of malaria prevalence between households where insecticides were sprayed and households where insecticides were not sprayed

To examine the linkage between malaria prevalence and insecticide usage a t-test was used; the results, as presented in Table 28, demonstrate that p-value was 0.872. These findings indicate that there was no significant difference in malaria prevalence between the two groups.

Table 28: T-test results comparison of malaria prevalence and various social levels

Parameters	N	Mean	t-value	Significance (p-value)
1. ITNs ownership				
(a) Yes the household owns ITNs	113	18.77	-0.436	0.738
(b) No the household doesn't owns ITNs	2	33.33		
2. Anti-malarial drugs usage				
(a) Yes the household uses anti-malarials	7	24.76	0.659	0.532
(b) No the household doesn't use anti-malarials	108	18.65		
3. Insecticides usage				
(a) Yes insecticides was sprayed	9	17.78	-0.165	0. 872
(b) No insecticides wasn't sprayed	106	19.13		

4.6.2.5 Correlation between malaria prevalence and distance to health care facilities

In order to determine the correlation between malaria prevalence and distance to health facilities, correlation coefficients were determined. Since there were two types of health facilities used, dispensaries and hospitals, the distances to them were correlated with malaria prevalence. The results demonstrated that there was a significant correlation between distance from home to nearest dispensary and malaria prevalence, whereby the correlation coefficient between them was 0.265 and the p-value was 0.004. Moreover, distance from home to hospital and malaria prevalence was also correlated; the p-value was 0.006 while the correlation coefficient was -0.255.

Table 29: Correlation results between malaria prevalence and distance to health facilities

Variables correlated		Correlation coefficient (r-value)	Significance (p-value)
A	**b**		
Distance from home to the nearest dispensary	Percentage of household members who succumbed to malaria within the past twelve months	0.265**	0.004
Distance from home to the hospital	Percentage of household members who succumbed to malaria within the past twelve months	-0.255**	0.006

** Correlation is significant at the 1% level (2-tailed).

Thus, these results show that there were relationships between malaria prevalence and distance to health care facilities. There is a possibility that because of the long distance, people might become uncomfortable looking for cure when they were sick, particularly when malaria infection was still in its incubation period. As well, the high transport expenses related to long distances might discourage people, especially low-income earners, from seeking treatment. These all may influence high malaria prevalence.

4.7 Hypothesis Testing Results

The hypotheses of the research were to determine whether there was significant difference in the prevalence of malaria between rural and urban areas and whether there were difference in malaria prevalence among households with various economic and social levels. To test the first hypothesis of this study, t-test analysis was used and the results are presented in Table 23.

To test the second hypothesis, which was on whether there was a significant difference in malaria prevalence among households with various economic and social factors, the result that are presented in section 4.6 show that the prevalence did not differ significantly among households with various levels of monetary values of assets. However, the results revealed that there was a significant difference in malaria prevalence ($p = 0.038$) among households with various levels of income. This is possible as income of the household can influence the household members' consultation with health care facilities due to costs attributed to the whole process of consulting a health care facility.

Furthermore, social factors linked with malaria prevalence were analyzed through One-way ANOVA, t-test and correlation. The linkage between mosquito nets usage and malaria prevalence as presented in Table 28 showed that the p-value was 0.738 indicating that there was no significant difference in malaria prevalence between households where mosquito nets were owned and where they were not. This is possible because not only that those mosquitoes that transmit malaria are found during the evening hours whereby most people are not in beds, the only place that mosquito nets are to be used, but also mosquito nets can not work alone in combating malaria but rather with support other ways. However, through correlation analysis to determine the correlation between malaria prevalence and distance to health facilities, the results as demonstrated in Table 29 showed that there was a significant correlation between distance from home to nearest dispensary and malaria prevalence, whereby, correlation coefficient between them was 0.265 and the p-value was 0.004. Moreover, distance from home to hospital and malaria prevalence were also correlated the 1% level whereby p-value was 0.006 while correlation was -0.255. These correlation results are desirable as it is often reported that distance is among the main factors that determine the way people report to the health facilities once they fall

sick. Basing on the above discussion about the second hypothesis, the alternative hypothesis which states that “There is significant difference in malaria prevalence among households with various economic and social factors” is confirmed and the null hypothesis which states that “There is no significant difference in malaria prevalence among households with various economic and social factors” is rejected.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Overview

This chapter gives a brief account of the findings and recommendations made from the findings of the study. The major objective of this study was to determine the association between malaria prevalence and economic and social factors in rural and urban areas of Mtwara District. The study aimed at achieving the following specific objectives: (a) to assess levels of economic and social factors related to frequencies of household members suffering from malaria, (b) to assess respondents' knowledge on symptoms and preventive measures for malaria (c) to estimate the frequency of malaria occurrence among household members, and (d) to determine linkages among income levels, education levels of household heads, use of ITNs, use of anti-malaria drugs, distance to health facilities and prevalence of malaria. This chapter gives broader conclusions derived from the findings and recommendations are made from the conclusions in view of the objectives and hypotheses of the research.

5.2 Conclusions

The overall findings from the study indicate that income levels, education levels of household heads, basic knowledge about malaria, availability and use of ITNs, availability and use of anti-malaria drugs, indoor spray, and distance to health facilities in Mtwara District are associated with malaria prevalence. Based on the findings that the majority of households (98.3%) owned at least one ITNs, it is concluded that ITNs availability is not a problem among the surveyed households. However, based on the findings of the study it was demonstrated that the vast majority (93.1%) of all household heads had never used

anti-malarials for malaria prevention; thus, it is concluded that anti-malarials usage for malaria prevention among surveyed households was tremendously low. Furthermore, it was observed from the study that only 7.8% of surveyed households reported that they had sprayed their houses within the last 12 previous months (3.3% in rural and 12.7% in urban areas); thus, it is concluded that the majority of people in rural and urban areas do not spray their houses with insecticides with insecticides to kill mosquitoes. In addition, the findings from the study showed that the nearest distance to a dispensary for rural and urban households was 1 kilometre while the farthest distance to a dispensary was 7 kilometre, which was for rural households. Thus, it is concluded that for the surveyed households health services are more accessible to urban people than to rural people as these rural people still walk long distances to health facilities.

It was found that the majority (80.9%) of all the respondents (80.0% in rural areas and 81.8% in urban areas) had higher scores of awareness about malaria symptoms, it is noted that knowledge on malaria symptoms is very high in Mtwara District. Again, the findings also revealed that household heads' knowledge about malaria prevention was 51.3% (33.3% in rural areas and 70.9% in urban areas), therefore, it is concluded that rural households have lower knowledge about malaria preventive measures compared to urban households. It was observed from the findings that the overall household heads' knowledge about malaria was 53.0% (36.7% in rural areas and 70.9% in urban areas), thus, it is also concluded that rural households have lower malaria knowledge compared to urban households. Furthermore, it was observed from the study that overall score of awareness of malaria symptoms had a positive correlation with the malaria prevalence whereby the correlation coefficient between them was 0.204 and significant at the 5% level ($p=0.029$). Based on this finding, it is concluded that where malaria prevalence is

high, people have high awareness about its symptoms. However, it was also observed from the findings that both overall scores on awareness of how to protect oneself against malaria and overall scores on people's awareness about malaria had no significant correlation with the percentage of household members who had succumbed to malaria within the previous twelve months. The correlations were 0.052 (p= 0.579) and 0.118 (p= 0.209) respectively. Therefore, it is concluded that people who know more and those who know lee about how to protect themselves against malaria are likely to succumb to malaria to the same extent.

Findings from the study showed that out of 115 surveyed households 19.0% succumbed to malaria within the previous 12 months. Moreover, through t-test, the difference in malaria prevalence between urban and rural people was not significant (p = 0.916), the prevalence of malaria being 18.8% in urban areas while that of rural areas was 19.2%. In view of this, it is concluded that area of residence (whether urban or rural) has no significant relationship with malaria prevalence.

Based on the findings from one-way ANOVA, t-tests and correlations on the linkages among income levels, education levels of households heads, use of ITNs, use of anti-malaria drugs, use of insecticides, distance to health facilities and prevalence of malaria; it can be concluded that malaria prevalence is related to household levels of incomes, and this might be due to the fact that malaria cases are highly reported to the hospitals by the household members who can afford the transport and medical expenses while the malaria cases for the lowest income quintile are often not or under reported.

Malaria prevalence had a negative relationship with education level. In this view, even though the results are converse to what was expected, the study showed that the risk of succumbing to malaria is almost equal to all people despite their difference in education level. This might be due to the fact that education alone doesn't guarantee one's safety against malaria, but rather it is a combination of more than one factor.

Use of mosquito nets also was not related to malaria prevalence contrary to the second hypothesis of this study that use of mosquito nets influences the prevalence of malaria as it was found out that the risk of suffering from malaria was not influenced by the use of mosquito nets but rather that everyone had equal chances of being affected by malaria whether owning or not owning a mosquito net. This might be due to the fact that Mtwara Region is a malaria endemic area.

Usage of anti-malaria drugs was not related to malaria prevalence as it was found out that malaria prevalence was not influenced by anti-malaria usage as a means of prevention of malaria infection. Not only that but also, many people were not using anti-malarials for prevention rather they used anti-malarials after succumbing to malaria. In view of this, it was concluded that there was negative relationship between malaria prevalence and households where anti-malarials were or were not used.

The study revealed that many of the surveyed households were not using insecticides for malaria prevention, whereby some of them claimed that they were not using insecticides because of its scarcity, expensiveness and the standard of their houses which were not conducive for sprays. Therefore, it was concluded that there was negative relationship between malaria prevalence and households where insecticides were or were not used.

There was a positive relationship between distance to a health facility and malaria prevalence as there are chances that the longer the distance to health care facilities the lower the chances of people reporting to health care facilities, the reason behind this was related to especially the transport and treatment costs and the end result was that people chose to buy medicines from the nearby pharmacies and treat themselves or they chose not to treat the sickness and let nature takes it course. Thus, it was concluded that malaria prevalence had a positive relationship with distance from home to health care centres.

Hypothesis number two, whether there was a significant difference in malaria prevalence among households with various economic and social factors; the study has shown that, households that are economically well can afford a standard life for example house with ceiling boards, wire gauze, doors, insecticides, bed nets, can meet educational and hospital expenses etc. compared to households with lower income. These all have an influence to malaria prevalence. Therefore, it can be concluded that malaria prevalence varies significantly among households with various economic and social factors.

5.3 Recommendations

Based on the above conclusion the following recommendations are made to help different development stakeholders at various levels including households themselves on how economic and social factors influence malaria prevalence.

5.3.1 Recommendations for decision makers

Based on the conclusion that ITNs availability is not a problem for the surveyed households and that LGA is a favorable source of mosquito nets for Mtwara households, it is recommended that the supply of the ITNs to the whole country by the government

should be a long term activity, as the mosquito nets provided won't last forever and there are those people who can not afford to buy new mosquito nets to replace the old ones. Even the methods used to supply the ITNs should be counter checked as there are those who get more nets than they deserve while others don't get any net at all.

Based on the conclusion that rural households have lower knowledge about malaria preventive measures compared to urban households, it is recommended that the government should increase efforts to reduce people about malaria preventive measures, especially in rural areas. This could be articulated through different seminars on malaria by the local government in order to reach the people at the grassroots.

Following the conclusion that health services are more accessible to urban people than to rural people, thus the government is urged to focus more on the poor rural as they also have a right to have full access to health facilities. However, it is recommended that while waiting for the establishment of health services to those places lacking nearby health facilities, home based care should be encouraged in order to minimize malaria prevalence.

5.3.2 Recommendation for development partners

Development partners such as international/national or regional NGOs and CBOs are urged to increase their concerted efforts on stamping out malaria prevalence by accelerating financial support to local communities on malaria vectors control. This is because the issue is not ITNs, anti-malarials etc.; the issue is vector control. Since malaria is endemic in Mtwara District, then what is needed is to control the vector so that malaria prevalence can decrease.

5.3.3 Recommendation to local government facilitators

Based on the conclusion that rural households were more likely to live in houses with no wire gauze compared to urban households, it is recommended that there should be an encouragement to rural people on the importance of living in standard houses so as to reduce malaria prevalence. Therefore, they should be encouraged to build houses with wire gauzes and ceiling boards. Moreover, the local government should establish projects which will build standard houses but on low costs to help those who are in need of standard houses but can not afford to build one.

5.3.4 Recommendation to health personnel

Following the conclusion that anti-malaria usage for malaria prevention is still low in Mtwara District, it is recommended that there is a need of encouraging local communities to protect themselves against malaria by using anti-malaria drugs and advise them to seek medical treatment once they sense malaria symptoms, and this could be achieved by the government through public health care givers. Additionally, based on the conclusion that rural people are more likely to treat malaria compared to urban people, it is recommended that urban people should also be encouraged to seek treatment once they feel seek instead of treating themselves by buying anti-malarials from nearby pharmacies.

5.3.5 Recommendation for people at household levels

Based on the conclusion that many of the majority of the respondents' lives in poor houses, don't report to health facilities once they sense malaria symptoms, and spent their evenings outdoors, it is recommended they should try to build standard houses, should report to health care facilities once they sense malaria symptoms and should try to spend

their evenings indoors and if it is necessary for them to be outdoors during evening hours they should use mosquito repellents.

5.4 Further Research

The finding that use of mosquito nets was associated with malaria prevalence is a matter that requires more research. Significantly, almost all respondents reported using mosquito nets, but still they were vulnerable to malaria infection. It is possible that use of mosquito nets might be a regular practice among respondents in this area. However, these people mostly spent their evenings outdoors and were habitually not using mosquito repellants. High costs of these chemicals could explain why most people did not use this method of malaria prevention on a regular basis.

Likewise, the data from this research have allowed us to do analysis, which has given us an insight into the malaria prevalence state, and its economic and social factors in the surveyed areas. However, a lot is yet to be covered in order to better understand all determinants of malaria prevalence in the area.

This study drew a sample from only four wards; there is a need to cover larger samples for each factor in order to determine the underlying factors influencing malaria prevalence in the area. As well, it is important that other factors that influence malaria prevalence be investigated. Other determinants of malaria prevalence such as environmental and biological factors should also be examined.

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APPENDICES

Appendix 1: Household Questionnaire

ECONOMIC AND SOCIAL FACTORS ASSOCIATED WITH MALARIA PREVALENCE IN MTWARA DISTRICT, TANZANIA: A RURAL-URBAN COMPARISON

Date of Interview ……..….....

1. Ward ……..... Location of the ward: 1. Urban, 2.Rural
2. Village ……OR Street …….……

PART A. BACKGROUND INFORMATION

3. Household composition

Variables	P1	P2	P3	P4	P5	P6	P7	P8
Age								
Sex (1=Male, 2=Female)								
Whether s/he resides there always (1 = Yes, 2. No)								
Marital status (1. Married, 2. Divorced, 3. Widowed, 4. Never married, 5. Others)								
Yrs of schooling								
Main occupation								
Health status on the date of interview (1. Ill, 2. Not ill)								
Did this person suffer from malaria within the past 12 months? (1.Yes 2. No)								
How many times has s/he suffered from malaria during the last 12 months?								
For how many days did the household member suffer from malaria for the whole period of 12 months?								

4. For how long have you been living in Mtwara Rural District? …….. (yrs)
5. For how long have you been living in Mtwara Municipality? …… …(yrs)
6. For how long have you been living in this ward ……..… (yrs)
7. For how long have you been living in this village/street? ……..…. (yrs)

8. Household assets

	SN	Item	Quantity	Current monetary value (TZS)
1.		House		
2.		Land		
3.		Shop		
4.		Car		
5.		Bicycle		
6.		Motorcycle		
7.		Sewing machine		
8.		Radio		
9.		Television		
10.		Sofa		
11.		Mobile phone		
12.		Beds		
13.		Mosquito nets		
14.		Insecticide-treated mosquito nets		
15.		An axe and machete		

9. What was your household income from various activities done by all household members during the 2010 calendar year?

Activity	Household member who did the activity	Total Costs per year	Gross revenue per year	Net revenue per year
Agriculture				
Livestock				
Fishing				
Trade				
Salary employment				
Remittances				
Rentals				
Others (specify)				

SECTION B. BASIC KNOWLEDGE ABOUT MALARIA

10. What are the symptoms of malaria? (Do not read answers, tick all that apply)

S/N	Symptoms	Maximum scores	Scores by the respondents
1.	Fever (Yes=5, No=0)	5	
2.	Headache (Yes=5, No=0)	5	
3.	Joint pains(Yes=5, No=0)	5	
4.	Convulsions (Yes=5, No=0)	5	
5.	Nausea/vomiting(Yes=5, No=0)	5	
6.	Don’t know(Yes=0, No=5)	5	
	Total		

11. What can people do to protect themselves against malaria? ***(Do not read answers, tick all that apply)***

SN	Preventive method	Maximum scores	Scores by the respondent
1.	Use of insecticides treated mosquito nets (Yes=5, No=0)	5	
2.	Burn local plants (Yes=,0 No=5)	5	
3.	Indoor and outdoor spraying of insecticides (Yes=5, No=0)	5	
4.	Use of mosquito repellent(Yes=5, No=0)	5	
5.	Use of traditional/local medicines(Yes=0, No=5)	5	
6.	Take anti-malaria drugs(Yes=5, No=0)	5	
7.	Filter/ treat drinking water(Yes=0, No=5)	5	
	Total		

12. Index scale determining awareness of people towards malaria

	S/N	Statement	Maximum scores	Scores by the respondent
1.		Malaria is a disease caused by evil spirits/ witch craft (Yes = 0, No = 5)	5	
2.		Anti-malarial drugs are useful for malaria prevention (Yes = 5, No = 0)	5	
3.		Indoor and outdoor spraying of insecticides helps to kill mosquitoes which cause malaria (Yes = 5, No = 0)	5	
4.		Anti-malarial drugs can only be taken by people suffering from malaria (Yes = 0, No = 5)	5	
5.		Insecticide treated mosquito nets (ITNs) are highly effective for malaria infection prevention (Yes = 5, No = 0)	5	
6.		Fever, joint pains and headaches are among the symptoms of malaria (Yes = 5, No = 0)	5	
7.		It is necessary to go for a check-up once someone senses symptoms of malaria (Yes = 5, No = 0)	5	
8.		Mosquitoes can be eradicated through burning of local plants at the breeding sites/ areas (Yes = 0, No = 5)	5	
9.		Traditional medicines are effective and mostly recommended than modern medicines (Yes=0,No=5)	5	
10.		If you sense malaria symptoms, you should contact traditional healer as soon as possible. (Yes=0,No=5)	5	
		Total		

SECTION C. SOCIAL DETERMINANTS OF MALARIA PREVALENCE

13. Do you own inseciticide treated mosquito nets in your household?

1. Yes *(Go to Q14)*
2. No *(Go to Q18)*

14. Where did you get mosquito nets?

1. Shop
2. Machinga
3. Health facilities
4. Market
5. Other…….

15. How much would it cost your household to buy a mosquito net? Tsh……

16. Who in your household uses a mosquito net? (Do not read answers, circle all that apply)

1. Children under 5
2. Pregnant women
3. Children and women
4. Men
5. Everyone
6. No one

17. How frequently do you (your family) sleep under mosquito nets? (Read answers, circle only one)

1. Throughout the year
2. Rainy season
3. Dry season
4. I don't know

18. a) Have you ever used drugs to prevent malaria infection?

1. Yes
2. No

b) If yes what malaria prevention drugs did you take/use? ……

c) About how many times per year do you use ant-malarial drugs? ……..

19. a) Have you ever used drugs for malaria treatment?

1. Yes
2. No

b) If yes which ones do you often use?

1. Alu .
2. Cotexin
3. Duo-cotexin
4. Metakelfin
5. Arinate
6. Chloroquine
7. Quinine
8. Other (specify) ……

20. Where do you normally get those ant-malaria drugs?

1. Nearby shop
2. Pharmacy
3. Dispensary
4. Hospital
5. Others (specify)

21. Are anti-malarial drugs always available from the nearest public health facilities?

1. Yes
2. No
3. Don't know

22. Where do you (your family members) often spend the evenings?

1. Outdoors
2. Indoors

23. a) Do you use mosquito repellents?

1. Yes
2. No

b) if yes what type of mosquito repellent do you use?

1.Burning

2.Smearing

24. Does the house you are living in have wire gauze?

1. Yes
2. No

25. Have you ever sprayed your house with insectcides ?

1. Yes
2. No

26. How often do you spray your house with insectcides?

1. Always
2. Almost always

3. Sometimes
4. Never

27. When did you lastly spray your house with insectcides? ……(in months)

28. Who sprayed your house with insectcides?

1. Government worker
2. Private company
3. Household member
4. Other (specify)…….…….

29. Presence of health facility

Presence of health facility	Distance from home (km)
Dispensary	
Hospital	

30. If you were to go to a health center, how would you go there?

1. Public transport (bus, taxi)
2. Private Car
3. Motorcycle
4. Animal cart
5. Walking Bicycle
6. Other (specify)…….

31. Where do you (your family members) usually go for consultation when you suspect that you or a member of the family suffers from malaria? (Do not read answers, tick only one)

1. We treat the person at home
2. Buy drugs from pharmacy/drug shop
3. Contact health facilities (HFs)
4. Contact traditional healers
5. Others……
6. None

THANK YOU FOR YOUR ATTENTION.

Appendix 2: A check list for key informants

WARD LEADERS

1. Measures taken to educate villagers on malaria
2. Regular meetings concerning with malaria
3. Special agenda concerning with cleaning the environment
4. Indigenous knowledge and practices concerning with Malaria
5. Special agenda concerning with build dispensary nearby village

LOCAL GOVERNMENT

1. How do you help people to control Malaria
2. Do you give them contribution on building hospital, toilets etc
3. Do you educate villagers to do scientific fumigation

HEALTH PERSONNEL

1. Prevalence of malaria in Mtwara District vis-à-vis other districts and Tanzania
2. Months in which the prevalence is high and why
3. Any peculiar reasons for high malaria prevalence in Mtwara district
4. Major challenges in stemming malaria in the district.
5. How many patients attend in hospital per day
6. Knowledge for preventing Malaria
7. Convincing them to attend several check-up
8. Relationship between Malaria and other diseases
9. Rate of malaria increasing or decreasing